

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Chateau Laurier Hotel, Ottawa, Ontario



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Study of Living Standards
Centre d'étude des
niveaux de vie*

An Index of Economic Well-being for Canada

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Session 1 "Trends in Economic Well-Being"
October 30 9:15 AM - 10:15 AM

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Paper Presented at the CSLS conference on the State of Living Standards and Quality of Life in Canada , October 30-31, 1998, Chateau Laurier Hotel, Ottawa, Ontario

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Acknowledgements

Earlier versions of this paper were presented at the annual meeting of the Canadian Economics Association, May 29-31, 1998, University of Ottawa, Ottawa, Ontario; the CSLS Preconference on the State of Living Standards and Quality of Life in Canada project, June 1-2, 1998, Lord Elgin Hotel, Ottawa, Ontario; and the 25th General Conference of The International Association for Research in Income and Wealth, Cambridge, England, 23-29 August, 1998. The Center for the Study of Living Standards would like to acknowledge the financial support of the Applied Research Branch of Human Resources Development Canada. The authors would like to thank the following persons for comments on earlier drafts of this paper: Satya Brink, Michael Hatfield, Jonathan Kesselman, David Longworth, Brian MacLean, Tim Sargent, David Slater, Allan Zeesman. We would also like to thank Michael Hatfield of HRDC for providing data on poverty rates and poverty gaps. Thanks also to the Social Policy Research Center at the University of New South Wales for their hospitality, to Gerry Redmond and to the participants in the December 1997 meeting of the CSLS Research Advisory Committee on the state of living standards and quality of life in Canada project for their helpful comments on earlier drafts. Since this is a preliminary version, subject to revision, please check with the authors before quotation.

Abstract

This objective of this paper is to develop an index of economic well-being for Canada for the period 1971 to 1997 using a framework originally laid out by Osberg (1985). Although the economic well-being of a society depends on the level of average consumption flows, aggregate accumulation of productive stocks, inequality in the distribution of individual incomes and insecurity in the anticipation of future incomes, the weights attached to each component will vary, depending on the values of different observers. It is argued that public debate would be improved if there is explicit consideration of the aspects of economic well-being obscured by average income trends and if the weights attached to these aspects were explicitly open for discussion.

The four components of economic well-being are: (1) effective per capita consumption flows, which includes consumption of marketed goods and services, and effective per capita flows of household production and other unmarketed goods and services; (2) net societal accumulation of stocks of productive resources, including net accumulation of tangible capital and housing stocks, net accumulation of human capital and R&D investment, net changes in the value of natural resources stocks; environmental costs, and net change in level of foreign indebtedness; (3) poverty and inequality, as indicated by the Gini index of inequality, and depth and incidence of poverty; and (4) indicators of insecurity, particularly economic security from unemployment, ill health, single parent poverty and poverty in old age. Estimates of the overall index and the subcomponents will be presented for the 1971-1997 for Canada and the index compared with other measures of economic welfare such as GDP per capita.

An Index of Economic Well-being for Canada¹

1. Introduction

Has the economic well-being of Canadians increased or decreased in recent years? How would one know and why might it be useful to know?

In modern democracies, national systems of social and economic statistics have become a crucial part of the informational feedback loop of public policy. By providing measures of social and economic outcomes, statistical agencies provide decision makers and voters with the information that often defines the success or failure of public policies. Evidence on such successes or failures can be used to reallocate resources, or to replace governments, hence the calculation of measures of economic well-being is an important issue.

However, the core problem of statistical agencies is that of deciding what information to record and how to present it. Knowing that all statistics summarize a complex reality, and that there are wide variations among the public in which aspects of social reality are considered to be of greatest importance, statistical agencies still have to decide what to count, and what not to count, as part of a measure of economic well being.

For many years, the System of National Accounts (SNA) has been the accounting framework within which most discussions of trends in economic well-being have been conducted, and Gross Domestic Product (GDP) per capita has been an often used summary measure of economic trends.² The compilers of the national accounts have often protested that their attempt to measure the aggregate value of marketed economic output was never intended as a full measure of economic well-being. Nevertheless, it has often been used as such, and the GDP accounting exercise has attracted a great deal of criticism as being a misleading indicator of economic well-being (e.g. Waring, 1988). Dissatisfaction with the GDP as a measure has led to a number of proposals for substitute measures (e.g. the Genuine Progress Indicator).

However, summarizing the economic well-being of a complex society inevitably requires a series of ethical and statistical judgements. There are many different dimensions to well-being, which are valued to different degrees by different observers. The problem with any single index number is that it is often difficult to disentangle the relative importance of value judgements in the construction of the index. Furthermore, in thinking about the appropriate public policy response, it is not particularly useful to know only that well-being has gone “up” or “down”, without also knowing which aspect of well-being has improved or deteriorated.

The construction of measures of economic well-being can be seen as a problem in the optimal aggregation of information. If the objective is to improve the quality of public decision making and political debate, excess aggregation is not helpful, because it does not enable value judgements and statistical judgements to be separated. Furthermore, excess

¹The Centre for the Study of Living Standards would like to thank Sebastian Gerlich and Dmitry Kabrelyan for their excellent work in compiling the data series used to construct the index.

²Keunig (forthcoming) reviews the contributions of Dawson (1996) and Kendrick (1996) and the most recent (U.N. 1993) revisions to the SNA

aggregation offers no guide to policy priorities.

Osberg (1985) therefore proposed that an index of economic well-being should be based on indices of consumption, accumulation, inequality and insecurity, with the explicit recognition that the weights attached to each component will vary, depending on the values of different observers.³ The underlying hypothesis is that public debate is likely to be improved if issues of fact, analysis and values are as clearly separated as possible. Measurement of the current level, or trend, of economic well-being can be seen as the first stage of a three stage discussion in which a society asks: (1) where are we? (2) do we want to go somewhere else? (3) how do we get there? Issues of measurement, of values and of analysis may be conceptually distinct, but in a single index of economic well-being, they often become hopelessly entangled. If the democratic debate on economic policy is to be fruitful, it would seem desirable to separate issues of measurement from the debate on values.

If the discussion is organized in this way, those people who fundamentally care most about a particular aspect of well being can discuss the facts about that aspect of well being and the most desirable way of improving it, without confusing the discussion with other issues. (For example, those who are concerned most with the bequest that this generation will leave for the future can discuss whether the best way to safeguard sustainability is to emphasize environmental regulation, or capital accumulation, without simultaneously concerning distributional issues.) Such discussions of measurement issues are of a fundamentally different nature from discussions of values – which aspect of economic well being *should* receive greatest weight.

This basic framework - that a society's well-being depends on societal consumption and accumulation and on the individual inequality and insecurity that surround the distribution of macro economic aggregates - is consistent with a variety of theoretical perspectives. We therefore avoid a specific, formal model.⁴

As part of a larger project on the state of living of standards and the quality of life in Canada, the Centre for the Study of Living Standards (CSLS) has constructed the index of economic well-being proposed by Osberg over a decade ago for Canada and for all provinces and for the United States. This paper provides estimates for Canada of the index.

³ By specifying additive sub-indices, we are implicitly assuming that preferences for social outcomes are separable in their components (e.g. that the weight placed on consumption does not depend on the weight placed on inequality). We do not explicitly constrain the weights to be assigned to each component of well being, since we think of them as the preferences of different observers. However, some observers may, if they are consistent, have linked preferences – for example, if attitudes to insecurity are driven solely by risk aversion (but see Osberg (1998)), then the weight an individual places on inequality, and the weight they place on insecurity, will both depend on the second derivative of their utility function.

⁴ However, a sufficient (but not necessary) set of conditions for the index of economic wellbeing we propose would be that societal economic wellbeing can be represented as the wellbeing of a “representative agent”, assuming that (1) such an agent has a risk-averse utility function (i.e. diminishing marginal utility); (2) from behind a “veil of ignorance” as to his/her own characteristics, each person draws an individual income stream (and prospects of future income) from the actual distribution of income streams; (3) each person has a utility function in which both personal consumption and bequest to future generations are valued; (4) individual income streams are exposed to unpredictable future shocks; (5) capital markets and public policies do not always automatically produce a socially optimal aggregate savings rate.

The paper is divided into two main parts. Part one discusses estimates of the four key components or dimensions of the index-consumption flows, stocks of wealth, inequality, and insecurity. Part two presents exploratory or preliminary estimates of the overall index.

2. The Components of Economic Well-Being

GDP is a measure of the aggregate marketed income of a society and most of its proposed substitutes (such as the GPI) are also primarily measures of adjusted average annual “income” flows [where the adjustments are meant to capture issues (such as environmental degradation) that GDP now ignores]. However, “income” is a flow variable which does not directly consider the aggregate value of the bequest which this generation will leave to its descendants. Although those Canadians now alive clearly care about the level of their own consumption, they also care (in varying degrees) about the well-being of future generations. Furthermore, although trends in average income are important, individual Canadians are justifiably concerned about the degree to which they personally will share in the prosperity of the average, and the degree to which their personal economic future is secure. The four components or dimensions of economic well-being in the proposed index of economic well-being are, therefore:

- 2.1 effective per capita consumption flows
 - includes consumption of marketed goods and services, and effective per capita flows of household production, leisure and other unmarketed goods and services;
- 2.2 net societal accumulation of stocks of productive resources
 - includes at this stage net accumulation of tangible capital, housing stocks and consumer durables, net accumulation of human capital, social capital and R&D investment, net changes in the value of natural resources stocks; environmental costs, and net change in level of foreign indebtedness;
 - to be included at a later stage of development stocks of consumer durables;
- 2.3 poverty and inequality,
 - includes the intensity of poverty (incidence and depth) and the inequality of income;
- 2.4 insecurity,
 - economic security from job loss and unemployment, illness, family breakup, poverty in old age;
 - to be included at a later stage of development includes personal security from crime and ill health (including workplace injury) and the impact of unanticipated inflation.

Table 1: Canada, Components of Personal Consumption

Year	Personal Consumption per capita (1992 \$)	% of Underground Consumption	Index of Life Expectancy 1971=1.00	Index of Equivalent Income 1971=1.00	Adjusted Personal Consumption per capita including regrettables (1992\$)	Total Regrettable Cost Per Cap. (1992 \$)	Adjusted Personal Consumption Per Cap. (1992 \$)	Index of Adjusted Personal Consumption 1971=1.00
	A	B	C	D	$E=A*(1+B/100)*C*D$	F	$G=E-F$	G'
1971	9,657	2.595	1.000	1.000	9,907	1,164	8,743	1.0000
1972	10,103	2.647	1.006	0.995	10,377	1,329	9,047	1.0348
1973	10,676	2.700	1.011	0.990	10,978	1,364	9,613	1.0995
1974	11,072	2.754	1.017	0.985	11,397	1,312	10,085	1.1535
1975	11,368	2.809	1.023	0.980	11,715	1,354	10,361	1.1851
1976	11,821	2.865	1.014	0.975	12,029	1,440	10,590	1.2112
1977	12,031	2.978	1.020	0.970	12,264	1,514	10,749	1.2295
1978	12,312	3.060	1.026	0.966	12,568	1,568	11,000	1.2582
1979	12,533	3.070	1.032	0.961	12,802	1,563	11,239	1.2855
1980	12,626	3.063	1.037	0.956	12,904	1,497	11,407	1.3047
1981	12,657	3.099	1.035	0.951	12,844	1,473	11,371	1.3006
1982	12,196	3.234	1.041	0.946	12,399	1,425	10,974	1.2552
1983	12,417	3.333	1.047	0.942	12,643	1,476	11,168	1.2773
1984	12,852	3.316	1.052	0.937	13,092	1,566	11,526	1.3183
1985	13,390	3.316	1.058	0.932	13,648	1,636	12,013	1.3740
1986	13,784	3.228	1.047	0.928	13,822	1,629	12,193	1.3946
1987	14,175	3.263	1.053	0.923	14,228	1,618	12,610	1.4423
1988	14,600	3.298	1.059	0.918	14,668	1,659	13,009	1.4879
1989	14,863	3.209	1.065	0.914	14,929	1,655	13,274	1.5183
1990	14,832	3.332	1.071	0.909	14,924	1,708	13,216	1.5116
1991	14,448	3.451	1.066	0.905	14,411	1,655	12,756	1.4590
1992	14,499	3.500	1.068	0.900	14,423	1,695	12,728	1.4558
1993	14,574	3.668	1.070	0.896	14,477	1,735	12,743	1.4575
1994	14,847	3.688	1.072	0.891	14,705	1,775	12,930	1.4789
1995	14,921	3.671	1.074	0.887	14,731	1,783	12,948	1.4809
1996	15,098	3.848	1.077	0.882	14,903	1,810	13,093	1.4976
1997	15,548	4.143	1.079	0.878	15,340	1,839	13,501	1.5442

Sources: Appendix Tables A1, A2, A5, A26

A fuller discussion of the rationale for this framework of average consumption flows, aggregate bequest, inequality and insecurity can be found in Osberg (1985). The reason for focussing on these four main dimensions of economic well-being is to enable persons with differing value judgements (e.g. a greater or less preference for intergenerational bequest, or for the reduction of poverty, compared to increases in average consumption) to account explicitly for those values. Each dimension of economic well-being is itself an aggregation of many underlying trends, on which the existing literature is sometimes spotty.⁵ However, it is surely a bad approximation to implicitly set the weight of a variable to zero, by ignoring entirely its influence.

2.1 Average Consumption Flows

2.1.1. marketed personal consumption

The starting point for this component of the index is aggregate real personal consumption per capita,⁶ readily available from the national accounts. This measure rose from \$9,657 (1992 dollars) in 1971 to \$15,548 in 1997, a 61.0 per cent increase (Table 1). (All dollar values in this paper are expressed in terms of 1992 constant dollars)

This estimate is of course sensitive to the price series used to deflate nominal consumption. In the national accounts, the consumer expenditure deflator is used, which differs slightly from the Consumer Price Index. Bias in price series obviously bias estimates of average real consumption flows. The recent debate on CPI bias is thus directly relevant to the estimation of real consumption flows. The Boskin Commission (Boskin et al., 1996) estimated that the US CPI had an upward bias of 1.1 per cent, largely due to the failure of prices indexes to capture the welfare effects of new goods and the quality improvements in existing products (Nordhaus, 1996). The Bank of Canada estimates that CPI bias in Canada is less than 0.5 per cent. In this paper, we do not make an adjustment for this bias.

adjustments to marketed personal consumption flows

The System of National Accounts provides a strong basis for estimating the consumption of marketed goods and the cost of providing government services, and there have been enough studies of the value of household production to enable some confidence as to the range of reasonable values. Estimates are more imprecise when one considers the value of a number of other factors which also influence consumption flows, such as leisure, regrettables, the underground economy and life expectancy. These factors are discussed below, with approximate estimates of their value, in some cases. At this stage in the development of the index of economic well-being, our inclination is to include, rather than exclude, imprecise measures on the principle that an imprecise measure is likely to embody a smaller error than omitting a variable, which would implicitly set its value to zero. However, subsequent versions of this paper will undoubtedly revise these estimates somewhat.

the underground economy

There has been much discussion in recent years about the growth of the underground economy. However, estimates of the value of goods and services produced, but not captured in official statistics,

⁵ Since a great deal of work has been done on the valuation of household production, there is at least a clearly defined range of estimates. However, economists have paid very little attention to the measurement of insecurity (see Osberg, 1998) and the measures of economic insecurity are correspondingly underdeveloped.

⁶ Consumption can also be calculated on a household basis. As the rate of growth of households has been faster than that of the overall population since 1971, consumption flows based on the number of households have risen at a slower pace than that based on population.

have ranged widely. The most comprehensive study, by Statistics Canada (1994), calculated that in Canada in 1992 consumption expenditure was underestimated by 3.5 per cent.

Since there always has been some level of “underground” activity, the issue for the measurement of trends in well-being is whether or not the prevalence of the underground economy has changed substantially over time. Rising tax rates may have increased the incentive to go underground, but the increased penetration of franchise systems in the small business sector and the greater computerization of business records may have also made it more difficult to escape detection.

For the purposes of this paper, the aggregate value of unrecorded consumption expenditure has been benchmarked at the 1992 Statistics Canada estimate. As the self-employed have more opportunity to engage in unreported economic transactions than paid workers, we have assumed that the size of this unrecorded consumption expenditure has varied over time in proportion to the percentage of self employed in the total employment.⁷ This share has risen from 11.2 per cent in 1971 to 17.9 per cent in 1997, a 59.7 per cent increase. This factor was applied to the 3.5 per cent benchmark figure for 1992. This meant that underground consumer expenditure was equivalent to 2.60 per cent of recorded consumption in 1971, with the proportion rising to 4.14 per cent in 1997 (Table 1). Personal consumption has been adjusted for this upward trend in underground activity.

the value of increased longevity

The life expectancy of Canadians has increased significantly in recent years, and we have every reason to believe that having a long life is an important component of the well-being of Canadians. Between 1971 and 1997 average life expectancy at birth increased 5.6 years from 73.0 years to 78.7 years, a 7.8 per cent rise (Table A6).⁸ It is interesting to note that the rate of increase in life expectancy has not slowed down over the last 25 years. The 0.3 per cent average rate of increase in life expectancy over the 1971-97 period is the same as that experienced between 1951 and 1971 (although the rate appears to have decelerated to 0.2 per cent in the 1990s). The economic value of these extra years of life should be included in the total consumption flows of individuals, since presumably people care both about how much they consume per year, and how many years they get to consume it.⁹

Years of life are one thing, and years of healthy, enjoyable life are a slightly different thing. A full appraisal of the value of increased longevity should consider trends in morbidity and health-adjusted life expectancy (HALE),¹⁰ as well as easier-to-measure trends in longevity. However, in considering either, one has to face the issue that the value of more years of life may look very different, the closer one actually is to death. Changes in life expectancy are occurring “in real time” and are affecting the well-being of all Canadians now alive. In aggregating over the population of Canadians now alive, one is aggregating over individuals at very different points in the life course. Although the economist’s reflex is to consider the discounted value of lifetime utility, it may be highly problematic to view the value of additional years of life as discounted to the point of view of a teenager. For the purposes of

⁷ A recent study by Schuetze reported by Little (1998) found that the opportunity to underreport income has fuelled the growth of self-employment.

⁸ Male life expectancy increased 6.3 years or 9.1 per cent from 69.4 to 75.7. Female life expectancy increased 5.0 years or 6.5 per cent from 76.5 to 81.5. The greater rise in male life expectancy increased from 90.7 per cent to 92.8 the average life span of men relative to women. It is interesting to note that the rate of increase in life expectancy has not slowed down over the last 25 years. The 0.3 per cent average rate of increase in life expectancy over the 1971-96 period is the same as that experienced between 1951 and 1971.

⁹ Dan Usher (1980) of Queen's University has developed a methodology for the estimation of the value of increased longevity.

¹⁰ Wolfson (1996) found for 1990-92 that the HALE for 15 year olds was 7.8 years less than life expectancy (55.6 versus 63.4 years). However, since there is no time series on health-adjusted life expectancy for Canada, we do not know if the rate of increase in the HALE has been greater than life expectancy over time.

this paper, we adopt the simple expedient of considering an increase in consumption per year or consumption for an increased number of years to be equivalent – i.e. we add to consumption flows in each year the percentage increase in average life expectancy.¹¹

For all years after 1971, personal consumption per capita is adjusted upward by the increase in life expectancy relative to 1971. For example, average life expectancy increased 7.8 per cent between 1971 and 1997, so average personal consumption is adjusted upward by 7.8 per cent in 1997 because of this development.

reduced economies of scale in household consumption

When individuals cohabit in households, they benefit from economies of scale in household consumption. There is a large literature on the estimation of “equivalence scales”, which attempt to account for the magnitude of such economies of scale in households of different sizes.¹² When comparing the average effective consumption of Canadians over time, the implication is that as households have shrunk in average size, economies of scale have been lost. Trends in average per capita consumption should therefore be adjusted for the average loss over time of economies of scale in household consumption.

Since economies of scale diminish in family size, the extent of change in economies of scale depends on where change occurs in the distribution of family sizes.¹³ As a consequence, we use Osberg’s (1997) estimates of equivalent income using the Statistics Canada LICO scales, which were calculated from 1975 to 1994 for all individuals in SCF micro-data. The ratio of aggregate equivalent income to aggregate money income is a measure of aggregate living standard gains due to household economies of scale – but these gains have been shrinking over time as household size has shrunk.. We therefore scale average money income down by an (increasing) fraction to represent the percent of effective consumption lost to decreasing economies of scale, relative to a 1971 base year.

In Survey of Consumer Finance data, Osberg (1997) finds that average family size in Canada for all families fell from 2.83 in 1975 to 2.59 in 1984, to 2.51 in 1989, and to 2.41 in 1994 (a 20.3 per cent decline in family size). Equivalence scales are non-linear functions of family size. Using the OECD or the Statistics Canada scale, a decline of 14.8 per cent from 2.83 family members to 2.41 from 1975 to 1994 would (holding per capita money income constant) reduce equivalent income by about 10 per cent, or 0.50 per cent per year. This rate has been applied to the 1971-97 period, resulting in a reduction of effective consumption of about 12.2 per cent for the period as a whole.

regrettables and intermediate consumer goods

It can be argued that certain types of economic activity included in GDP do not contribute to economic welfare, but rather are defensive expenditures, or intermediate inputs, that individuals make in order to be able to produce or consume. The costs households pay in order to commute to work are considered in the GDP to be part of household consumption, but the expenses which firms incur to bring materials to the work site are seen as an intermediate input in production. Since intermediate inputs in the business sector are netted out in the calculation of value added, it can be argued that similar expenditures by households should be subtracted from marketed consumption to obtain a better

¹¹ Implicitly, this procedure ignores both the differential value which individuals might place on changes in mortality probability at different ages and the distribution, by age, of actual changes in mortality probability.

¹² See, for example, Burkhauser et al (1996) or Phipps and Garner (1994).

¹³ Even though the impact on average household size is the same, the impact on average living standards of (for example) a five-person household splitting will differ from the impact of a two-person household splitting, since the latter change will imply a greater loss of economies of scale.

estimate of true consumption flows. Similarly, if the good that individuals want to consume is “a crime free street”, but it now takes a greater expenditure on police services to produce that good, this should not be counted as an increase in consumption.

The GPI has developed methodologies for estimating the costs of crime, cost of commuting, cost of pollution abatement, and the cost of auto accidents. Messinger and Tarasofsky (1997) has made estimates for these variables for Canada (Table A5). The costs of commuting are defined as the cost of travelling to and from work using either public transportation or private vehicle, as well as an estimate of time use while commuting. The cost of crime and auto accidents are defined as the costs associated with medical and legal expenses and expenditures related to lost or damaged property. The cost of household pollution abatement represents the expenditure on air and water filters and devices to improve air and water quality in the home.

Estimates of these costs, expressed in 1992 dollars per capita, are highlighted below.¹⁴

- The cost of commuting in 1971 was estimated at \$600, increasing 61.5 per cent to \$969 in 1997.
- The cost of home pollution abatement in 1971 was estimated at was \$29, increasing 65.5 per cent to \$48 in 1997.
- The cost of auto accidents was estimated at \$423 in 1971, increasing 57.2 per cent to \$665 in 1997.
- The cost of crime in 1971 was at \$112 per capita, rising 39.4 per cent to \$156 in 1997.

These estimates are very likely too low in absolute terms, since there is no consideration of any indirect influences – e.g. the impact of crime on residential neighbourhoods. However, it is not so much the absolute level, but the lack of any overall trend that is significant for the measurement of trends in aggregate economic well-being. Taken together, the four regrettable discussed above totaled \$1,164 per capita in 1971 (11.7 per cent of adjusted personal consumption excluding regrettables, that is consumption adjusted for the underground economy, life expectancy and family size) and \$1,839 in 1997 (12.0 per cent). This represents a 58.0 per cent increase over the 1971-97 period, compared to 54.8 per cent for adjusted personal consumption excluding regrettables.

The values for the four regrettables have been subtracted from personal consumption after the adjustments for the underground economy, family size, and life expectancy (Table 1).

¹⁴In addition to the four regrettables discussed in the paper, a number of other expenditures could be considered defensive in nature, but are not included. For example, we have not made any adjustment to the value of government expenditure on defense. Presumably, the desired good which defense expenditures are trying to produce is “national security”, which does not increase during an arms race, even if defense expenditure does. However, expenditure on the Canadian Armed Forces is partly devoted to activities, such as disaster relief, which do correspond to greater utility for Canadians. We have not yet developed a way to disentangle the components of Canadian defense expenditures which do, and which do not, correspond to greater utility.

Table 2: Canada, Components of Total Consumption

Year	Adjusted Personal Consumption per capita (1992 \$)	Gov't Real Current Expenditure Per Capita (1992 \$)	Unpaid Work Per Capita (Replacement by Generalist) (1992 \$)	Total Consumption Flows Per Capita (1992 \$)	Index 1971=1.01
	A	B	C	D=A+B+C	E=Index of D
1971	8,743	4,200	6,212	19,156	1.0000
1972	9,047	4,240	6,206	19,494	1.0176
1973	9,613	4,386	6,260	20,259	1.0576
1974	10,085	4,600	6,301	20,987	1.0956
1975	10,361	4,838	6,341	21,540	1.1244
1976	10,590	4,865	6,386	21,841	1.1402
1977	10,749	5,032	6,441	22,223	1.1601
1978	11,000	5,069	6,508	22,578	1.1786
1979	11,239	5,072	6,579	22,890	1.1949
1980	11,407	5,181	6,633	23,220	1.2122
1981	11,371	5,194	6,684	23,250	1.2137
1982	10,974	5,241	6,629	22,844	1.1925
1983	11,168	5,275	6,586	23,029	1.2022
1984	11,526	5,284	6,547	23,358	1.2194
1985	12,013	5,461	6,511	23,984	1.2520
1986	12,193	5,509	6,470	24,172	1.2619
1987	12,610	5,516	6,545	24,671	1.2879
1988	13,009	5,693	6,617	25,319	1.3217
1989	13,274	5,754	6,663	25,692	1.3412
1990	13,216	5,875	6,724	25,815	1.3476
1991	12,756	5,965	6,801	25,522	1.3323
1992	12,728	5,943	6,870	25,542	1.3334
1993	12,743	5,851	6,946	25,540	1.3333
1994	12,930	5,677	7,027	25,635	1.3382
1995	12,948	5,588	7,113	25,648	1.3389
1996	13,093	5,454	7,202	25,750	1.3442
1997	13,501	5,390	7,299	26,190	1.3672

Sources: A-Table 1, B - Appendix Table A2, C - Appendix Table A3.

leisure

With the increased employment/population ratio of the last two decades, the work-hours of Canadian families have risen substantially, and a decrease in leisure, everything else being equal, decreases economic welfare. The valuation of leisure poses a major challenge, although data on leisure time can be obtained residually from data on hours worked and directly from time-use surveys. It should be noted that the increase in unemployment and involuntary part-time unemployment during the 1980s and 1990s cannot be considered an increase in leisure time.

The average work week for full-time workers has declined greatly in the first half of this century, but the fall has been much less since 1950, with little change in recent years. In 1870, standard weekly hours in manufacturing were 64.0 (Ostry and Zaidi, 1979: Table IV-1). This fell to 58.6 in 1901, 50.3 in 1921, 48.7 in 1946 and 43.6 in 1951. By 1976, it had only reached 39.4 hours. Labour Force Survey Data show that the average usual weekly hours of all workers only fell from 39.0 in 1976 to 37.8 in 1996 despite the growth in part-time employment. Average hours of full-time workers exhibited no downward movement. On a family basis, however, the last 25 years have seen a substantial increase in market work, as two parent families increasingly become two earner families.¹⁵

There are two main approaches to the valuation of leisure. The first, used by Nordhaus and Tobin in the construction of the Measure of Economic Welfare (MEW), is to place a value on the total amount of leisure. The second, used by the Redefining Progress Institute (1995) in the construction of the Genuine Progress Indicator (GPI), is to value changes in leisure relative to the amount of leisure enjoyed in the base year.

Messinger and Tarasofsky (1997) estimated the value of leisure in Canada using both approaches. Based on the MEW approach, they impute a value of \$518.5 billion (1986 dollars) to leisure in 1995, or \$17,509 per capita, nearly one and one half the value of marketed consumption. This is an increase of 5.2 per cent over the 1971 per capita valuation. Based on the GPI methodology, they value the loss of leisure time relative to the 1970 base at \$16.7 billion (1986 dollars) in 1994, or \$571 per capita.

Since the GPI methodology estimates there has been a fall in leisure equal in value to a 2.8% cut in total consumption (i.e. personal consumption plus government services and unpaid work), while the MEW methodology indicates an increase in leisure equal to 4.5% of the value of total consumption, clearly any perception of trends depends on the methodology chosen. Other estimates indicate that if the market and non-market work hours of Canadians aged 20 to 59 are added together, there is not much of any trend over time (Bittman, 1998).

Many Canadian families are feeling the time crunch of two demanding jobs, plus family responsibilities, but although some families are working more, there has also been a substantial trend to earlier retirement. Although work hours and leisure are unequally distributed among people and may be poorly distributed over the life cycle, there does not

¹⁵Kilfoil (1998) notes that the husband/wife families in the top 5% of the earnings distribution worked an average of 3097 hours in 1975, but keeping the same position took 4026 hours of paid work in 1994 – while at the median of the household earnings distribution, the increase in average household hours was from 2500 to 3043.

appear to be reliable evidence of a significant trend in the average. Hence, this paper will not attempt to assign a value to leisure, or to trends in its magnitude.

At this point, since our focus is on trends in *aggregate* consumption, we are concerned with the aggregate amount of leisure enjoyed by Canadians, as a part of aggregate consumption. The *distribution* of hours of leisure is another issue. Picot (1996) has pointed to the increase in the percentage of individuals working very short weekly hours *and* the increased percentage working very long hours – although the inequality of weekly working hours has increased, the average is nearly constant. At the family level, Kilfoil (1998) has emphasized that working age families have less leisure now than in the early 1970s, due to the increase in paid hours worked by married women entering the paid labour force over the period 1971-1996. However, the trend to earlier retirement also means that over the life cycle, Canadians are now enjoying more aggregate years of leisure, albeit in the latter part of their lives. Since there are offsetting trends in the distribution of leisure, near constancy in its aggregate level may mask declines in the utility derived from leisure, but we leave consideration of distributional issues to Section 2.3.

positional goods

Positional goods can be defined as those goods in limited supply that provide utility only because they are inherently scarce. For example, only one type of motorcycle can be “the fastest in town”, and if the point of the purchase of motorcycles is to be the fastest, increased competitive expenditures on horsepower generate no aggregate increase in utility. To the extent that individuals' overall satisfaction is related to the consumption of positional goods, increases in aggregate consumption will raise economic well-being by less than the increase in dollar value of consumption. As it is unclear how to quantify the relative importance of positional goods and their implications for economic well-being, this aspect of economic well-being has not been developed in the current version of our work.

2.1.2 Government services

The provision of non-marketed or heavily subsidized services by the government is part of the consumption flow of Canadians. These data are available from the national accounts. Current expenditure by all levels of government including defense and capital consumption allowances, but excluding debt service charges and transfer payments (which influence marketed consumption) are used. Current dollar data are deflated by the price index for government current expenditures on goods and services. This measure rose from \$4,200 (1992 dollars) in 1971 to \$5,390 in 1997, a 28.3 per cent increase (Table 2).

2.1.3 Unpaid work

Unpaid work contributes to economic welfare and thus should be included in an index of economic well-being. Unpaid work consists of both household work and volunteer work.¹⁶

¹⁶Statistics Canada has identified the following types of unpaid work: food and meal preparation; food or meal clean-up; cleaning; laundry and ironing; clothes repair and shoe care; home repair and maintenance;

Statistics Canada (1996) has produced estimates of unpaid work for Canada and the provinces for the years 1961, 1971, 1981, 1986, and 1992, expressed in 1986 dollars. Data for other years have been interpolated or extrapolated. Estimates in 1986 dollars have been rebased to 1992 dollars with the CPI.

There are a number of methodologies for the valuation of unpaid work, including opportunity cost before tax or after tax, or at the replacement cost using a specialist or generalist. The value of unpaid work is not surprisingly greatest when it is valued on the basis of opportunity cost before taxes, followed by replacement cost using a specialist, opportunity cost after tax, and finally replacement cost using a generalist. The rate of growth over time however is not greatly affected by which valuation method is used.

This paper uses the value of unpaid work per capita based on replacement with a generalist – which amounts to \$6,212 in 1971 (1992 dollars) and \$7,299 in 1997, an increase of only 17.5 per cent (Table 2). Increased female and youth participation, the expansion in the range of personal services available to households provided by the market, and the increase in the number and quality of time-saving household production innovations such as the microwave oven may have tended to decrease the *relative weight* of unpaid household work.

2.1.4 Total consumption flows

Total per capita consumption is defined as the sum of personal consumption (adjusted for the growth of the underground economy, increased life expectancy, smaller household size, and certain regrettable expenditures), government services and unpaid work. In 1971, it amounted to \$19,156 (Table 2). By 1997, it had reached \$26,190, a 36.6 per cent increase. The slower per capita growth over the 1971-97 period of unpaid labour (17.5 per cent), meant that the rate of growth of total consumption flows was much less than adjusted personal consumption (a 54.4 per cent increase).

2.2 Wealth Stocks, Sustainability and the Intergenerational Bequest

In our view, measurement of trends in well-being should include consideration of changes in the well-being of generations yet unborn. This consideration of future generations can be justified either on the grounds that those Canadians now living care about the well-being of future generations or on the grounds that a concept of “Canadian society” should include both present and future generations. Either way, wealth accumulation by this generation of Canadians will increase the bequest left to future generations, and is an important component of well-being.¹⁷ We would emphasize that this component of economic

gardening and grounds maintenance; pet care; other domestic work, not elsewhere classified; physical care-children; education-children; medical care-children; other care-children; personal care-adults; medical care-adults; household management and administration; shopping for goods and services; transport-children; transport-all other household work; volunteer work; other help and care; and transport-other unpaid work. In 1992, household work represented 94 per cent of total unpaid work, with volunteer work the remainder.

¹⁷If one could assume that income flows were always optimally divided between consumption and savings, one could omit separate consideration of consumption and wealth accumulation and concentrate on trends in average income. However, since aggregate wealth accumulation depends heavily on the political process, and because capital markets have significant imperfections, this seems too hopeful by far – for

well-being consists of those stocks of real productive assets that can generate real income for future generations – not the financial instruments that will determine the allocation of the return from those assets. The stocks of “wealth” left to the next generation, broadly conceived to include environmental and human resources as well as physical capital stock, will determine whether Canadian society is on a long-run sustainable trajectory.

2.2.1 Physical capital stock

The physical capital stock includes both residential structures and machinery and equipment and non-residential, and both the business sector and the government sector. The greater the capital stock, the greater is future productive capacity and future potential consumption flows, and economic well-being. The capital stock data are based on the perpetual inventory method where investment flows are accumulated over time, with depreciation rates applied to the different assets. Statistics Canada produces estimates of the various components of the capital stock in current and constant prices by province for the 1961-1997 period.

In 1971, the net non-residential capital stock per capita, expressed in 1992 dollars, was \$11,548 (Table A7). By 1997, it had increased to \$16,805, up 45.5 per cent. The per capita housing stock was \$11,954 in 1971, rising 109.5 per cent to \$24,990 in 1997. The total capital stock (residential and non-residential) was \$23,502 per capita in 1971, rising 77.8 per cent to \$41,795 in 1997 (Table 3).

2.2.2. Research and development capital stock

Closely related to the physical capital stock is the concept of the research and development (R&D) capital stock. In an era of rapid technological change, expenditure on R&D is a crucial ingredient in the ability of society to innovate and create wealth. Statistics Canada does not produce R&D stock data. The Center for the Study of Living Standards has constructed a R&D stock series for Canada and the provinces from Statistics Canada's annual flows of general domestic expenditure on research and development (GERD). The stock of R&D capital is valued at cost of investment, and a depreciation rate of 20 per cent on the declining balance is assumed.

The R&D stock more than tripled from \$17,152 million (1992 dollars) in 1971 to \$56,130 in 1997 (Table A8). On a per capita basis, the R&D capital stock rose from \$788 in 1971 to \$1,856 in 1997, a 135.5 per cent increase.

2.2.3 Value of natural resource stocks

The current consumption of Canadians could be increased by running down our stock of non-renewable natural resources or by exploiting our renewable resources in a non-sustainable manner, but this would be at the cost of the consumption of future generations of Canadians. A key aspect of the wealth accumulation component of economic well-being is net changes in the value of natural resources.

Table 3: Canada, Stocks of Wealth

Year	Total Per Capita Net Capital Stock (1992 \$)	Per Capita Depreciated Accumulated Stock GERD (1992 \$)	Total Real Per Capita Value of Nat. Res. (1992 \$)	Human Capital per capita (1992 \$)	Per Capita Real Net Int'l Investment Position (1992 \$)	Per Capita Greenhouse Gas Emission Cost (1992 \$)	Total Real Per Capita Wealth (1992 \$)	Index 1971=1.00
	A	B	C	D	E	F	G=A+B+C+D+E-F	H-index of G
1971	23,502	788	15,170	52,654	-5,512	362	86,239	1.0000
1972	24,037	835	14,358	53,106	-5,560	364	86,412	1.0020
1973	24,900	872	14,810	53,642	-5,416	369	88,438	1.0255
1974	25,743	897	15,963	54,301	-5,217	379	91,308	1.0588
1975	26,562	918	16,905	54,936	-5,572	384	93,365	1.0826
1976	27,463	932	17,216	55,623	-6,123	391	94,719	1.0983
1977	28,320	951	17,189	56,400	-6,345	391	96,125	1.1146
1978	29,145	978	18,323	56,979	-7,562	393	97,470	1.1302
1979	30,064	1,011	22,729	57,490	-8,002	397	102,894	1.1931
1980	30,926	1,046	26,453	58,286	-7,610	396	108,704	1.2605
1981	31,972	1,098	21,777	59,167	-8,339	403	105,272	1.2207
1982	32,469	1,158	20,109	59,974	-7,634	387	105,689	1.2255
1983	32,934	1,208	20,615	60,972	-7,582	389	107,758	1.2495
1984	33,381	1,270	20,158	61,605	-7,772	396	108,246	1.2552
1985	34,044	1,342	18,265	62,363	-8,653	401	106,961	1.2403
1986	34,775	1,413	12,473	63,092	-9,222	400	102,132	1.1843
1987	35,703	1,465	13,472	63,751	-9,392	402	104,598	1.2129
1988	36,805	1,506	13,508	64,521	-9,005	402	106,934	1.2400
1989	37,854	1,535	13,897	64,482	-9,087	397	108,284	1.2556
1990	38,675	1,576	13,844	67,941	-9,452	388	112,196	1.3010
1991	39,311	1,613	10,617	68,625	-9,635	379	110,153	1.2773
1992	39,715	1,648	9,409	69,568	-10,447	376	109,518	1.2699
1993	40,021	1,695	8,578	70,768	-11,049	384	109,629	1.2712
1994	40,378	1,744	9,028	71,831	-11,227	400	111,355	1.2912
1995	40,821	1,786	9,546	72,260	-10,823	400	113,191	1.3125
1996	41,271	1,823	9,306	72,853	-10,369	400	114,484	1.3275
1997	41,795	1,856	9,159	73,964	-10,573	400	115,801	1.3428

Sources: A - Appendix Table A7, B- Appendix Table A8, C- Appendix Table A12, D - Appendix Table A13, E - Appendix Table A14, F- Appendix Table A25.

From an intergenerational perspective, it is the value of the natural resources, not their physical extent, which counts. The valuation of these resources poses conceptual problems, but estimates certainly are possible. Statistics Canada (1997) has recently provided both physical and value estimates of natural resources such as forests, energy reserves, and minerals. [Data on the value of fish stocks have not yet been developed.]

The estimated market value is the price the resources would bring if sold on the open market. It is based on the difference between the annual cost of extraction of a given resource and the revenue generated from the sale of the resource. In other words, the total value or wealth associated with a stock is calculated as the present value of all future annual rent that the stock is expected to yield. This amount of rent is determined by the quality of the resources, the state of existing extraction technologies, the price of the resource, and factor costs.

Table A9 presents estimates of the current dollar value of timber stocks in Canada, and estimates of the per capita constant dollar value (the GDP deflator was used to deflator nominal values to 1992 dollars).¹⁸ In 1971, the value of timber was \$2,831 (1992 dollars) per capita. By 1997, it had risen to \$3,527, a 24.6 per cent increase.

Table A10 presents estimates of the value of the five types of energy resources (crude oil reserves, natural gas reserves, crude bitumen reserves (tar sands), subbituminous coal and lignite reserves, and bituminous coal). It should be noted that this valuation is based on remaining established reserves, which represent only a small proportion of known reserves and ultimately recoverable resources.¹⁹ The per capita value of energy resources has fluctuated dramatically over the 1971-97 period, going from \$3,917 in 1971 to a peak of \$14,410 in 1983, reflecting increased energy prices and rising proven reserves. By 1997, the per capita value had fallen to \$2,789, which is 28.8 per cent below the 1971 level.

Table A11 presents estimates of the value of 10 minerals (copper, potash, silver, sulphur, uranium, gold, iron, nickel, lead, and molybdenum), again based on remaining established reserves. The per capita value of mineral deposits has fallen from \$8,421 in 1971 to \$2,843 in 1997, a 66.3 per cent decrease.

In addition to the data on the value of natural resources, Statistics Canada produces estimates of the physical size of the resources. Over the period for which data are available (which varies by resource), the physical extent of timber stocks has fallen slightly. Concerning the five types of energy resources for which data are available, stocks for three have increased (natural gas, bituminous coal, crude bitumen,) one is unchanged (subbituminous coal and lignite reserves), and one has fallen (crude oil). For the 10 minerals for which data on reserves are available, four have increased (uranium, sulphur, potash, gold) and six have decreased (silver, copper, iron, nickel, lead, molybdenum).

¹⁸The estimates are based on a positive return to produced capital. Statistics Canada also produces an estimate based on a zero return to produced capital.

¹⁹For example, based on the situation in 1992, Natural Resources Canada and the National Energy Board (see Statistics Canada, 1996:Table 6.1) provided the following estimates of the the remaining established reserves of energy resources, as a proportion of ultimately recoverable resources: crude oil (7.9 per cent); crude bitumen (0.98 per cent); Western Canada natural gas (26.5 per cent); frontier natural gas (0.11 per cent); and coal (8.3 per cent).

Table A12 and Table 3 aggregate the data on the value of timber, energy, and mineral resources into one global measure for the value of natural resources for Canada. Between 1971 and 1997, the total per capita value (1992 dollars) of natural resources fell 39.6 per cent from \$15,170 in 1971 to \$9,159 in 1997, largely due to the fall in the value of mineral resources. In 1997, timber represented 38.5 per cent of the total value of natural resources, followed by minerals at 31.0 per cent and energy at 30.5 per cent.

2.2.4 - Stocks of human capital

The human capital accumulated by the workforce generates both current and future income. Trends in the stock of human capital, including both formal educational attainment levels and on-the-job training, are important determinants of current and future economic well-being. School retention and participation in post-secondary education have increased dramatically in Canada over the last three decades,²⁰ and there is a strong relationship between educational attainment and individual income.

One approach to the valuation of human capital is to estimate the returns associated with different levels of educational attainment of the population and compute the implicit present discounted value of education (Jorgenson and Fraumeni, 1992). [A major problem with this methodology, however, is that it imputes to education stocks any differential in the structure of wages that is correlated with education.] A second, input-based approach is to apply the perpetual inventory method of estimating the physical capital stock based on investment flows and depreciation assumptions to public and private expenditure on education and training (Kendrick, 1976). A third approach to human capital accounting is to develop methods for systematically evaluating and recording knowledge assets acquired through experience, education, and training (OECD, 1996).

Our approach in this paper is admittedly crude and incomplete and will be improved upon at a later date. We estimate the cost per year of education expenditures at the primary, secondary and post secondary levels and use yearly estimates of the distribution of education within the population to compute the total cash cost of production of human capital in education. Our estimates of the change over time in the value of human capital stocks are, therefore, under-estimates, since we do not yet account for the cost of student time in human capital production or for the value of experience or on-the-job training.

In 1992-93, the average cost of educating a student at the elementary-secondary level in Canada, calculated by dividing total expenditure at the level by enrolment, was \$6,518,. At the community college level, the cost was \$11,348 and at the university level \$20,269.

The average number of years of education assumed for each educational attainment group are given below (with the average cost in 1992-93 of educating an individual at that level of educational attainment in brackets):

- for the 0-8 year group is 8 years (\$52,144);
- for the some secondary education group 10 years (\$65,180);

²⁰ The increase has been particularly large in Atlantic Canada – see Osberg (1994).

- for graduated high school 12 years (\$78,216);
- for some post-secondary 12 years of elementary-secondary school and the average of one year of community college and one year of university ((\$94,025);
- for post-secondary certificate 12 years of elementary-secondary school and two years of community college (\$100,912); and
- for university graduates 12 years of elementary-secondary school and five years of university (an average of four years of undergraduate study and one year of graduate or professional study) (\$179,561).

The size of the population and stock of human capital by educational attainment is found in Table A13.

In 1971, human capital per capita, expressed in 1992 dollars, was \$52,654. By 1997 the stock of human capital had reached \$73,964, up 40.5 per cent. This was 77 per cent higher than the stock of physical capital and over eight times that of the stock of natural resources.

Like these other assets, the value of the human capital of living Canadians represents the future consumption that possession of such assets enables. The endogenous growth perspective has argued that the benefits of societal learning are partly the output such learning enables in the current generation and partly the fact that future generations can start learning at a higher level. As a consequence, higher levels of education produce a higher long run growth rate, as well as a higher current level of income [Galor and Zeira (1993), Eckstein and Zilcha (1994)]. If this is correct, a production cost valuation of human capital may underestimate considerably the value of the human capital stock investments.

2.2.5 Net foreign indebtedness

We do not count the gross level of government, or corporate, debt as a “burden” on future generations, and we do not count as part of the intergenerational bequest the value of paper gains in the stock market. In general, financial instruments represent both assets to their holders and liabilities to their issuers. The distribution of such assets/liabilities will play a major role in allocating the real returns to the future capital stock, but the issue at this point is the aggregate value of the intergenerational bequest.

However, net debt to foreigners is another issue. Since interest payments on the net foreign indebtedness of Canadians to other countries will lower the aggregate future consumption options of Canadians, increases in the level of foreign indebtedness reduce economic well-being. Unlike many of the other stock variables, well developed data are available. Statistics Canada publishes data on net foreign indebtedness for both direct foreign investment and portfolio investment. In this paper, we will not attempt any estimate of the more controversial aspects of the net costs of equity investments and foreign ownership (e.g.

possible foreign sourcing of suppliers).

Table A14 gives estimates of the net international investment position of Canadians. On a per capita basis, with the figures expressed in 1992 dollars, Canada's net foreign debt nearly doubled from \$5,512 to \$10,573 between 1971 and 1997.

2.2.6 State of the Environment and National Heritage

Like the excess depletion of natural resources, the current consumption of Canadians can be increased at the expense of the degradation of the environment, reducing the economic well-being of future generations. Consequently, changes in the level of air and water pollution should be considered an important aspect of the wealth accumulation of Canadians.

Canadians pass on from generation to generation both a natural and made-made national heritage. If this heritage were damaged, the economic well-being of future generations of Canadians would be reduced. Since it is very difficult, if not impossible, to put a monetary value on, for example, the pristine condition of our national parks, or the Parliament Buildings, there will be no attempt to set an aggregate value to these assets. However, the issue of *trends* in well-being is the *change* in such assets, which is easier to measure and indexes of indicators of environmental quality can be developed.²¹

²¹ Environment Canada produces environmental indicators in a number of areas, including urban air quality, urban water quality, climate change, acid rain, toxic contaminants, and stratospheric pollutants (See the Environment Canada website (www.ec.gc.ca) for the National Environmental Indicator Series) There is no one indicator that attempts to combine trends in these different areas, so it is difficult to identify an overall trend in environmental conditions.

What is interesting however is that many if not most environmental indicators have shown an improvement over time. A sampling of these developments is highlighted below:

- the concentration of DDE and PCBs in double-crested Cormorant eggs in different locations across Canada has decreased significantly since the first half of the 1970s;
- emissions of sulphur dioxide had been cut in half in Eastern Canada between 1980 and 1994;
- the number of days in Canadian cities with airborne particles exceeding the national objective has fallen greatly since 1979;
- the average annual benzene concentrations in Canadian cities has fallen in the 1990s; and
- the proportion of the population with wastewater treatment in Canada increased from 70 per cent in 1983 to 90 per cent in 1994.

There have been however a number of negative developments, as noted below:

- the amount of greenhouse gas emissions in equivalent tones of carbon dioxide increased 8.3 per cent between 1981 and 1992, a negative development because of the implications for global warming (Table A16);
 - the average amount of ozone in the atmosphere, measured in Dobson units, at three locations in Canada (Toronto, Edmonton, and Resolute) has fallen 6.8 per cent between 1971 and 1994, indicating a deterioration in air quality (Table A16); and
 - over the past half century, Canada's average annual temperature has increased 0.4C.
- The Fraser Institute has recently issued a report on environmental indicators for Canada and the United States (Hayward and Jones, 1998). It shows that for Canada over the 1980-95 period the relative severity of environmental problems in the areas of air quality, water quality, and natural resources improved, while it deteriorated for solid waste. Overall, there was a 10.8 per cent reduction in the severity of environmental problems.

Osberg (1985a) has argued that heritage preservation laws can be seen as an optimal intergenerational contract, which constrains the present generation not to despoil irreplaceable assets. In the presence of such constraints, the current generation still has to decide how large a bequest to future generations to leave in the form of replaceable assets, but the "national heritage" remains untouched. As a consequence, (like the family heirloom that is never priced because it will never be sold), trends in economic well-being can be evaluated without placing an explicit monetary value on irreplaceable environmental and cultural assets.

Probably the best known environmental problem is global warming arising from increased emissions of greenhouse gases, the most common of which is carbon dioxide emissions. Fortunately, data are available on these emissions and it is possible to estimate the costs of these emissions. These costs can then be subtracted from the stock of wealth to obtain an environmentally adjusted stock of wealth.

Needless to say there are major conceptual issues to be dealt with in estimating the costs of CO₂ emissions. These include whether the costs should be viewed from a global, national or sub-national perspective, whether the costs increase linearly with the levels of pollution, whether the costs should be borne by the producer or receptor of trans-border emissions, and whether costs should vary from country to country or be assumed the same for all countries. Since global warming affects all countries, we estimate world total costs of emissions and allocate these costs on the basis of a country's share of world GDP.²²

Fankhauser (1995) has estimated that the globalized social costs of CO₂ emissions (with no adjustment for different national costs) at \$20 US per ton in 1990 (or \$24.40 Canadian based on Statistics Canada purchasing power parity estimate of 1.22). World Bank researchers (Atkinson et al, 1997) have applied this number to CO₂ emissions in developed countries to estimate the value of the loss of environmental services as a proportion of output and the measure of genuine saving.

According to data from the International Energy Agency, world CO₂ emissions in 1997 were 22,636 millions of metric tons (see Table A25). Based on the \$24.40 Canadian per ton cost of CO₂ emissions, the world social costs of CO₂ emissions was \$552,327 million. Given Canada's 2.1 per cent share of world GDP, our share of the world cost of CO₂ emissions was 11,634 million, or \$400 per capita. As these costs represent a loss in

²² Data on CO₂ emissions for Canada are published by Environment Canada (Jaques, 1997) and currently available for the 1958-1995 period at the national level and for the 1990-95 period for the provinces. With the approach adopted in this paper, these data are not directly used for the calculation of the social costs of CO₂ emissions for Canadians. They do enter indirectly through Canada's contribution to world CO₂ emissions.

the value of the services provided by the environment, they can be considered a deduction from the total stock of wealth of the society. In 1997, the overall value of stocks of wealth in Canada were reduced by 0.35 per cent from the social costs imposed by CO2 emissions according to this methodology.

2.2.7 Estimates of total wealth

As the estimates of the physical capital stock, the R&D capital stock, and natural resource wealth, human capital, net foreign debt, and environmental degradation are expressed in value terms, they can be aggregated and presented on a per capita basis (Table 3). Net foreign debt per capita is a negative entry, while the social costs of CO2 emissions are subtracted from the stocks of wealth.

In 1971, the value, on a per capita basis and expressed in 1992 dollars, the value of the stock of physical capital, R&D, and natural resources, minus debt foreign debt, was \$86,239, with the human capital constituting the lion's share of the wealth (61.1 per cent), followed by physical capital (27.3 per cent). By 1997, the value of the wealth stock had risen to \$115,801, a 34.3 per cent increase.

2.2.8 Other wealth variables

Data for the above variables have been used in the construction of the index of economic well-being presented in this paper. In addition, a number of other variables, whose estimation may be more problematic, are discussed briefly below.

consumer durables

The stock of consumer durables contributes directly to the well-being of Canadians. Statistics Canada's household facilities survey provides data on the ownership of a large number of household equipment. From these data, the Center for the Study of Living Standards has constructed an index of household penetration for 14 types of household equipment over the 1968-95 period (Table A15).²³

In 1971, the average household penetration rate for the 14 items of household equipment in the index was 40.5 per cent. By 1995 it had reached 75.0 per cent, a 81.0 per cent increase.

Given data on the number of households and the value of the 14 items of household equipment, an estimate of the total value of these consumer durables can be built up from the data on the penetration rates.

²³ Items included in the index with the 1996 penetration rate given in brackets are bath facilities (99.8 per cent), flush toilets (99.8 per cent), refrigerators (99.6 per cent), telephones (98.7 per cent), colour TVs (98.5 per cent), microwave ovens (85.3 per cent), video recorders (83.5 per cent), automatic washing machines (78.0 per cent), clothes dryers (76.5 per cent), one or more automobiles (73.6 per cent), freezers (57.1 per cent), dishwashers (47.7 per cent), home computers (31.6 per cent), and air conditioners (29.3 per cent).

social capital

It has been argued by a number of authors that “social capital” is highly important for economic productivity. Social capital can be taken to include the social institutions that produce habits of honesty and co-operation, a justifiable sense of mutual trust in business dealings and a willingness to compromise in negotiations – all of which clearly help to make economic transactions run more smoothly. Recently, Knack and Keefer (1997) have found that countries scoring higher on measures of social capital tend to grow more rapidly over time. Despite the potential importance of this variable, it is not included at this time.

2.3 Inequality and Poverty

The idea of a “Social Welfare Function” which is a positive function of average incomes and a negative function of the inequality of incomes has a long tradition in welfare economics. However, in measuring the level of social welfare, the exact relative weight to be assigned to changes in average incomes, compared to changes in inequality, cannot be specified by economic theory. Indeed, the measurement of inequality itself depends on the relative value which the observer places on the utility of individuals at different points in the income distribution. For a “Rawlsian”, only changes in the well-being of the least well off matter, but others will admit some positive weight for the income gains of the non-poor,²⁴ and will assign some negative weight to inequality among the non-poor.

Since the economic well-being of the population is affected by inequality in the distribution of income and by the extent of poverty²⁵, there are two issues: 1) one’s perspective on the importance of inequality/poverty compared to trends in average income, and 2) one’s view of the relative weight to be placed on poverty compared to inequality. We therefore suggest that a compound sub-index to recognize explicitly these issues would place some weight (β) on a measure of inequality in the aggregate distribution of income and some weight ($1-\beta$) on a measure of poverty.

²⁴ Jenkins (1991) surveys the issues involved in measurement of inequality.

²⁵ Wilkinson (1996) argues that greater inequality increases the mortality rate. Daly and Duncan (1998) argue that absolute deprivation reduces life expectancy and conclude that policies targeted at increasing the incomes of the poor are likely to have a larger effect on mortality risk than policies designed to reduce inequality more generally.

Table 4: Canada, Index of Economic Inequality

Year	Poverty Intensity	Poverty Intensity Index	Gini Coeff. (income after tax)	Gini Coeff. (income after tax), Index	Overall index of Inequality
	A	A'	B	B'	$C = -1*(A'*0.75 + B'*0.25)$
1971	0.051	1.000	0.373	1.000	-1.000
1972	0.051	1.000	0.368	0.987	-0.997
1973	0.051	1.000	0.368	0.987	-0.997
1974	0.055	1.084	0.363	0.973	-1.056
1975	0.059	1.170	0.364	0.976	-1.122
1976	0.061	1.205	0.374	1.003	-1.154
1977	0.063	1.239	0.362	0.971	-1.172
1978	0.060	1.192	0.367	0.984	-1.140
1979	0.058	1.145	0.355	0.952	-1.097
1980	0.055	1.075	0.358	0.960	-1.046
1981	0.051	1.008	0.351	0.941	-0.991
1982	0.050	0.990	0.353	0.946	-0.979
1983	0.052	1.027	0.363	0.973	-1.014
1984	0.054	1.065	0.359	0.962	-1.040
1985	0.050	0.982	0.358	0.960	-0.976
1986	0.048	0.940	0.359	0.962	-0.945
1987	0.046	0.914	0.357	0.957	-0.925
1988	0.045	0.886	0.355	0.952	-0.902
1989	0.044	0.867	0.352	0.944	-0.886
1990	0.048	0.940	0.352	0.944	-0.941
1991	0.047	0.933	0.357	0.957	-0.939
1992	0.047	0.933	0.356	0.954	-0.939
1993	0.047	0.916	0.358	0.960	-0.927
1994	0.046	0.898	0.354	0.949	-0.911
1995	0.048	0.952	0.357	0.957	-0.953
1996	0.048	0.952	0.362	0.971	-0.957
1997	0.048	0.952	0.362	0.971	-0.957

Sources: A - Appendix Table A18, B- Appendix Table A17.

The most popular measure of inequality in the distribution of income is undoubtedly the Gini index. Statistics Canada has published Gini indices for three definitions of income: income before transfers, total money income, and income after tax (Table A17). For the purposes of the construction of the index of economic well-being, we have chosen the income after tax measure as it represents the best measure of purchasing power. This measure of income inequality for all persons has shown little fluctuation over the 1971-97 period.²⁶ In 1997, it was 0.362 down 2.9 per cent from 0.373 in 1971.

Recently, Osberg and Xu (1998) have noted that the Sen-Shorrocks-Thon measure of poverty intensity is both theoretically attractive as a measure of poverty, and also convenient, since it can be decomposed as the product of the poverty rate, the average poverty gap ratio and the inequality of poverty gap ratios. Furthermore, since, the inequality of poverty gap ratios is essentially constant, poverty intensity can be approximated as the product of the poverty rate and the average poverty gap ratio.

An earlier version of this paper used Statistic Canada's low-income cutoffs (LICOs) as an indicator of poverty. Because of problems with consistency in the series over time (particularly before 1980) with the use of different base years, we have now adopted the Low Income Measure (LIM), defined as the proportion of the population with income below one half the median adjusted income.²⁷ This is consistent with the methodology of most international studies of poverty. In contrast, the LICO is a uniquely Canadian methodology, which includes both absolute and relative components of poverty.

The proportion of Canadians living below the LIM has been relatively stable over time, rising from 14.5 per cent in 1971 to a peak of 17.0 per cent in 1977, then falling to 15.1 per cent in 1985 (see Table A18). Since then it has shown extremely little annual variation, remaining in the 14.2-15.1 range.

The poverty gap is defined as the gap between the average income of those below the poverty line or LIM cutoff and the cutoff. The poverty gap ratio is this gap divided by the LIM cutoff (one half median income). This ratio also has *been relatively* stable over time, falling from 35 per cent in 1971 to 32 per cent in 1997, a 8.6 per cent decline.

The overall intensity of poverty is *approximately equal to* the product of the poverty rate

²⁶ Since there is no data available on inequality and poverty within families, we have no option but to follow the standard pattern of assuming that equivalent income is equally shared among family members. Sharif and Phipps (1994) have demonstrated that if children do not in fact share equally in household resources, inequality within the family can make a very big difference to perceptions of the level of child poverty – and the same implications would hold for gender inequalities. However, since the issue for this paper is the *trend* of poverty, our conclusions will hold unless there has been a systematic trend over time in the degree of inequality within families (e.g. if senior citizen families, whose share of the poverty population has fallen over time, have systematically different levels of within-family inequality than younger families).

²⁷ The poverty thresholds or levels for the LIM and LICO are quite similar. For example, the LIM threshold based on one-half median adjusted family unit income for a family of four in 1996 was \$25,304 (1996 dollars). The LICO threshold for a family of four was \$27,036 (1996 dollars), based on the unweighted average for the five thresholds based on the population of the community of residence.

and the poverty gap ratio, and registered a 4.8 per cent decline over the 1971-97 period.

The overall index of equality is a weighted average of the indexes of the poverty intensity for all units or households and the Gini coefficient for after-tax income, with the weights 0.75 and 0.25 respectively. The index is multiplied by -1 in order to reflect the convention that increases are desirable. Table 4 shows that equality index increased from -1.0 in 1971 to -0.957 in 1997.

other indicators of inequality

By using measures of aggregate inequality, and aggregate poverty, we implicitly impose the ethical value of anonymity, and count the poverty of any person as being of equal social concern, regardless of their identity or such characteristics as age or gender. Those observers who consider the poverty of a particular group (e.g. women) to be of greater ethical concern, will want to calculate the poverty rate and average poverty gap ratio separately and aggregate them with differential weights. Such observers would also presumably want to use an index of inequality (such as the Theil index) which can be decomposed into between group and within group inequality. This has not been done in the current version of our work, but could be, if demand warranted.

Those who are concerned with norms of equity between groups may in addition wish to consider additional indicators of inequality, such as the earnings gap between men and women. In 1971, the earnings ratio between women and men for full-year, full-time worker was 59.7 per cent (Table A19). By 1995, it had risen 22.4 per cent to 73.1 per cent. Such differentials are reflected in the aggregate Gini index of all incomes, and in the rate and extent of poverty, but only enter our measures of poverty and inequality in so far as they affect those aggregate measures.

2.4 Insecurity

If individuals knew their own economic futures with certainty, their welfare would depend only on their actual incomes over their lifetimes, since there would be no reason to feel anxiety about the future. However, uncertainty about the future will decrease the economic welfare of risk averse individuals. Individuals can try to avoid risk through social and private insurance, but such mechanisms do not completely eliminate economic anxieties. Given the value Canadians place on economic security, insecurity reduces economic well-being.

Although public opinion polling can reveal that many Canadians feel themselves to be economically insecure, and that such insecurity decreases their subjective state of well-being, the concept of economic insecurity is rarely discussed in academic economics.²⁸ Consequently, there is no generally agreed definition of economic insecurity. Osberg (1998) has argued that economic insecurity is, in a general sense, “the anxiety produced by a lack of economic safety – i.e. by an inability to obtain protection against subjectively

²⁸ To be precise, in the ECONLIT database from 1969 to December 1997, there are nine matches to the term “economic insecurity”. A search of the Social Sciences Index from 1983, and the PAIS International and PAIS Periodicals/Publisher Index from 1972, yielded eleven matches. The Social Sciences Citation Index for the years 1987-1997 was similarly unproductive.

significant potential economic losses.” In this sense, individuals’ perceptions of insecurity are inherently forward looking, the resultant of their expectations of the future and their current economic context – hence only imperfectly captured by measures such as the ex post variability of income flows.²⁹ Ideally, one would measure trends in economic security with data which included the percentage of Canadians who have credible guarantees of employment continuity and the adequacy of personal savings to support consumption during illness or unemployment. However, such data is not available (the last survey of asset holdings in Canada took place in 1983/84). For these reasons, rather than attempt an overall measure of economic insecurity, this paper adopts a “named risks” approach, and addresses the change over time in four key economic risks.

Fifty years ago, the United Nations’ Universal Declaration of Human Rights declared:

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other loss of livelihood in circumstances beyond his control. [Article 25]³⁰

For this paper, we construct measures of the percentage change over time in the economic risks associated with unemployment, illness, “widowhood” (or single female parenthood) and old age. In each case, we model the risk of an economic loss associated with the event as a conditional probability, which can itself be represented as the product of a number of underlying probabilities. We weight the prevalence of the underlying risk by the proportion of the population which it affects. The core hypothesis underlying the measure of economic insecurity proposed here is that changes in the subjective level of anxiety about a lack of economic safety are proportionate to changes in objective risk.

2.4.1 – Unemployment

The economic risk associated with unemployment can be modelled as the product of the risk of unemployment in the population and the extent to which people are protected from the income risks of unemployment. We have taken as a proxy for the risk of unemployment the employment rate (employment/population ratio).³¹ Changes in this ratio reflect changes in the

²⁹ For example, a tenured professor with occasional consulting income may have a variable income stream, but feel little insecurity – and data only on individuals’ income streams cannot reveal who had a long term employment guarantee (like tenure), and who sweated out a series of short term contract renewals..

³⁰ In the 1990s, the gender specificity of the language of 1948 will strike many people as odd – but Article 2 makes it clear that all Articles of the Universal Declaration of Human Rights are to be guaranteed to male and female persons equally.

³¹ Readers who are familiar with our earlier papers will note that we have changed our measure of unemployment insecurity. In this paper, we essentially model “security” – we start from the employment/population ratio, the percentage of the unemployed who get benefits and the percentage of average earnings replaced. This is akin to looking at the glass as if it is “three quarters full”, with the significant implication that a given absolute change in joblessness will have a smaller proportionate impact on the employment/population ratio. As a consequence, this paper shows a distinctly less sharp decline in security in the 1990s than our previous work. In our earlier papers, we emphasized “insecurity”, and

unemployment rate and changes in the participation rate (both cyclical and structural). The extent to which people have been protected by UI from the financial impacts of unemployment can be modelled as the product of: 1) the percentage of the unemployed who claim regular UI benefits (which has declined precipitously in recent years – from 83 per cent in 1990 to under 42 per cent in 1997) and 2) the percentage of average weekly wages replaced by UI.

The index of security from unemployment has shown considerable variation over the 1971-97 period (see Table 5). It doubled in the early 1970 with the increased generosity of UI. In the 1990s it has fallen by more than half due to the falling employment rate, reflecting higher unemployment and the falling participation rate, and cuts to the UI/EI program in both coverage and benefit levels.³²

2.4.2 – Illness

Viewed from a longer term perspective, the economic insecurities associated with illness in Canada certainly dropped considerably with the introduction of Medicare in the late 1960s. Since our other data series are often difficult to obtain prior to 1971, the period covered by the present study is 1971 to 1997, which therefore unfortunately largely omits the improvement in economic well-being that Medicare represented. Nevertheless, it is still of interest to examine how the economic insecurities associated with illness have evolved over the last quarter century.

constructed a measure based on the percentage of the unemployed that do not get benefits, the percentage of the labour force unemployed, the percentage of average wages not replaced by UI/EI, etc. This change in the “framing” of unemployment and insecurity can be criticized, on the grounds that anxiety is driven by changes in the probability of danger, rather than by the converse probability of safety (e.g. safety boards normally think of changes in the probability of an airplane crash, rather than the probability of safe arrival). We have changed to a focus on “employment” because the increased proportion of two earner households may have reduced insecurity by decreasing the probability that a household will lose all employment income due to unemployment. However, it is also true that households may depend on having two pay cheques to meet family needs, such as mortgage obligations – see Fortin (1995).

³² For discussion of this issue, see HDRC (1998).

Table 5: Risk imposed by unemployment, Canada

Year	Employment rate	% of the unemployed receiving reg.benefits	Average weekly benefits/ average weekly earnings (%)	ER Index	UR Index	UI coverage	multi- plicative Index
	A	B	C	D= index of A	E=Index of B	F=Index of D	G=D*E*F
1971	54.5	73.71	31.25	1.0000	1.0000	1.0000	1.0000
1972	54.9	94.93	45.27	1.0073	1.2878	1.4486	1.8792
1973	56.4	107.40	46.64	1.0349	1.4570	1.4925	2.2504
1974	57.3	110.88	45.98	1.0514	1.5042	1.4714	2.3269
1975	56.9	98.03	45.51	1.0440	1.3299	1.4563	2.0220
1976	57.1	83.54	44.53	1.0477	1.1333	1.4250	1.6919
1977	57.0	76.09	44.18	1.0459	1.0322	1.4138	1.5262
1978	57.9	75.44	45.20	1.0624	1.0234	1.4464	1.5726
1979	59.2	70.97	41.19	1.0862	0.9628	1.3181	1.3785
1980	59.7	67.26	41.65	1.0954	0.9124	1.3328	1.3321
1981	60.4	66.61	40.14	1.1083	0.9037	1.2845	1.2864
1982	57.5	75.95	39.69	1.0550	1.0304	1.2701	1.3807
1983	57.1	74.58	40.19	1.0477	1.0118	1.2862	1.3634
1984	57.9	73.71	40.14	1.0624	1.0000	1.2846	1.3647
1985	58.9	74.12	40.96	1.0807	1.0055	1.3108	1.4244
1986	59.9	76.04	42.04	1.0991	1.0316	1.3453	1.5253
1987	60.8	75.61	42.42	1.1156	1.0257	1.3575	1.5533
1988	62.0	82.11	43.20	1.1376	1.1139	1.3825	1.7518
1989	62.4	83.78	43.88	1.1450	1.1366	1.4041	1.8273
1990	61.9	83.07	45.43	1.1358	1.1269	1.4538	1.8609
1991	59.8	77.92	46.17	1.0972	1.0570	1.4776	1.7137
1992	58.4	70.41	46.14	1.0716	0.9551	1.4763	1.5110
1993	58.2	65.45	45.89	1.0679	0.8879	1.4684	1.3922
1994	58.5	58.51	44.31	1.0734	0.7937	1.4179	1.2080
1995	58.6	52.06	44.09	1.0752	0.7062	1.4108	1.0713
1996	58.6	48.37	43.57	1.0752	0.6562	1.3941	0.9836
1997	58.9	42.25	41.74	1.0807	0.5731	1.3357	0.8273

Source: Table A24, Data on employment rate are from Historical Labour force Survey 71F0004XCB.

We would emphasize that we do not attempt to model the psychological insecurities associated with health – just the economic risks. Recent decades have seen both substantial advances in medical technology and increased awareness of health hazards (such as Jakob-Kreutzfeld Syndrome -“mad cow disease”) which were previously unimaginable. It is not clear whether subjective anxieties about health have increased or fallen as a result.

Our objective is only to model the trend in economic anxieties associated with ill health, but at this stage of our research, there is an important omission. The economic risks associated with illness are partly the risk of loss of earnings. Historically, a portion of the Canadian labour force have had some protection against such losses through sick leave provisions in their individual or collective employment contracts. One implication of the trend to short term contract employment and self employment in Canadian labour markets is an increase in the fraction of the population whose incomes ceases totally, in the event of ill health. This paper does not attempt to model such risks.

Instead, we focus on the risk of large out of pocket health care costs. Health Canada publishes a series on total health expenditures by sector (federal, provincial, municipal, workers' compensation, private). In 1991, net private expenditure was \$16,848 million, or 25.4 per cent of total health expenditure. The 1992 Famex shows average household expenditure on health care of \$1,035, broken down into \$658 for direct costs to household (\$233 for medicinal and pharmaceutical products, \$138 for eye-care goods and services, and \$184 for dental care) and into \$378 for health insurance premiums (\$174 for private health care plans). We exclude expenditure on private health insurance premiums (since these are in fact a way of avoiding health care cost risk) and express remaining private expenditures on health care (net of health insurance reimbursements) as a percentage of total after-tax personal income.

Private expenditures on health have risen 82.7 per cent from 2.55 per cent in 1971 to 4.66 per cent in 1997, with almost all the relative increase taking place in the 1980s and 1990s. This increase has been caused by a number of factors, including delisting of certain medical services provided in the past by provincial health plans, large increases in drug prices, the aging of the population, supplier-induced increases in patient demand for health services, and medical advances that have produced medical services not previously available.

However, to follow the convention that increases in the sub-components of the index of economic security are improvements, we want an index of "security" and not an index of "insecurity", hence we multiply the risk of illness where increases are negative for economic well-being by -1 . A negative sign therefore indicates that an increased negative value represents a decline in well-being (and a decreased negative value an increase in well-being).

Table 6: Canada, Risk imposed by Illness

Year	Medical Care Expenses,% of Disposable income	Index
1971	2.55	-1.000
1972	2.55	-1.000
1973	2.55	-1.000
1974	2.55	-1.000
1975	2.55	-1.000
1976	2.52	-0.988
1977	2.55	-1.000
1978	2.55	-1.000
1979	2.56	-1.004
1980	2.67	-1.047
1981	2.66	-1.043
1982	2.78	-1.090
1983	2.88	-1.129
1984	2.92	-1.145
1985	3.03	-1.188
1986	3.18	-1.247
1987	3.24	-1.271
1988	3.28	-1.286
1989	3.30	-1.294
1990	3.43	-1.345
1991	3.62	-1.420
1992	3.80	-1.490
1993	3.96	-1.553
1994	4.12	-1.616
1995	4.24	-1.663
1996	4.47	-1.753
1997	4.66	-1.829

Note: Data for 1996-1997 were extrapolated on the assumption of constant growth from the 1990 to 1995 period.

2.4.3 – Single Parent Poverty

When the UN Universal Declaration of Human Rights was drafted in 1948, the percentage of single parent families was relatively high, partly as a result of World War II. At that point in time, “widowhood” was the primary way in which women and children lost access to male earnings. Since then, divorce and separation have become the primary origins of single parent families. However, it remains true that many women and children are “one man away from poverty”, since the prevalence of poverty among single parent families is extremely high.

To model trends in this aspect of economic insecurity, we multiply (the probability of divorce) * (the poverty rate among single female parent families)³³ * (the average poverty gap ratio among single female parent families)³⁴

We stress that in constructing a measure of the economic insecurity associated with single parent status, we are *not* constructing a measure of the social costs of divorce. Economic well being is only part of social well being, and divorce has emotional and social costs (e.g. for the involved children) that are not considered here. Arguably, over time the social costs associated with divorce (e.g. stigma) have changed, as the institution of marriage itself has changed – but such issues lie well beyond the scope of this paper.

Table 7 shows that the divorce rate has more than doubled over the period rising from an annual rate of 0.59 per cent per legally married couple in 1971 to 1.22 per cent in 1997. The poverty rate for households headed by lone-parent females, defined on a LIM basis, rose 10.9 per cent between 1971 and 1997 from 49.5 per cent to 54.9 per cent, while the average poverty gap ratio fell 22 per cent from 41 per cent to 32 per cent. The overall index 81.2 per cent, indicating a major increase in the risk of poverty for households headed by a lone female.

Again, to follow the convention that increases in the sub-components of the index of economic security are improvements, we want an index of “security” and not an index of “insecurity”, hence we multiply the risk of single-parenthood where increases are negative for economic well-being by –1. A negative sign therefore indicates that an increased negative value represents a decline in well-being (and a decreased negative value an increase in well-being).

³³ However, RATE= INCIDENCE x AVERAGE DURATION. Since the poverty rate among single parents is equal to the conditional probability that a single parent will enter poverty and the average duration of a poverty spell, we do implicitly account jointly for the duration of poverty spells and for their likelihood.

³⁴ This procedure effectively ignores single male parents. While the authors of this paper feel this is an important group, males comprise only about 10 per cent of the single parent population, and their income loss on divorce is considerably less than that of women.

2.4.4 – Old Age

Since income in old age is the result of a lifelong series of events and decisions, which we cannot hope to disentangle in this paper, we model the idea of “insecurity in old age” as the chance that an elderly person will be poor, and the average depth of that poverty.

The elderly poverty rate, defined on a LIM basis, declined from 26.5 per cent in 1971 to 9.6 per cent in 1997 (see Table 8). In contrast, the average poverty gap ratio declined from 25 per cent to 10. Consequently, the overall index of risk of poverty intensity fell 86 per cent between 1971 and 1997.

Again, to follow the convention that increases in the sub-components of the index of economic security are improvements, we want an index of “security” and not an index of “insecurity”, hence we multiply the risk of elderly poverty where increases are negative for economic well-being by -1 . A negative sign therefore indicates that an increased negative value represents a decline in well-being (and a decreased negative value an increase in well-being).

2.4.5 Overall Index of Economic Security

The four risks discussed above have been aggregated into an index of economic security (Table 9). The aggregation weights are the relative importance of the four groups in the population (Table A20).

- For unemployment, the proportion of the 15-64 population in the total population (66.8 per cent in 1997).
- For illness, the proportion of the population at risk of illness, which is 100 per cent.
- For single parent poverty, the proportion of the population comprised of married women with children under 18 (51.9 per cent in 1997).
- For old age poverty, the proportion of the population in immediate risk of poverty in old age, defined as the proportion of the 45-64 population in the total population (21.7 per cent in 1997).

The above proportions have been normalized for all years to one (Table A20), giving in 1997 the following weights-unemployment (0.2779), illness (0.4160), single parenthood (0.2158), and old age (0.0904).

Table 7: Canada, Risk imposed of Single Parent Poverty

Year	% of Women and children at Risk of Widowhood	Divorce rate (% of legally married couples) (A)	Poverty rate (%) for single women with children under 18 (B)	Poverty gap/poverty rate or average depth of poverty (C)	Index of A (A')	Index of B (B')	Index of C (C')	Multiplicative index (A'*B'*C')*-1
1971	57.73	0.585	49.5	0.41	1.000	1.000	1.0000	-1.0000
1972	57.50	0.631	49.5	0.41	1.079	1.000	1.0000	-1.0786
1973	57.28	0.706	49.5	0.41	1.207	1.000	1.0000	-1.2068
1974	57.05	0.854	52.8	0.40	1.460	1.066	0.9634	-1.4988
1975	56.83	0.947	56.0	0.38	1.619	1.131	0.9268	-1.6974
1976	56.60	1.001	55.5	0.41	1.711	1.121	0.9878	-1.8951
1977	56.38	1.010	55.0	0.43	1.726	1.111	1.0488	-2.0119
1978	56.15	1.032	54.8	0.45	1.764	1.107	1.0854	-2.1197
1979	55.93	1.064	54.6	0.46	1.819	1.103	1.1220	-2.2509
1980	55.70	1.095	52.7	0.45	1.872	1.065	1.0976	-2.1872
1981	55.48	1.180	50.8	0.44	2.017	1.026	1.0732	-2.2215
1982	55.25	1.215	45.2	0.39	2.077	0.913	0.9512	-1.8040
1983	55.03	1.171	51.0	0.38	2.002	1.030	0.9268	-1.9115
1984	54.80	1.103	56.8	0.37	1.885	1.147	0.9024	-1.9525
1985	54.58	1.040	57.1	0.39	1.778	1.154	0.9512	-1.9507
1986	54.35	1.302	56.1	0.37	2.226	1.133	0.9024	-2.2763
1987	54.13	1.586	55.8	0.38	2.711	1.127	0.9268	-2.8325
1988	53.90	1.367	54.4	0.37	2.337	1.099	0.9024	-2.3175
1989	53.68	1.312	53.7	0.35	2.243	1.085	0.8537	-2.0770
1990	53.45	1.263	59.0	0.36	2.159	1.192	0.8780	-2.2595
1991	53.23	1.235	58.1	0.36	2.111	1.174	0.8780	-2.1757
1992	53.00	1.258	54.7	0.34	2.150	1.105	0.8293	-1.9706
1993	52.78	1.238	53.7	0.31	2.116	1.085	0.7561	-1.7358
1994	52.55	1.246	54.4	0.32	2.130	1.099	0.7805	-1.8269
1995	52.33	1.222	54.9	0.32	2.089	1.109	0.7805	-1.8082
1996	52.10	1.225	54.9	0.32	2.093	1.109	0.7805	-1.8120
1997	51.88	1.225	54.9	0.32	2.093	1.109	0.7805	-1.8120

Nate: Data for 1996, 1997 is assumed to be equal data for 1995.

Table 8: Canada, Risk imposed by Old Age

Year	% 45-64 of pop 18+	Elderly poverty rate (A)	Elderly poverty gap (% of poverty line) (B)	Poverty intensity (C=A*B)	Poverty Intensity Index, C'
1971	28.60	26.5	0.25	0.0663	-1.0000
1972	28.41	26.5	0.25	0.0663	-1.0000
1973	28.21	26.5	0.25	0.0663	-1.0000
1974	28.02	32.0	0.27	0.0847	-1.2780
1975	27.82	37.4	0.28	0.1047	-1.5807
1976	27.63	38.1	0.30	0.1122	-1.6943
1977	27.33	38.7	0.31	0.1200	-1.8109
1978	27.03	37.4	0.29	0.1064	-1.6068
1979	26.73	36.0	0.26	0.0936	-1.4128
1980	26.43	33.4	0.24	0.0785	-1.1848
1981	26.13	30.8	0.21	0.0647	-0.9763
1982	25.98	22.8	0.18	0.0410	-0.6195
1983	25.98	21.4	0.18	0.0384	-0.5801
1984	25.78	19.9	0.18	0.0358	-0.5407
1985	25.59	17.5	0.17	0.0298	-0.4491
1986	25.39	18.9	0.16	0.0302	-0.4565
1987	25.46	17.0	0.16	0.0272	-0.4106
1988	25.53	20.4	0.16	0.0326	-0.4927
1989	25.59	19.7	0.14	0.0276	-0.4163
1990	25.66	17.2	0.13	0.0224	-0.3375
1991	25.73	12.7	0.12	0.0152	-0.2300
1992	25.80	11.7	0.12	0.0140	-0.2119
1993	25.87	12.5	0.15	0.0188	-0.2830
1994	25.93	9.9	0.13	0.0129	-0.1943
1995	26.00	9.6	0.10	0.0096	-0.1449
1996	26.07	9.6	0.10	0.0096	-0.1449
1997	26.14	9.6	0.10	0.0096	-0.1449

Note: Data on Poverty rate & Poverty Gap for 1996, 1997 is assumed to be equal data for 1995.
 Poverty Intensity = Poverty rate * Poverty gap

Table 9: Index of Economic Security, Canada

Year	Index 1 Unemployed Risk	Index 2 Illness Risk	Index 3 Single Parent Poverty Risk	Index 4 Old Age risk	Weight for Index of WAP (15+ Pop/ All Pop)	Weight for Index of Pop under risk for health	Weight for Index of women in poverty	Weight for Index of Elderly Pop	Weighted Index 1 Unemploy ment	Weighted Index 2 Health	Weighted Index 3 Women	Weighted Index 4 Old Age	Average Weighted Index
	A	B+2	C+2	D+2	E	F	G	H	I=A*E	J=B*F	K=C*G	L=D*H	M=I+J+K+L
1971	1.0000	1.0000	1.0000	1.0000	0.2635	0.4180	0.2413	0.0772	0.2635	0.4180	0.2413	0.0772	1.0000
1972	1.8792	1.0000	0.9214	1.0000	0.2640	0.4183	0.2405	0.0771	0.4961	0.4183	0.2216	0.0771	1.2132
1973	2.2504	1.0000	0.7932	1.0000	0.2663	0.4173	0.2390	0.0773	0.5994	0.4173	0.1896	0.0773	1.2836
1974	2.3269	1.0000	0.5012	0.7220	0.2690	0.4162	0.2374	0.0774	0.6259	0.4162	0.1190	0.0559	1.2170
1975	2.0220	1.0000	0.3026	0.4193	0.2717	0.4150	0.2359	0.0774	0.5493	0.4150	0.0714	0.0325	1.0682
1976	1.6919	1.0118	0.1049	0.3057	0.2703	0.4162	0.2356	0.0779	0.4572	0.4211	0.0247	0.0238	0.9269
1977	1.5262	1.0000	-0.0119	0.1891	0.2721	0.4157	0.2343	0.0778	0.4153	0.4157	-0.0028	0.0147	0.8429
1978	1.5726	1.0000	-0.1197	0.3932	0.2739	0.4151	0.2331	0.0778	0.4308	0.4151	-0.0279	0.0306	0.8486
1979	1.3785	0.9961	-0.2509	0.5872	0.2757	0.4147	0.2319	0.0776	0.3801	0.4131	-0.0582	0.0456	0.7806
1980	1.3321	0.9529	-0.1872	0.8152	0.2773	0.4146	0.2309	0.0772	0.3694	0.3951	-0.0432	0.0629	0.7842
1981	1.2864	0.9569	-0.2215	1.0237	0.2784	0.4147	0.2301	0.0768	0.3581	0.3969	-0.0510	0.0786	0.7826
1982	1.3807	0.9098	0.1960	1.3805	0.2788	0.4146	0.2291	0.0776	0.3849	0.3772	0.0449	0.1071	0.9141
1983	1.3634	0.8706	0.0885	1.4199	0.2794	0.4147	0.2282	0.0777	0.3809	0.3610	0.0202	0.1104	0.8725
1984	1.3647	0.8549	0.0475	1.4593	0.2798	0.4149	0.2274	0.0780	0.3819	0.3547	0.0108	0.1138	0.8611
1985	1.4244	0.8118	0.0493	1.5509	0.2802	0.4153	0.2266	0.0779	0.3991	0.3371	0.0112	0.1208	0.8682
1986	1.5253	0.7529	-0.2763	1.5435	0.2804	0.4157	0.2259	0.0779	0.4277	0.3130	-0.0624	0.1203	0.7986
1987	1.5533	0.7294	-0.8325	1.5894	0.2801	0.4168	0.2256	0.0775	0.4351	0.3040	-0.1878	0.1232	0.6745
1988	1.7518	0.7137	-0.3175	1.5073	0.2796	0.4175	0.2250	0.0779	0.4899	0.2980	-0.0715	0.1174	0.8337
1989	1.8273	0.7059	-0.0770	1.5837	0.2786	0.4187	0.2247	0.0780	0.5091	0.2955	-0.0173	0.1236	0.9109
1990	1.8609	0.6549	-0.2595	1.6625	0.2782	0.4193	0.2241	0.0784	0.5177	0.2746	-0.0582	0.1304	0.8645
1991	1.7137	0.5804	-0.1757	1.7700	0.2784	0.4193	0.2232	0.0791	0.4771	0.2434	-0.0392	0.1400	0.8212
1992	1.5110	0.5098	0.0294	1.7881	0.2779	0.4181	0.2216	0.0825	0.4199	0.2131	0.0065	0.1475	0.7870
1993	1.3922	0.4471	0.2642	1.7170	0.2782	0.4176	0.2204	0.0838	0.3873	0.1867	0.0582	0.1439	0.7761
1994	1.2080	0.3843	0.1731	1.8057	0.2781	0.4170	0.2192	0.0857	0.3360	0.1603	0.0379	0.1547	0.6889
1995	1.0713	0.3373	0.1918	1.8551	0.2778	0.4168	0.2181	0.0872	0.2976	0.1406	0.0418	0.1618	0.6419
1996	0.9836	0.2471	0.1880	1.8551	0.2778	0.4165	0.2170	0.0888	0.2732	0.1029	0.0408	0.1647	0.5817
1997	0.8273	0.1709	0.1880	1.8551	0.2779	0.4160	0.2158	0.0904	0.2299	0.0711	0.0406	0.1676	0.5092

Sources: Tables 5,6,7,8 for indexes, and Table A20 for weights.

In order that the base year for the indexes of all risks of economic security be the same at 1.000 in Table 9, the constant 2 has been added to the indexes of risk of illness, single parenthood, and old age, whose original base was -1.

Based on the above weights, the overall index of economic security declined 49.1 per cent between 1971 and 1997 (see Table 9 and Chart 2). The increased risk from unemployment was the driving force behind this development, both because of a rising unemployment rate and the reduced coverage provided by UI/EI. Increased private expenditure on health and increased risk of single parent poverty due to the doubling of the divorce rate and the increased poverty rate for single mothers also contributed to the rise. Canada's success story from an economic security perspective has been the fall in the poverty rate of the elderly – which has meant that those approaching old age have had a lower risk of indigence in old age to worry about.

2.4.6 - Other aspects of insecurity

unanticipated inflation

Anticipated inflation does not create “insecurity” since inflationary expectations become embedded in interest rates, which are known to both borrower and lender. Unanticipated inflation, however, causes unanticipated changes in the real value of money assets and liabilities and an unanticipated redistribution of real income. Since individuals worry about the possibility of such losses and gains, unanticipated inflation can also contribute to economic insecurity.³⁵

The absolute value of unanticipated inflation (actual-expected inflation) dropped from an average of 1.49 per cent in 1975-84 to 0.73 per cent in 1985-95 (Table A21). At this time, no estimates of the costs of unanticipated inflation made been incorporated in the index.³⁶

However, given the relatively small absolute change in inflation uncertainty, we expect the influence of this variable to be small.

personal security indicators

Freedom from economic catastrophe constitutes an element of economic security. Such catastrophes include crime, auto accidents and work accidents, which can cripple the ability of those affected to earn a living. The incidence of crime reported to police in Canada has increased

³⁵ A related issue is the belief by some that low inflation contributes more to economic well-being and economic security than moderate inflation because low inflation is associated with less price variability. But a recent Bank of Canada paper (Ragan, 1998) concludes “... the current state of economic research-both empirical and theoretical-provides little basis for believing in significant observable benefits of low inflation such as an increase in the growth rate of real GDP. Moreover, what observable benefits do exist are unlikely to justify a policy of disinflation, even if the transitional costs of disinflation are quite moderate.”

³⁶ To calculate the unanticipated component of inflation, one must specify a model of inflationary expectations. Since several such models exist and their virtues are arguable. In the future, we plan to adopt the simpler strategy of using the Iscan and Xu (1998) estimates of the variability of inflation as a proxy for unanticipated inflation. Since only the money denominated portions of personal wealth are exposed to inflation risk, we will multiply the year to year percentage change in inflation variability by the percentage of bonds in national balance sheet assets, weighted by the percentage of the population holding such assets.

significantly in recent years. The incidence of violent crime doubled from 491 incidents per 100,000 population in 1971 to 995 in 1995 (Table A22). The incidence of property crime rose 44.0 per cent from 3,638 incidents per 100,000 in 1971 to 5,237 in 1995.

In contrast to rising crime trends, the probability of being killed in an auto accident or on the job has fallen. In 1971, 25.3 persons per 100,000 were killed in auto accidents (Table A23). By 1996, this had fallen 59.3 per cent to 10.3 per 100,000. The probability of being injured in an auto accident also fell, but only by 11.8 per cent. The probability of being killed or injured on the job has also declined, in part because of the employment shift to less dangerous service industries.

The Canadian Council for Social Development is currently developing a personal security index, which may be useful as a sub-component of the economic security component of the index of economic well-being.

3. Estimates of the Overall Index of Economic Well-being for Canada

3.1 Weighting of components

Trends in the index are determined by the choice of variables that are included in the index, the trends in those variables and the weights given these variables. Since the four main dimensions of average consumption, bequest, inequality/poverty and insecurity are separately identified, it is easy to conduct sensitivity analyses of the impact on perceived overall trends of different weighting of these dimensions. For discussion purposes, consumption flows have been given a weight of 0.4, wealth stocks a weight of 0.1, and equality and economic security have each been given weights of 0.25.

As the sub-components of the consumption flows and wealth stocks are expressed in dollars, there is no need for explicit weighting. Their dollar values represent implicit weights. In terms of the inequality/poverty subcomponents, a Rawlsian perspective assigns greater importance to poverty than to overall inequality trends, and a weight of 0.1877 or ($=0.25 \times 0.75$) has therefore been given poverty intensity and 0.0625 ($=0.25 \times 0.25$) to the Gini coefficient. In other words, poverty is given three times the weight of inequality. The subcomponents of the economic security index are weighted by the relative importance of the specific population at risk. In the total population.

The weighting of components and subcomponents of the economic well-being index are shown below and in Chart 1.

Chart 1: Weighting Tree

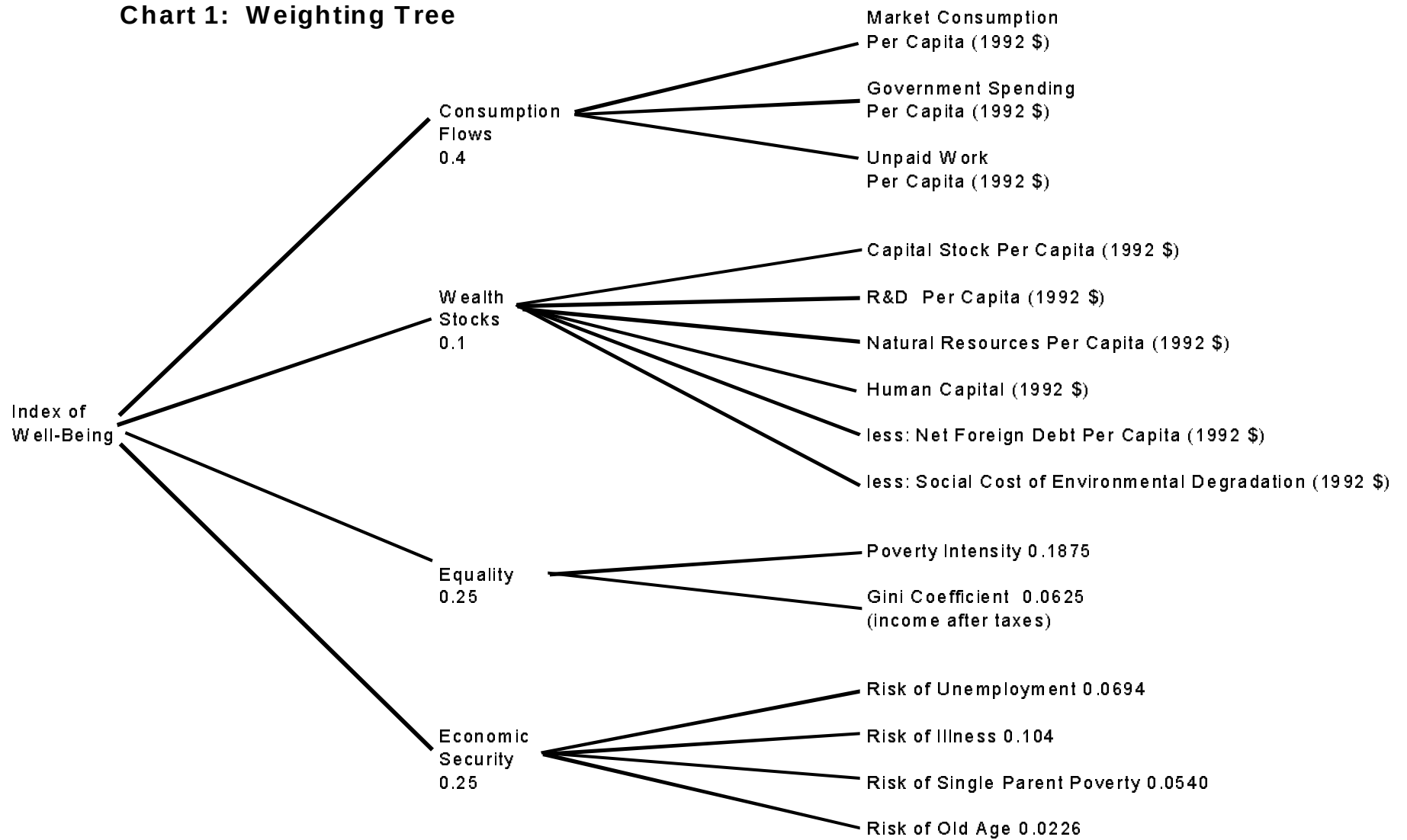


Table 10: Overall Well being Index, Canada

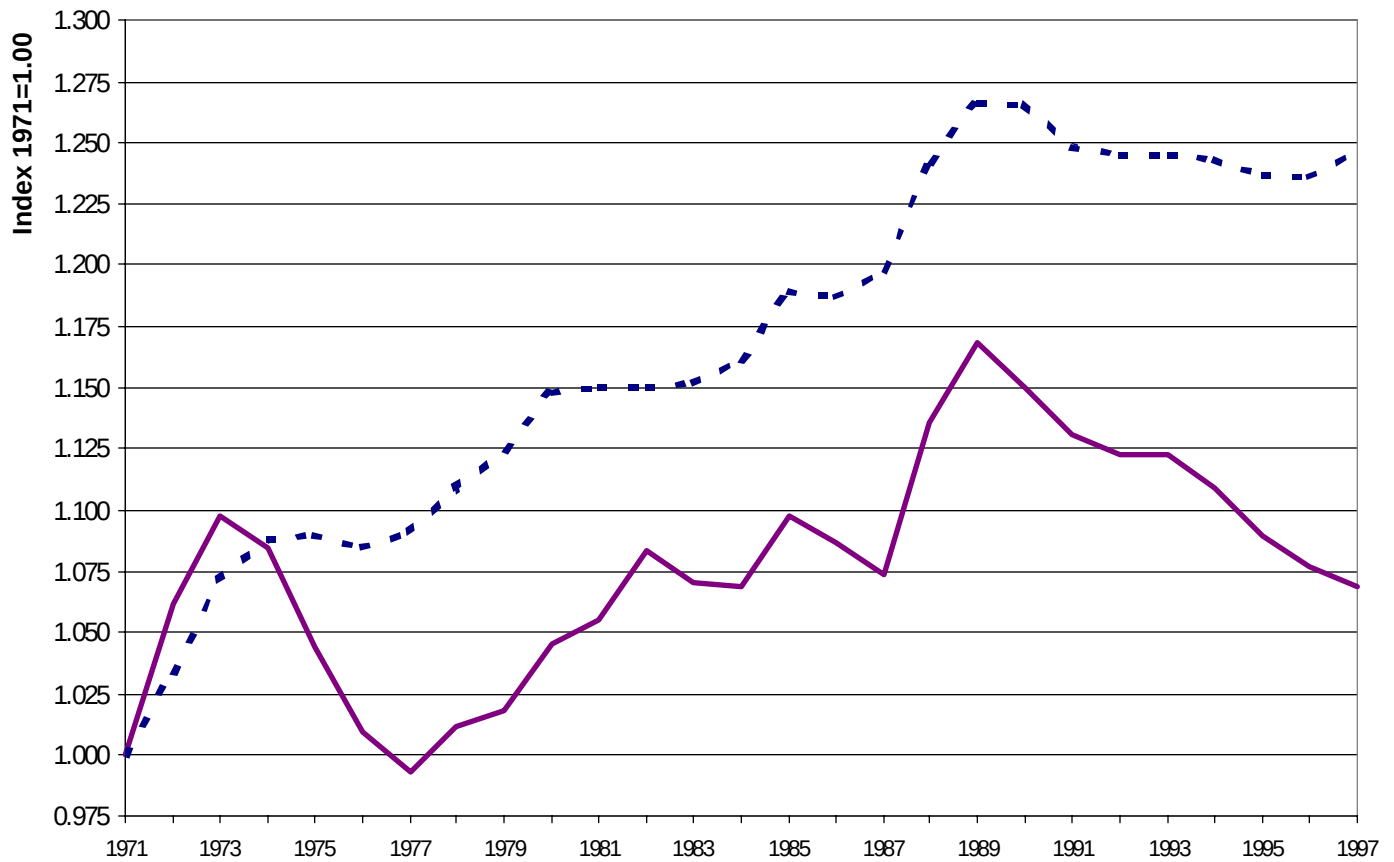
Year	Consumption Flows 0.4	Wealth Stocks 0.1	Inequality Measures	Equality Measures 0.25	Economic Security 0.25	Well-being Index
	A	B	C	D=C+2	E	$G=0.4*A+0.1*B+0.25*D+0.25*E$
1971	1.0000	1.0000	-1.0000	1.0000	1.0000	1.0000
1972	1.0176	1.0020	-0.9966	1.0034	1.2132	1.0614
1973	1.0576	1.0255	-0.9966	1.0034	1.2836	1.0973
1974	1.0956	1.0588	-1.0565	0.9435	1.2170	1.0842
1975	1.1244	1.0826	-1.1218	0.8782	1.0682	1.0446
1976	1.1402	1.0983	-1.1542	0.8458	0.9269	1.0091
1977	1.1601	1.1146	-1.1722	0.8278	0.8429	0.9932
1978	1.1786	1.1302	-1.1398	0.8602	0.8486	1.0117
1979	1.1949	1.1931	-1.0966	0.9034	0.7806	1.0183
1980	1.2122	1.2605	-1.0464	0.9536	0.7842	1.0454
1981	1.2137	1.2207	-0.9912	1.0088	0.7826	1.0554
1982	1.1925	1.2255	-0.9791	1.0209	0.9141	1.0833
1983	1.2022	1.2495	-1.0138	0.9862	0.8725	1.0705
1984	1.2194	1.2552	-1.0395	0.9605	0.8611	1.0687
1985	1.2520	1.2403	-0.9764	1.0236	0.8682	1.0978
1986	1.2619	1.1843	-0.9452	1.0548	0.7986	1.0865
1987	1.2879	1.2129	-0.9250	1.0750	0.6745	1.0738
1988	1.3217	1.2400	-0.9022	1.0978	0.8337	1.1356
1989	1.3412	1.2556	-0.8865	1.1135	0.9109	1.1681
1990	1.3476	1.3010	-0.9406	1.0594	0.8645	1.1501
1991	1.3323	1.2773	-0.9392	1.0608	0.8212	1.1312
1992	1.3334	1.2699	-0.9385	1.0615	0.7870	1.1225
1993	1.3333	1.2712	-0.9271	1.0729	0.7761	1.1227
1994	1.3382	1.2912	-0.9107	1.0893	0.6889	1.1090
1995	1.3389	1.3125	-0.9534	1.0466	0.6419	1.0889
1996	1.3442	1.3275	-0.9567	1.0433	0.5817	1.0767
1997	1.3672	1.3428	-0.9567	1.0433	0.5092	1.0693

Sources: Tables 2,3,4,9

Table 11: Canada, Comparison of Index of Economic Well-Being to GDP per capita, MEW, GPI, and ISH Indexes

Year	Economic Well-Being Index	Sustainable MEW Index	GPI Index	ISH Index	GDP mil 1992\$	Population thous.	Gdp per Capita 1992\$	GDP per Capita Index
1971	1.000	1.000	1.000	1.000	370859	21,780	17,028	1.0000
1972	1.061	0.877	0.985	1.190	390702	22,253	17,557	1.0311
1973	1.097	0.934	0.990	1.167	418797	22,521	18,596	1.0921
1974	1.084	0.833	1.045	1.381	436151	22,839	19,097	1.1215
1975	1.045	0.995	1.070	1.381	445813	23,169	19,242	1.1300
1976	1.009	1.131	1.091	1.524	470291	23,482	20,028	1.1762
1977	0.993	0.991	1.036	1.548	486562	23,764	20,475	1.2024
1978	1.012	0.833	1.104	1.548	506413	24,008	21,093	1.2387
1979	1.018	1.042	1.071	1.667	527703	24,245	21,765	1.2782
1980	1.045	1.067	1.130	1.643	535007	24,548	21,794	1.2799
1981	1.055	1.096	1.251	1.548	551305	24,864	22,172	1.3021
1982	1.083	0.947	1.233	1.357	535113	25,167	21,262	1.2487
1983	1.070	1.298	1.179	1.286	549843	25,425	21,626	1.2700
1984	1.069	1.141	1.037	1.310	581038	25,671	22,634	1.3292
1985	1.098	1.029	0.968	1.333	612416	25,912	23,634	1.3880
1986	1.087	1.072	1.109	1.310	628575	26,171	24,018	1.4105
1987	1.074	1.154	1.125	1.333	654360	26,503	24,691	1.4500
1988	1.136	1.108	1.179	1.381	686176	26,856	25,550	1.5005
1989	1.168	1.072	1.158	1.381	703577	27,318	25,755	1.5125
1990	1.150	1.006	1.151	1.310	705464	27,733	25,438	1.4939
1991	1.131	1.215	1.197	1.071	692247	28,086	24,648	1.4475
1992	1.122	1.200	1.085	1.214	698544	28,481	24,526	1.4404
1993	1.123	1.145	1.041	1.190	716123	28,858	24,815	1.4573
1994	1.109	1.233	1.117	1.167	744220	29,220	25,470	1.4958
1995	1.089	1.231		1.143	760309	29,574	25,709	1.5098
1996	1.077				769730	29,918	25,728	1.5110
1997	1.069				798183	30,241	26,394	1.5501

Chart 2: Total Economic Well Being Index



— Well Being Index = $0.4 \times \text{Consumption} + 0.1 \times \text{Wealth} + 0.25 \times \text{Inequality} + 0.25 \times \text{Security}$
 - - Well Being Index = $0.7 \times \text{Consumption} + 0.1 \times \text{Wealth} + 0.1 \times \text{Inequality} + 0.1 \times \text{Security}$

Weighting of the Index of Economic Well-being
(weights of total index in brackets)

<u>Basic Component</u>	<u>Sub-components</u>
Consumption Flows (0.40)	real total consumption (dollars per capita) real per capita current government spending excluding debt charges (dollars) real current government spending on goods and services excluding debt service (dollars per capita) real value of unpaid labour (dollars per capita)
Stocks of Wealth (0.10)	real capital stock (including housing) (dollars per capita) real R&D stock (dollars per capita) real stock of natural resources (dollars per capita) real human capital stock (dollars per capita) real net foreign debt (dollars per capita) real social cost of environmental degradation (CO2 emissions) (dollars per capita)
Equality (0.25)	LIM poverty intensity (0.1875) After-tax income Gini coefficient (0.0625)
Security ³⁷ (0.25)	risk of unemployment (0.0694) risk of illness (0.1040) risk of single parenthood (0.0540) risk of old age (0.0226)

The formula for the overall index follows:

$$IEWB = (0.4)[C+G+UP] + (0.1)[K+ R\&D+NR+HC-D-ED] + [(0.1875 (LIM)+(0.0625)Gini)+ [(0.0694)UR+(0.1040)ILL+(0.0540)SP+ (0.0226)OLD]$$

where

IEWB= index of economic well-being

C= real per capita adjusted personal consumption

G= real per capita current government spending excluding debt charges

UP= real value of per capita unpaid labour

K= real per capita capital stock (including housing)

R&D= real per capita stock of research and development

³⁷The weights are for 1997. The actual weights used vary by year.

NR= real per capita stock of natural resource wealth

HC= real per capita stock of human capital

D= real per capita net foreign debt

ED= real per capita social costs of environmental degradation (CO2 emissions)

LIM= poverty intensity

Gini= Gini coefficient for after tax income

UR= risk of unemployment

ILL= risk of illness

SP= risk of single parenthood

OLD= risk of old age

Table 10 shows the indexes for all four components of the index of economic well-being and the overall index. To put all the sub-components to a common base of 1, the constant 2 has been added to the index of inequality (Table 4) to convert it to an index where an increase corresponds to a rise in economic well-being.

3.2 Trends in the overall index of economic well-being

The overall index of economic well-being for Canada showed no overall trend in the 1970s, rose in the 1980s to a peak on 1.168 in 1989 (1971=1.00), and has fallen continually in the 1990s, reaching 1.069 in 1997 (Actual data for a number of series for 1997 are not yet available and estimates have been used. For this reason, the index for 1997 is preliminary and subject to revision).

Some of the year-to-year movement in the index reflects the sensitivity to the business cycle by certain components of the index. For example, consumption flows depend on personal income, which is determined largely by demand-driven employment levels. Wealth stocks include the capital stock which is determined by cyclically-sensitive investment, and the value of natural resources, which reflects cyclical commodity prices. The two inequality measures (poverty intensity and Gini coefficients) are influenced by the state of the economy (Sharpe and Zyblock, 1997). Finally, a number of the components of the economic security index are also very sensitive to the business cycle, such as the employment population ratio.

Trends in the index are, not surprisingly, very sensitive to the weighting given the four components. As mentioned earlier, for discussion purposes our preferred weighting is the following: consumption 0.4, stocks of wealth 0.1, equality 0.25, and security 0.25. Chart 2 shows trends in the index with consumption flows given a much greater weight (0.7) and the other three components each with weights of 0.1. This index exhibits a different pattern during certain periods. While the two indexes tracked each other in the early years of the 1970s, they diverged in mid-decade, with the index with the higher consumption weight

stable and the index with the lower weight declining. From the late 1970s to the late 1980s, the indexes again tracked one another. Then in the 1990s, they diverged again, with the high-consumption-weighted index falling slightly and the high-equality and security-weighted index falling much more.

Table 12: Trends in Components of the Economic Well-being Index for Canada, 1971-97 (per cent change)

	1971-97	1971-80	1980-1989	1989-1997
Overall Index (1.0)	6.9	4.5	11.7	-8.5
Consumption Flows (0.4)	36.7	21.2	10.6	1.9
Wealth Stocks (0.1)	34.3	26.1	-0.4	6.9
Inequality (0.25)	4.3	-4.6	16.8	-6.3
Economic Security (0.25)	-49.1	-21.6	16.2	-44.1

Source: Table 10

Table 12 and Chart 3 provide a breakdown of the changes in the four components of the index over the 1971-97 period and in the 1970s, 1980s, and 1990s. Over the 26 year period covered by the time series, the economic security component experienced the largest change of any of the four components of the index, down 49.1 per cent. This change reflected the large increase in the risk of illness and of single-parenthood (Table 9). There were improvements in all the other components of well-being, with consumption up 36.7 per cent, wealth stocks up 34.3 per cent and equality up 4.3 per cent.

The absolute decline in the index in the 1990s reflects fall in the indexes for consumption, equality, and security. The latter index fell 44.1 per cent due to large increases in the risks associated with unemployment and illness (Table 9).

3.3 Comparisons of trends in the index of economic well-being with other indexes of well-being

Table 11 and Chart 4 show that the index of economic well-being tracked real GDP per capita in the first half of the 1970s, and then fell behind, with the gap growing greatly over time. By 1989, the GDP per capita index had reached 158.8, compared to 116.8 for the index of economic well-being, indicating growth of this conventional measure of economic welfare had been more than three times as fast as the index of economic well-being over the 1971-89 period (2.8 per cent per year versus 0.9 per cent). In the 1990s, GDP per capita fell, but by 1997 had regained its 1989 pre-recession level. The index of economic well-being has also fallen in the 1990s, but in contrast to GDP per capita has not rebounded and in 1997 was 8.6 per cent below the 1989 peak. Overall the 1971-97 period, real per capita GDP was up 58.3 per cent, nearly 10 times the rate of advance of the index of economic well-being (6.7 per cent).

The divergence between growth in GDP per capita and the economic well-being index since 1971 is partly explained by slower growth in per capita consumption and stocks of wealth, but more importantly by the failure of economic equality to increase and the large fall in economic security.

Chart 3: Total Economic Well Being Index and Components

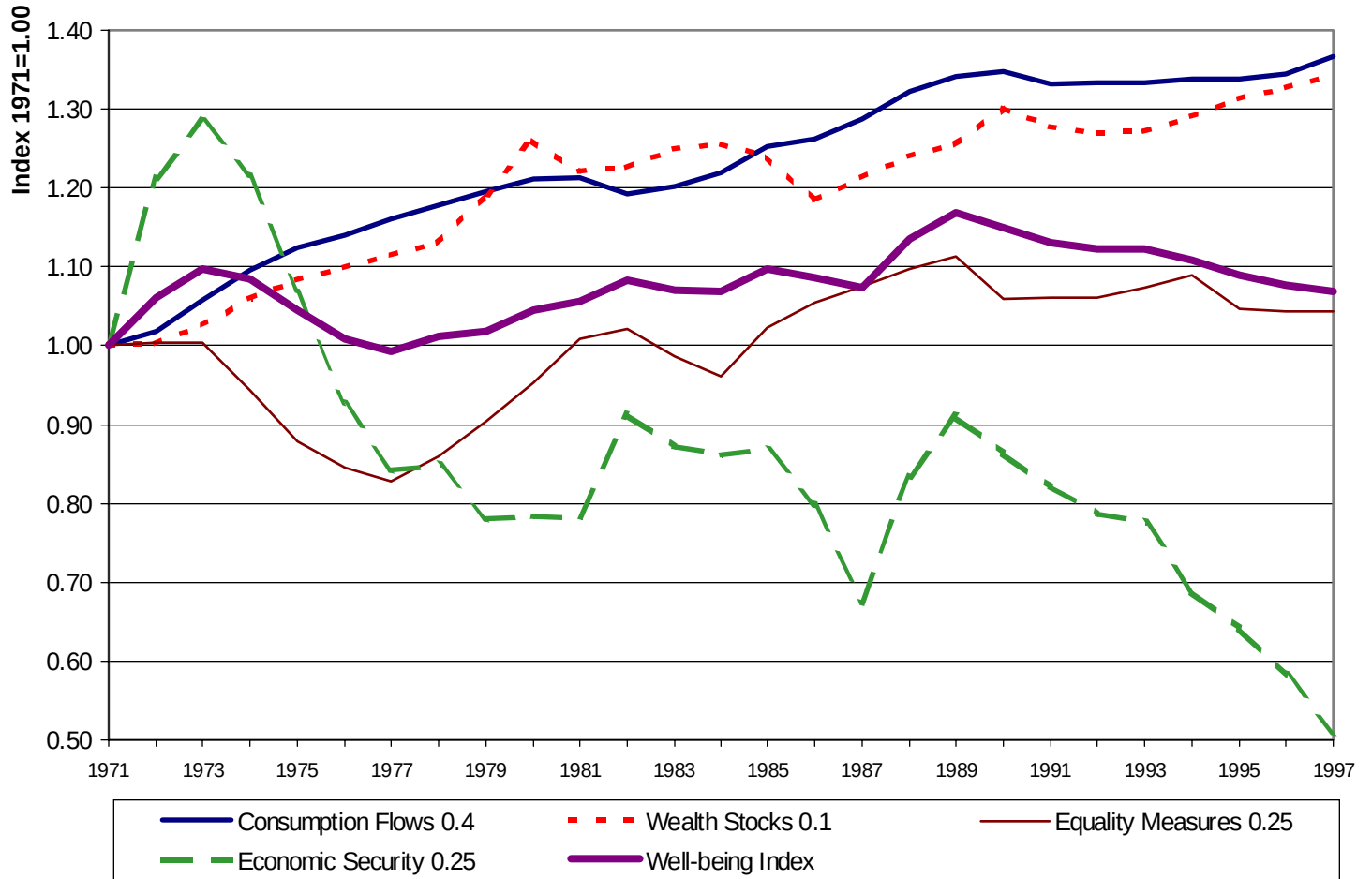


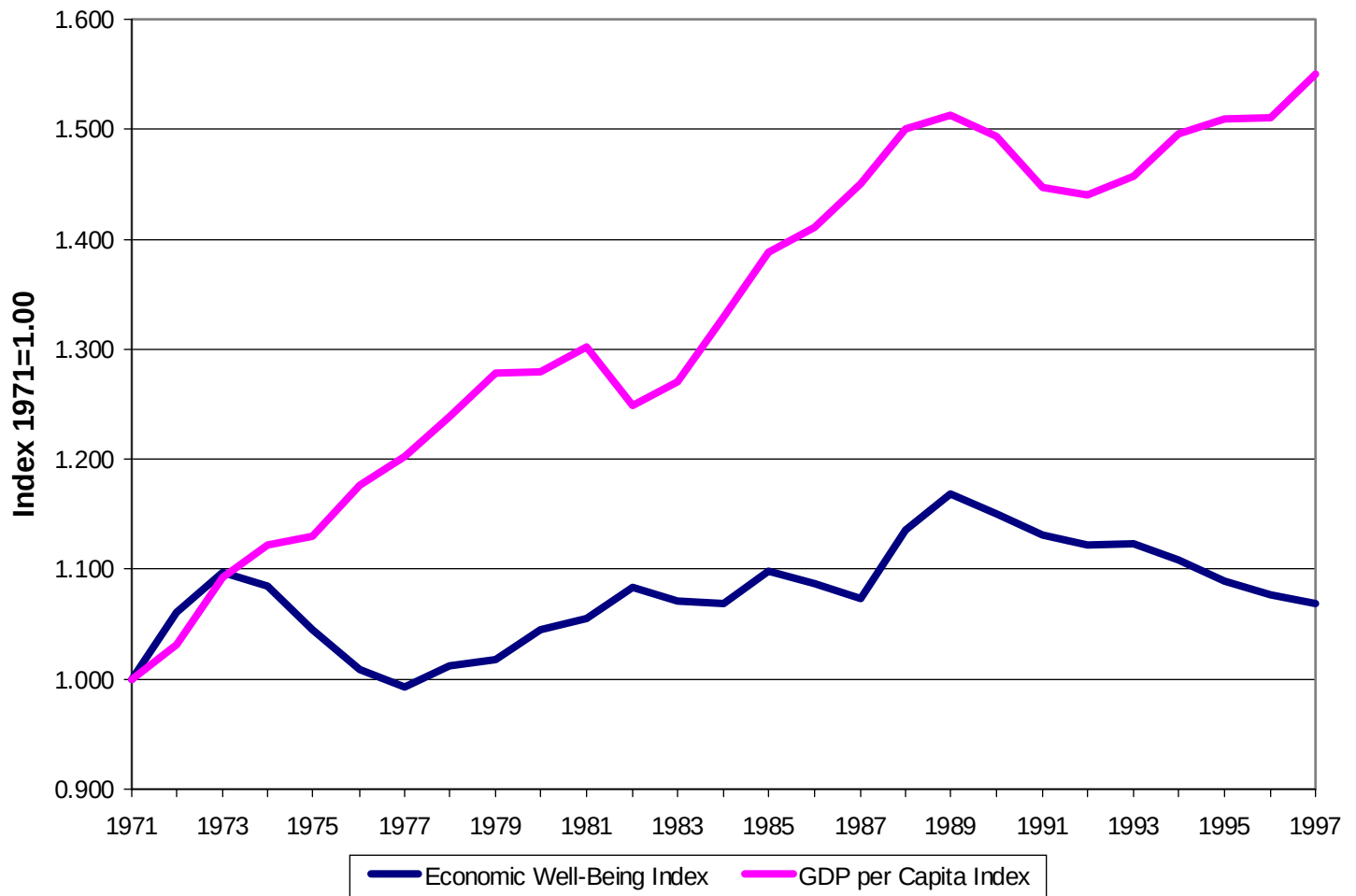
Chart 4: Trends in Economic Well-Being & GDP Per Capita Indexes

Chart 5: Trends in Economic Well-Being, Sustainable MEW, GPI, and ISH Indexes

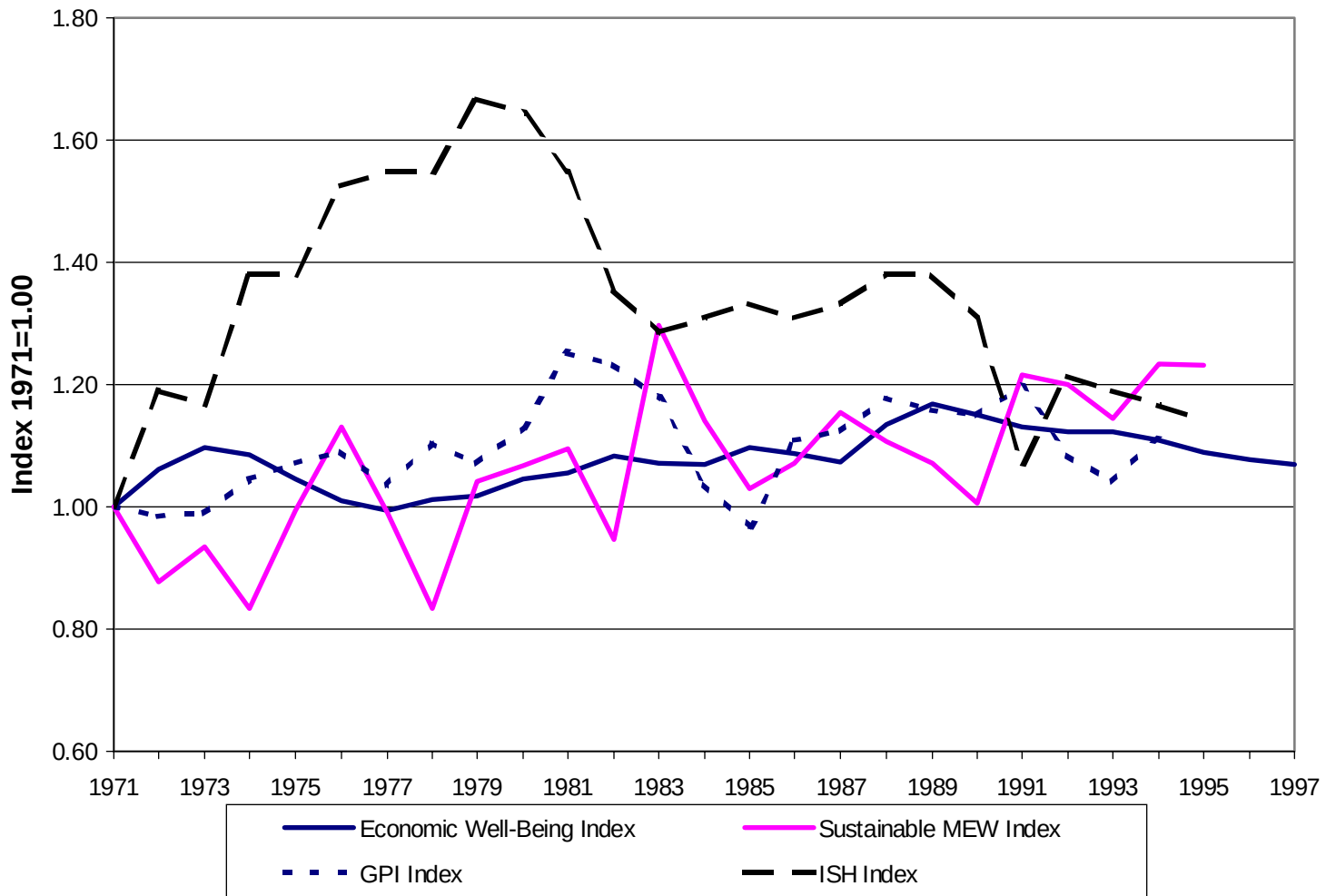


Table 11 and Chart 5 compare the trend in the index of economic well-being with that of the Genuine Progress Indicator (GPI) and the Measure of Economic Welfare (MEW), both of which Statistics Canada has estimated for Canada (Messinger, 1997), and the Index of Social Health (ISH), which Human Resources Development Canada has recently estimated for Canada and the provinces (Brink and Zeesman, 1997). The data upon which both the GPI, MEW and ISH are based are given in Tables A24-26.

Between 1971 and 1995 (the most recent year for which data are available) the GPI increased 11.7 per cent, the sustainable MEW 23.1 per cent, and the ISH 14.3 per cent.³⁸ Thus the 8.9 per cent increase in the index of economic well-being between 1971 and 1995 represented a smaller increase than that experienced by other three alternative indicators.

4. Directions for Future Research

There are a number of priorities for future development. For consumption flows, priorities include the inclusion of data on changes in the amount of leisure time (either an index or an adjustment to consumption); better data on the valuation of increased life expectancy (either index or adjustment to consumption); and more data on regrettables such as commuting and crime-prevention expenditure (adjustment to consumption).

For stocks of wealth, priorities include the inclusion of the stock of consumer durables or a household facility index; indexes of environmental quality and sustainability; better data on the stock of human capital; and data on the stock of social capital.

For the economic insecurity component, priorities for revision are the incidence of crime; and the insecurity created by unanticipated inflation (actual minus moving average of past inflation).

5. Conclusion

This paper has developed an index of economic well-being based on four dimensions or components of economic well-being, with the weight given each component in brackets—consumption flows (0.4), stocks of wealth including physical capital and natural resources (0.1), equality (0.25), and economic security (0.25). Estimates for the index for Canada for the 1971-97 period are given.

We argue that providing explicit weights of these components of well-being is important in enabling other observers to assess whether, by their values of what is important in economic well-being, they would agree with this assessment of trends in the Canadian economy.

A key finding is the economic well-being of Canadians, at least as measured by the index constructed in this paper, has increased at a much slower rate over the last 25 years than real GDP per capita, a widely-used indicator of economic well-being. This result is consistent with the trend observed in other indexes of social and economic well-being such as the Genuine Progress Indicator and the Index of Social Health. The index also shows a large (10 per cent absolute deterioration of economic well-being in Canada in the 1990s.

³⁸ Both the GPI and the MEW are expressed in dollars. In 1971, the GPI was \$8,018 per capita (1986 dollars) while the MEW was \$27,466.

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Table A1: Canada, Personal Consumption on Consumer Goods and Services

Measure	Personal Consumption (millions of 1992 \$)	Population (persons)	Personal Consumption per capita (1992 \$)	Index 1971=1.00
Matrix Series	6535 *d15372	1 *d1		
1961	134,009	18,238,000	7,348	0.761
1962	140,860	18,583,000	7,580	0.785
1963	146,731	18,931,000	7,751	0.803
1964	154,507	19,277,200	8,015	0.830
1965	163,548	19,633,500	8,330	0.863
1966	171,654	19,997,500	8,584	0.889
1967	178,057	20,363,700	8,744	0.905
1968	185,983	20,692,000	8,988	0.931
1969	195,023	20,994,200	9,289	0.962
1970	198,364	21,287,500	9,318	0.965
1971	210,322	21,779,600	9,657	1.000
1972	224,819	22,253,000	10,103	1.354
1973	240,443	22,521,300	10,676	1.431
1974	252,874	22,839,300	11,072	1.484
1975	263,377	23,168,800	11,368	1.524
1976	277,572	23,481,900	11,821	1.584
1977	285,897	23,764,100	12,031	1.612
1978	295,598	24,008,400	12,312	1.650
1979	303,855	24,245,300	12,533	1.680
1980	309,935	24,548,200	12,626	1.692
1981	314,720	24,864,400	12,657	1.696
1982	306,931	25,167,300	12,196	1.635
1983	315,693	25,425,200	12,417	1.664
1984	329,926	25,670,900	12,852	1.723
1985	346,955	25,912,100	13,390	1.795
1986	360,738	26,171,000	13,784	1.847
1987	375,678	26,502,500	14,175	1.900
1988	392,093	26,855,800	14,600	1.957
1989	406,034	27,318,300	14,863	1.992
1990	411,343	27,733,000	14,832	1.988
1991	405,783	28,085,700	14,448	1.936
1992	412,940	28,481,300	14,499	1.943
1993	420,595	28,858,300	14,574	1.953
1994	433,812	29,219,500	14,847	1.990
1995	441,263	29,573,600	14,921	2.000
1996	451,682	29,917,500	15,098	2.024
1997	470,177	30,241,100	15,548	2.084

Note: Population is the annual average number of persons for the quarterly estimates.
For all Appendix Tables *D, *P numbers are CANSIM series numbers.

Table A2: Canada, Government Spending, all levels.

Matrix Series	Real Current Expenditure (mill. of 1992 \$) 6522 *d14848	Population (persons) thousands 1 *d1	Real Current Expenditure Per Capita (1992 \$)	Index 1971=1.00
1961	51557	18,238.0	2,826.90	0.6730
1962	53923	18,583.0	2,901.74	0.6908
1963	55760	18,931.0	2,945.43	0.7012
1964	58702	19,277.2	3,045.15	0.7250
1965	61356	19,633.5	3,125.07	0.7440
1966	66789	19,997.5	3,339.87	0.7951
1967	72649	20,363.7	3,567.57	0.8493
1968	77397	20,692.0	3,740.43	0.8905
1969	80760	20,994.2	3,846.78	0.9158
1970	87850	21,287.5	4,126.83	0.9825
1971	91485	21,779.6	4,200.49	1.0000
1972	94346	22,253.0	4,239.70	1.0093
1973	98782	22,521.3	4,386.16	1.0442
1974	105059	22,839.3	4,599.92	1.0951
1975	112092	23,168.8	4,838.06	1.1518
1976	114247	23,481.9	4,865.32	1.1583
1977	119590	23,764.1	5,032.38	1.1980
1978	121700	24,008.4	5,069.06	1.2068
1979	122979	24,245.3	5,072.28	1.2075
1980	127172	24,548.2	5,180.50	1.2333
1981	129157	24,864.4	5,194.45	1.2366
1982	131901	25,167.3	5,240.97	1.2477
1983	134119	25,425.2	5,275.04	1.2558
1984	135654	25,670.9	5,284.35	1.2580
1985	141501	25,912.1	5,460.81	1.3000
1986	144166	26,171.0	5,508.62	1.3114
1987	146180	26,502.5	5,515.71	1.3131
1988	152897	26,855.8	5,693.26	1.3554
1989	157195	27,318.3	5,754.20	1.3699
1990	162937	27,733.0	5,875.20	1.3987
1991	167541	28,085.7	5,965.35	1.4202
1992	169262	28,481.3	5,942.92	1.4148
1993	168864	28,858.3	5,851.49	1.3930
1994	165888	29,219.5	5,677.30	1.3516
1995	165244	29,573.6	5,587.55	1.3302
1996	163164	29,917.5	5,453.80	1.2984
1997	162988	30,241.1	5,389.62	1.2831

Note: Series d15599 is the Implicit price index, G.D.P., 1992 =100, Net government current expenditure on goods and services.

Table A3: Unpaid Work, Canada: (millions of 1992 \$)

Year	Replacement Cost by Generalist	Population	Unpaid Work Per Capita (1986 \$)	Unpaid Work Per Capita (1992 \$)	Index 1971=1.00
1961	88,398	18,238.0	4,846.91	6,206.03	0.999
1962	89,990	18,583.0	4,842.59	6,200.50	0.998
1963	91,610	18,931.0	4,839.17	6,196.12	0.997
1964	93,260	19,277.2	4,837.84	6,194.41	0.997
1965	94,939	19,633.5	4,835.58	6,191.52	0.997
1966	96,649	19,997.5	4,833.05	6,188.29	0.996
1967	98,389	20,363.7	4,831.60	6,186.43	0.996
1968	100,161	20,692.0	4,840.57	6,197.91	0.998
1969	101,965	20,994.2	4,856.80	6,218.70	1.001
1970	103,801	21,287.5	4,876.14	6,243.46	1.005
1971	105,670	21,779.6	4,851.79	6,212.28	1.000
1972	107,866	22,253.0	4,847.27	6,206.49	0.999
1973	110,108	22,521.3	4,889.07	6,260.01	1.008
1974	112,397	22,839.3	4,921.20	6,301.15	1.014
1975	114,733	23,168.8	4,952.04	6,340.64	1.021
1976	117,117	23,481.9	4,987.56	6,386.12	1.028
1977	119,552	23,764.1	5,030.77	6,441.44	1.037
1978	122,036	24,008.4	5,083.07	6,508.42	1.048
1979	124,573	24,245.3	5,138.02	6,578.77	1.059
1980	127,162	24,548.2	5,180.10	6,632.65	1.068
1981	129,805	24,864.4	5,220.52	6,684.40	1.076
1982	130,291	25,167.3	5,176.99	6,628.67	1.067
1983	130,779	25,425.2	5,143.67	6,586.00	1.060
1984	131,268	25,670.9	5,113.51	6,547.38	1.054
1985	131,760	25,912.1	5,084.87	6,510.72	1.048
1986	132,253	26,171.0	5,053.42	6,470.45	1.042
1987	135,478	26,502.5	5,111.91	6,545.34	1.054
1988	138,783	26,855.8	5,167.70	6,616.77	1.065
1989	142,167	27,318.3	5,204.11	6,663.39	1.073
1990	145,635	27,733.0	5,251.31	6,723.83	1.082
1991	149,187	28,085.7	5,311.83	6,801.32	1.095
1992	152,825	28,481.3	5,365.80	6,870.42	1.106
1993	156,552	28,858.3	5,424.86	6,946.04	1.118
1994	160,370	29,219.5	5,488.47	7,027.49	1.131
1995	164,282	29,573.6	5,555.01	7,112.69	1.145
1996	168,288	29,917.5	5,625.08	7,202.40	1.159
1997	172,393	30,241.1	5,700.60	7,299.11	1.175

Source: Data for 1961, 1971, 1981, 1986, and 1992 are from Statistics Canada *Household's Unpaid Work: Measurement and Valuation* Cat. No. 13-603E. Data between these years are interpolated on assumption of constant growth between given years. Data for 1993 onwards are extrapolated on assumption of constant growth from the 1986 to 1992 period.

Recalculation into 1992 dollars base has done with CPI (P200000) 1992=100, 1986=78.1

Table A4: Canada, Value and Losses of Leisure Time

Year	Imputation for Leisure (mil 1986\$)	Per Capita Imputation for Leisure (1986\$)	Index 1971=1.00	Loss of Leisure Time (bil 1986\$)	Per Capita Loss of Leisure (1986 \$)	Index 1971=1.00
1971	354,723	16,105	1.000	4.7	213	1.000
1972	370,980	16,647	1.034	6.7	301	0.710
1973	370,125	16,406	1.019	13.3	590	0.362
1974	384,245	16,798	1.043	13.8	603	0.354
1975	403,432	17,383	1.079	11.4	491	0.434
1976	431,272	18,338	1.139	11.1	472	0.452
1977	441,056	18,535	1.151	11.9	500	0.427
1978	432,009	17,973	1.116	17.1	711	0.300
1979	432,873	17,831	1.107	21.1	869	0.246
1980	448,714	18,246	1.133	19.1	777	0.275
1981	450,687	18,100	1.124	20.4	819	0.260
1982	468,031	18,571	1.153	6.3	250	0.854
1983	466,453	18,324	1.138	12.6	495	0.431
1984	464,272	18,064	1.122	17.7	689	0.310
1985	462,104	17,813	1.106	19.6	756	0.282
1986	457,219	17,448	1.083	21.0	801	0.266
1987	453,025	17,063	1.059	22.6	851	0.251
1988	453,326	16,855	1.047	25.4	944	0.226
1989	461,876	16,870	1.047	24.2	884	0.241
1990	468,015	16,841	1.046	20.9	752	0.284
1991	481,476	17,122	1.063	12.9	459	0.465
1992	504,447	17,674	1.097	12.6	441	0.483
1993	510,869	17,648	1.096	15.0	518	0.412
1994	527,729	18,038	1.120	16.7	571	0.374
1995	518,534	17,509	1.087			

Source: Hans Messinger, Statistics Canada, "Measuring Sustainable Economic Welfare: Looking Beyond GDP."

Note: Loss of Leisure time - is the value of lost leisure in relation to the year of greatest leisure over the estimated time period (1950-94). Hours lost are valued by the average real wage rate.

Table A5: Canada, Costs of Various Regrettables

	Population (thousands) d1	Cost of Commuting (bil 1992 \$)	Cost of Commuting Per Capita (1992 \$)	Cost of Crime (bil 1992 \$)	Cost of Crime Per Capita (1992 \$)	Cost of House Pollution Abatement (bil 1992 \$)	Cost of House Pollution Abatement Per Capita (1992 \$)	Cost of Auto Accidents (bil 1992 \$)	Cost of Auto Accidents Per Capita (1992 \$)	Total Regrettable Cost Per Cap. (1992 \$)	Index 1971=1.00
1971	21,780	13.1	600	2.4	112	0.6	29	9.2	423	1,164	1.000
1972	22,253	15.2	685	2.7	121	0.8	35	10.9	489	1,329	1.142
1973	22,521	16.1	716	2.8	125	0.9	40	10.9	483	1,364	1.172
1974	22,839	16.1	706	2.9	129	1.0	45	9.9	432	1,312	1.127
1975	23,169	16.1	696	3.1	133	1.3	55	10.9	470	1,354	1.163
1976	23,482	17.5	747	3.2	136	1.4	60	11.7	496	1,440	1.237
1977	23,764	18.8	792	3.2	135	1.5	65	12.4	523	1,514	1.301
1978	24,008	19.7	821	3.3	139	1.5	64	13.1	544	1,568	1.347
1979	24,245	20.4	840	3.5	143	1.5	63	12.5	518	1,563	1.343
1980	24,548	20.4	829	3.6	146	1.5	63	11.3	459	1,497	1.286
1981	24,864	20.7	834	3.6	144	1.8	72	10.5	422	1,473	1.265
1982	25,167	20.2	804	3.7	148	1.8	71	10.1	402	1,425	1.224
1983	25,425	21.5	846	3.7	146	2.2	86	10.1	398	1,476	1.268
1984	25,671	23.2	903	3.8	150	2.3	90	10.9	424	1,566	1.346
1985	25,912	24.5	944	4.0	153	2.4	94	11.5	445	1,636	1.405
1986	26,171	24.1	920	4.0	152	2.7	103	11.9	455	1,629	1.400
1987	26,503	24.2	913	4.1	155	2.3	87	12.3	464	1,618	1.390
1988	26,856	25.4	944	4.2	157	2.6	95	12.4	462	1,659	1.425
1989	27,318	26.1	956	4.4	159	2.2	80	12.5	459	1,655	1.421
1990	27,733	26.2	946	4.5	162	1.9	69	14.7	531	1,708	1.468
1991	28,086	25.2	898	4.5	160	1.4	50	15.4	547	1,655	1.422
1992	28,481	26.1	917	4.5	157	1.5	54	16.1	566	1,695	1.456
1993	28,858	27.0	936	4.6	160	1.5	53	16.9	586	1,735	1.490
1994	29,220	28.0	960	4.6	158	1.7	57	17.5	600	1,775	1.525
1995	29,574	28.2	952	4.6	157	1.5	51	18.4	622	1,783	1.532
1996	29,918	28.7	960	4.7	157	1.5	50	19.2	643	1,810	1.555
1997	30,241	29.3	969	4.7	156	1.5	48	20.1	665	1,839	1.580

Source: Hans Messinger, Statistics Canada, "Measuring Sustainable Economic Welfare: Looking Beyond GDP."

Note: Cost of commuting - cost of traveling to and from work using either public transportation or private vehicle, as well as an estimate of time use while commuting;

Cost of crime and automobile accidents - costs associated with medical and legal expenses, and expenditures related to lost or damaged property. Spending on crime prevention (alarm systems, locks etc.) are also deducted from consumer expenditures;

Cost of household pollution abatement - represents expenditures on air and water filters and devices to improve air and water quality in the home. Data for 1995 onwards are extrapolated on assumption of constant growth from the 1990 to 1994 period.

Recalculation into 1992 dollars base has done with consumer price index 1992=100, 1986=78.1, Source P200000.

Table A6: Canada, Life Expectancy at Birth

Year	Life Expectancy			Index 1971=1.00
	Male	Female	Average	
1971	69.4	76.5	73.0	1.000
1972	69.8	76.9	73.4	1.006
1973	70.2	77.4	73.8	1.011
1974	70.6	77.8	74.2	1.017
1975	71.0	78.2	74.6	1.023
1976	70.3	77.7	74.0	1.014
1977	70.7	78.1	74.4	1.020
1978	71.1	78.6	74.8	1.026
1979	71.5	79.0	75.3	1.032
1980	71.9	79.4	75.7	1.037
1981	71.9	79.1	75.5	1.035
1982	72.3	79.5	75.9	1.041
1983	72.7	80.0	76.3	1.047
1984	73.1	80.4	76.8	1.052
1985	73.5	80.9	77.2	1.058
1986	73.0	79.8	76.4	1.047
1987	73.4	80.2	76.8	1.053
1988	73.8	80.7	77.3	1.059
1989	74.3	81.1	77.7	1.065
1990	74.7	81.6	78.1	1.071
1991	74.6	80.9	77.8	1.066
1992	74.8	81.0	77.9	1.068
1993	75.0	81.1	78.0	1.070
1994	75.2	81.2	78.2	1.072
1995	75.4	81.3	78.4	1.074
1996	75.7	81.5	78.6	1.077
1997	75.9	81.6	78.7	1.079

Source: Data for 1921, 1926, 1931, 1936, 1941, 1946, 1951, 1956, 1961, 1966, 1971, 1976, 1981, 1986, 1991, 1994, and 1995 are from Statistics Canada *Births and Deaths, 1995* Cat. No. 84-210. Other years are interpolated on the assumption of constant growth between the benchmark years. Data for 1996 are from Statistics Canada Cat No. 91-209, 1997.

Data for 1997 were extrapolated on the basis of constant growth in 1992 to 1996 period.

The average is evenly weighted between both sexes.

Table A7: Canada, Net Year-End Capital Stock in Millions of 1992 K\$

Matrix Series	population thousands 1 d1	Canada non-res. (mil 1986 \$) 8590 D886842	Canada non-res. Per Capita (1986 \$)	Canada non-res. Per Capita (1992 \$)	Housing Capital Stock Cat. No. 13-568 (mil 1986 \$)	Housing Per Capita Capital Stock (1986 \$)	Housing Per Capita Capital Stock (1992 \$)	Total Per Capita Net Capital Stock (1992 \$)	Total Per Capita Net Capital Stock Index 1971=1.00
1961	18,238	169,142	9,274	8,797	124,247	6,813	8,793	17,590	0.748
1962	18,583	175,408	9,439	8,953	129,929	6,992	9,025	17,978	0.765
1963	18,931	182,147	9,622	9,127	135,784	7,173	9,258	18,384	0.782
1964	19,277	191,490	9,933	9,422	142,879	7,412	9,567	18,989	0.808
1965	19,634	203,436	10,362	9,828	150,229	7,652	9,876	19,705	0.838
1966	19,998	218,389	10,921	10,359	156,991	7,851	10,133	20,492	0.872
1967	20,364	230,437	11,316	10,734	163,900	8,049	10,389	21,122	0.899
1968	20,692	239,556	11,577	10,981	172,254	8,325	10,745	21,726	0.924
1969	20,994	247,791	11,803	11,195	182,262	8,682	11,206	22,401	0.953
1970	21,288	256,202	12,035	11,416	191,105	8,977	11,587	23,003	0.979
1971	21,780	265,156	12,175	11,548	201,703	9,261	11,954	23,502	1.000
1972	22,253	273,593	12,295	11,662	213,343	9,587	12,375	24,037	1.023
1973	22,521	284,033	12,612	11,963	225,736	10,023	12,937	24,900	1.059
1974	22,839	295,393	12,934	12,268	238,434	10,440	13,475	25,743	1.095
1975	23,169	308,191	13,302	12,617	250,307	10,804	13,945	26,562	1.130
1976	23,482	318,439	13,561	12,863	265,610	11,311	14,600	27,463	1.169
1977	23,764	327,724	13,791	13,081	280,560	11,806	15,238	28,320	1.205
1978	24,008	335,901	13,991	13,271	295,266	12,298	15,874	29,145	1.240
1979	24,245	347,824	14,346	13,608	309,111	12,749	16,456	30,064	1.279
1980	24,548	363,393	14,803	14,041	321,113	13,081	16,884	30,926	1.316
1981	24,864	382,833	15,397	14,605	334,567	13,456	17,368	31,972	1.360
1982	25,167	392,481	15,595	14,792	344,665	13,695	17,677	32,469	1.382
1983	25,425	396,301	15,587	14,785	357,511	14,061	18,149	32,934	1.401
1984	25,671	399,943	15,580	14,778	369,987	14,413	18,603	33,381	1.420
1985	25,912	407,796	15,738	14,928	383,755	14,810	19,116	34,044	1.449
1986	26,171	414,910	15,854	15,038	400,193	15,291	19,737	34,775	1.480
1987	26,503	424,494	16,017	15,193	421,124	15,890	20,510	35,703	1.519
1988	26,856	440,701	16,410	15,565	441,931	16,456	21,240	36,805	1.566
1989	27,318	459,359	16,815	15,950	463,593	16,970	21,904	37,854	1.611
1990	27,733	474,284	17,102	16,222	482,430	17,396	22,453	38,675	1.646
1991	28,086	488,939	17,409	16,513	496,068	17,663	22,798	39,311	1.673
1992	28,481	497,077	17,453	16,555	511,060	17,944	23,161	39,715	1.690
1993	28,858	503,519	17,448	16,550	524,769	18,184	23,471	40,021	1.703
1994	29,220	511,285	17,498	16,598	538,341	18,424	23,781	40,378	1.718
1995	29,574	518,717	17,540	16,637	554,111	18,737	24,184	40,821	1.737
1996	29,918	526,620	17,602	16,697	569,593	19,039	24,574	41,271	1.756
1997	30,241	535,773	17,717	16,805	585,507	19,361	24,990	41,795	1.778

Note: Housing stock for 1995-1997 is computed using assumption of constant growth rate for 1990-1994. Recalculation into 1992 dollars base for housing stock has been done with IPI, GDP gross fixed capital formation: residential structures 1992=100, 1986=77.48, Source D15602. Recalculation into 1992 dollars base for non-residential stock has been done with IPI, GDP gross fixed capital formation: non-residential structures and equipment 1992=100, 1986=105.43, Source D15603.

Table A8: Canada, Expenditures and Stocks of R&D Investment

Year	GERD (millions \$)	GDP defl. 1992=100	Real GERD (mil. 1992 \$)	Accumulated Stock GERD (mil. 1992 \$)	Depreciated Accumulated Stock GERD (mil. 1992 \$)	population thousands	Per Capita Depreciated Accumulated Stock GERD (1992 \$)	Index 1971=1.00
Series		d15612				d1		
1963	458	19.38	2,364	2,364	2,364	18,931	124.9	0.159
1964	555	19.90	2,789	5,153	4,680	19,277	242.8	0.308
1965	662	20.65	3,206	8,359	6,950	19,634	354.0	0.449
1966	750	21.68	3,460	11,819	9,020	19,998	451.1	0.573
1967	853	22.63	3,770	15,589	10,986	20,364	539.5	0.685
1968	905	23.45	3,859	19,448	12,648	20,692	611.3	0.776
1969	976	24.53	3,980	23,428	14,098	20,994	671.5	0.853
1970	1,059	25.73	4,117	27,545	15,395	21,288	723.2	0.918
1971	1,285	26.58	4,835	32,380	17,152	21,780	787.5	1.000
1972	1,372	28.18	4,870	37,249	18,591	22,253	835.4	1.061
1973	1,470	30.83	4,769	42,018	19,641	22,521	872.1	1.107
1974	1,689	35.35	4,778	46,796	20,491	22,839	897.2	1.139
1975	1,901	39.00	4,874	51,671	21,267	23,169	917.9	1.166
1976	2,071	42.58	4,864	56,535	21,878	23,482	931.7	1.183
1977	2,322	45.48	5,106	61,641	22,609	23,764	951.4	1.208
1978	2,609	48.48	5,382	67,023	23,469	24,008	977.5	1.241
1979	3,044	53.10	5,733	72,756	24,508	24,245	1,010.8	1.284
1980	3,575	58.93	6,067	78,823	25,673	24,548	1,045.8	1.328
1981	4,415	65.38	6,753	85,576	27,292	24,864	1,097.6	1.394
1982	5,198	71.00	7,321	92,897	29,155	25,167	1,158.4	1.471
1983	5,517	74.78	7,378	100,275	30,702	25,425	1,207.5	1.533
1984	6,206	77.30	8,028	108,304	32,590	25,671	1,269.5	1.612
1985	6,904	79.23	8,714	117,018	34,786	25,912	1,342.5	1.705
1986	7,460	81.45	9,159	126,177	36,988	26,171	1,413.3	1.795
1987	7,865	85.25	9,226	135,403	38,816	26,503	1,464.6	1.860
1988	8,373	89.15	9,392	144,795	40,445	26,856	1,506.0	1.912
1989	8,944	93.28	9,589	154,384	41,945	27,318	1,535.4	1.950
1990	9,756	96.13	10,149	164,533	43,705	27,733	1,575.9	2.001
1991	10,207	98.70	10,341	174,875	45,306	28,086	1,613.1	2.048
1992	10,698	99.98	10,701	185,575	46,945	28,481	1,648.3	2.093
1993	11,490	101.23	11,351	196,926	48,907	28,858	1,694.7	2.152
1994	12,121	102.40	11,837	208,763	50,963	29,220	1,744.1	2.215
1995	12,660	105.10	12,046	220,809	52,816	29,574	1,785.9	2.268
1996	13,102	106.58	12,294	233,103	54,546	29,918	1,823.2	2.315
1997	13,383	107.13	12,493	245,596	56,130	30,241	1,856.1	2.357

Note: GERD is general domestic expenditure on research and development.

Source: Statistics Canada *Industrial Research and Development - 1997 Intentions*. GDP deflator is from *Canadian Economic Observer*, 1995/1996, except for 1996 which is a four quarter average from *Canadian Economic Observer*, August 1997. The depreciation is 20% of a declining balance.

Table A9: Canada, Value of Timber Stocks

Year	Value of Timber Stocks Stock Value I mil. dollars	GDP Deflator 1992=100 *d15612	population thousands *d1	Real Per Capita Value of Timber Stocks Stock Value I 1992\$	Real Per Capita Value of Timber Stocks Stock Value I Index 1971=1.00
1961	11,940.4	18.7	18,238	3,506	1.238
1962	12,887.2	19.0	18,583	3,655	1.291
1963	13,707.7	19.4	18,931	3,737	1.320
1964	14,661.9	19.9	19,277	3,822	1.350
1965	15,187.9	20.7	19,634	3,746	1.323
1966	16,194.8	21.7	19,998	3,736	1.320
1967	16,310.8	22.6	20,364	3,540	1.251
1968	16,879.8	23.5	20,692	3,479	1.229
1969	17,619.7	24.5	20,994	3,422	1.209
1970	17,080.2	25.7	21,288	3,119	1.102
1971	16,383.6	26.6	21,780	2,831	1.000
1972	18,038.2	28.2	22,253	2,877	1.016
1973	22,909.2	30.8	22,521	3,300	1.166
1974	29,673.0	35.4	22,839	3,675	1.298
1975	33,468.2	39.0	23,169	3,704	1.308
1976	38,685.8	42.6	23,482	3,870	1.367
1977	43,541.7	45.5	23,764	4,029	1.423
1978	48,457.7	48.5	24,008	4,164	1.471
1979	57,630.9	53.1	24,245	4,476	1.581
1980	68,787.9	58.9	24,548	4,755	1.680
1981	73,853.3	65.4	24,864	4,543	1.605
1982	68,972.3	71.0	25,167	3,860	1.363
1983	63,206.4	74.8	25,425	3,325	1.174
1984	55,848.9	77.3	25,671	2,814	0.994
1985	51,324.3	79.2	25,912	2,500	0.883
1986	59,569.8	81.5	26,171	2,795	0.987
1987	88,135.5	85.3	26,503	3,901	1.378
1988	119,604.6	89.2	26,856	4,996	1.765
1989	140,435.5	93.3	27,318	5,511	1.947
1990	146,842.7	96.1	27,733	5,508	1.946
1991	130,282.7	98.7	28,086	4,700	1.660
1992	106,164.6	100.0	28,481	3,728	1.317
1993	86,675.8	101.2	28,858	2,967	1.048
1994	92,957.4	102.4	29,220	3,107	1.097
1995	114,257.9	105.1	29,574	3,676	1.298
1996	114,257.9	106.6	29,918	3,583	1.266
1997	114,257.9	107.1	30,241	3,527	1.246

Source: Statistics Canada *Econnections* CD-ROM Cat. No. 16-200-XKE.

Note: Value of timber stocks in 1996, 1997 is assumed to be equal value in 1995.

Table A10: Canada, Value of Energy Natural Resources

Year	Real Value of Recoverable Bituminous Coal Res. Present Value (mil 1992\$)	Real Value of Established Crude Bitumen Res. Present Value (mil 1992\$)	Real Value of Established Natural Gas Reserves Present Value (mil 1992\$)	Real Value of Established Crude Oil Reserves Present Value (mil 1992\$)	Real Value of Subbituminous Coal & Lignite Reserves Present Value (mil 1992\$)	Total Real Energy Reserves (mil 1992\$)	Per Capita Total Real Energy Reserves (1992 \$)	Index 1971=1.00
1961			1,591	22,002		23,593	1,294	0.330
1962			3,069	23,028		26,097	1,404	0.359
1963			5,115	25,765		30,880	1,631	0.416
1964			6,357	27,138		33,495	1,738	0.444
1965			7,361	33,491		40,851	2,081	0.531
1966			6,777	33,876		40,654	2,033	0.519
1967		62	6,561	34,052		40,675	1,997	0.510
1968		535	6,477	37,074		44,086	2,131	0.544
1969		0	7,371	38,559		45,930	2,188	0.559
1970		0	6,694	42,199		48,893	2,297	0.586
1971	30,523	0	6,264	45,827	2,707	85,321	3,917	1.000
1972	28,790	608	5,382	45,151	2,554	82,484	3,707	0.946
1973	26,315	836	17,137	54,475	2,334	101,097	4,489	1.146
1974	22,946	1,915	35,861	79,993	2,035	142,750	6,250	1.596
1975	20,799	1,193	72,456	84,581	1,845	180,874	7,807	1.993
1976	19,052	1,834	93,048	83,288	1,690	198,912	8,471	2.163
1977	18,642	0	94,121	90,602	1,809	205,174	8,634	2.204
1978	20,497	0	102,190	98,913	1,900	223,500	9,309	2.377
1979	19,917	0	118,873	94,336	2,479	235,605	9,718	2.481
1980	13,856	22,673	170,797	93,203	3,002	303,532	12,365	3.157
1981	13,634	13,263	173,541	94,962	4,047	299,447	12,043	3.075
1982	15,742	19,727	178,527	112,977	5,065	332,038	13,193	3.368
1983	18,465	19,293	187,339	135,902	5,367	366,367	14,410	3.679
1984	26,552	18,000	173,659	138,673	6,917	363,800	14,172	3.618
1985	23,539	17,898	161,821	131,401	6,274	340,932	13,157	3.359
1986	20,817	8,381	106,264	50,437	4,821	190,721	7,288	1.860
1987	18,741	18,392	69,396	63,160	5,270	174,959	6,602	1.685
1988	20,484	3,241	54,551	30,852	5,689	114,816	4,275	1.091
1989	14,388	9,673	48,234	39,290	3,733	115,318	4,221	1.078
1990	17,708	19,823	56,308	48,458	4,268	146,564	5,285	1.349
1991	16,502	10,279	42,479	26,293	4,578	100,130	3,565	0.910
1992	12,405	10,236	45,163	25,330	4,538	97,672	3,429	0.876
1993	16,205	8,766	57,021	22,525	4,938	109,455	3,793	0.968
1994	11,921	11,760	49,498	23,897	5,866	102,942	3,523	0.899
1995	13,650	15,863	27,761	23,788	4,905	85,967	2,907	0.742
1996	13,461	15,645	27,377	23,460	4,838	84,781	2,834	0.723
1997	13,392	15,565	27,238	23,340	4,814	84,349	2,789	0.712

Source: Statistics Canada *Econnections* CD-ROM Cat. No. 16-200-XKE.

Note: Data in bold represents the earliest available data point for that series. This was assumed to be the value for all previous periods.

Note: Value of all energy natural resources in 1996, 1997 is assumed to be equal value in 1995.

Table A11: Canada, Value of Mineral Natural Resources (proven and probable)

	Value of Nickel, Copper, & Molybdenum Reserves Present Value (mil \$)	Value of Gold Reserves Present Value (mil \$)	Value of Iron Reserves Present Value (mil \$)	Value of Zinc-Lead- Silver Reserves Present Value (mil \$)	Value of Potash Reserves Present Value (mil \$)	Value of Uranium Reserves Present Value (mil \$)	GDP defl. 1992=100	Population thous.	Total Value of Minerals (mil \$)	Total Real Value of Minerals Per Capita (1992 \$)	Index 1971=1.00
1971	16,365	0	13,448	10,166	5,525	3,239	26.6	21,780	48,743	8,421	1.000
1972	16,365	0	13,448	10,166	5,525	3,239	28.2	22,253	48,743	7,774	0.923
1973	16,365	0	13,448	10,166	5,525	3,239	30.8	22,521	48,743	7,021	0.834
1974	16,365	0	13,448	10,166	5,525	3,239	35.4	22,839	48,743	6,037	0.717
1975	16,365	0	13,448	10,166	5,525	3,239	39.0	23,169	48,743	5,394	0.641
1976	16,365	0	13,448	10,166	5,525	3,239	42.6	23,482	48,743	4,876	0.579
1977	12,030	0	15,105	10,166	6,330	5,283	45.5	23,764	48,914	4,526	0.537
1978	16,392	0	13,538	10,166	7,634	8,715	48.5	24,008	56,444	4,850	0.576
1979	50,878	0	25,550	10,166	12,733	10,561	53.1	24,245	109,887	8,535	1.014
1980	62,575	2,265	27,475	12,399	19,287	10,992	58.9	24,548	134,994	9,332	1.108
1981	32,684	914	20,187	3,479	17,902	9,197	65.4	24,864	84,363	5,190	0.616
1982	19,430	0	14,910	3,376	8,101	8,785	71.0	25,167	54,602	3,056	0.363
1983	22,495	2,199	12,786	3,550	7,192	6,548	74.8	25,425	54,769	2,881	0.342
1984	22,342	1,040	11,910	4,740	14,550	8,357	77.3	25,671	62,939	3,172	0.377
1985	20,109	1,161	15,319	2,729	5,880	8,337	79.2	25,912	53,534	2,608	0.310
1986	16,145	4,118	13,155	5,142	4,455	7,950	81.5	26,171	50,965	2,391	0.284
1987	24,904	7,062	15,020	4,383	7,867	7,863	85.3	26,503	67,099	2,970	0.353
1988	54,897	5,766	11,715	5,227	16,194	7,649	89.2	26,856	101,447	4,237	0.503
1989	55,683	3,033	13,071	9,892	18,068	6,362	93.3	27,318	106,109	4,164	0.494
1990	39,459	3,178	9,963	7,855	15,402	5,482	96.1	27,733	81,339	3,051	0.362
1991	26,186	2,309	10,377	3,353	15,617	7,365	98.7	28,086	65,205	2,352	0.279
1992	25,470	1,675	8,231	4,929	17,020	6,785	100.0	28,481	64,109	2,251	0.267
1993	17,907	4,897	7,068	1,162	15,639	6,428	101.2	28,858	53,100	1,818	0.216
1994	25,731	5,856	10,179	2,203	21,769	6,018	102.4	29,220	71,757	2,398	0.285
1995	40,193	5,372	11,464	2,746	25,814	6,515	105.1	29,574	92,104	2,963	0.352
1996	40,193	5,372	11,464	2,746	25,814	6,515	106.6	29,918	92,104	2,889	0.343
1997	40,193	5,372	11,464	2,746	25,814	6,515	107.1	30,241	92,104	2,843	0.338

Source: Statistics Canada *Econnections* CD-ROM Cat. No. 16-200-XKE.

Note: Data in bold represents the earliest available data point for that series. This was assumed to be the value for all previous periods.

Value of all minerals in 1996, 1997 is assumed to be equal value in 1995.

Table A12: Canada, Total Value of Natural Resources

Year	Real Per Capita Value of Timber Stocks Stock Value I (1992 \$)	Per Capita Total Real Energy Reserves (1992 \$)	Total Real Value of Minerals Per Capita (1992 \$)	Total Real Per Capita Value of Nat. Res. (1992 \$)	Index 1971=1.00
1971	2,831	3,917	8,421	15,170	1.000
1972	2,877	3,707	7,774	14,358	1.221
1973	3,300	4,489	7,021	14,810	1.259
1974	3,675	6,250	6,037	15,963	1.357
1975	3,704	7,807	5,394	16,905	1.438
1976	3,870	8,471	4,876	17,216	1.464
1977	4,029	8,634	4,526	17,189	1.462
1978	4,164	9,309	4,850	18,323	1.558
1979	4,476	9,718	8,535	22,729	1.933
1980	4,755	12,365	9,332	26,453	2.250
1981	4,543	12,043	5,190	21,777	1.852
1982	3,860	13,193	3,056	20,109	1.710
1983	3,325	14,410	2,881	20,615	1.753
1984	2,814	14,172	3,172	20,158	1.714
1985	2,500	13,157	2,608	18,265	1.553
1986	2,795	7,288	2,391	12,473	1.061
1987	3,901	6,602	2,970	13,472	1.146
1988	4,996	4,275	4,237	13,508	1.149
1989	5,511	4,221	4,164	13,897	1.182
1990	5,508	5,285	3,051	13,844	1.177
1991	4,700	3,565	2,352	10,617	0.903
1992	3,728	3,429	2,251	9,409	0.800
1993	2,967	3,793	1,818	8,578	0.729
1994	3,107	3,523	2,398	9,028	0.768
1995	3,676	2,907	2,963	9,546	0.812
1996	3,583	2,834	2,889	9,306	0.791
1997	3,527	2,789	2,843	9,159	0.779

Sources: Tables A9, A10, A11.

Table A13: Canada, Estimates of the costs of Human Capital by educational attainment level

Year	0 - 8 years, thousands	Cost in millions, thousands	Some secondary education	Cost in millions	Graduated from high school, thousands	Cost in millions	Some post-secondary, thousands	Cost in millions	Post-secondary certificate/diploma, thousands	Cost in millions	University degree, thousands	Cost in millions	Work age, thousands	Cost in millions	Population, thousands	Human Capital per capita in 1992\$
1971	4360.6	227.4	6894.0	449.4			1703.2	160.1	1571.8	158.6	914.6	164.2	15251	1159.7	22,026	52,654
1972	4338.5	226.2	7140.8	465.5			1670.6	157.1	1595.4	161.0	967.3	173.7	15570	1183.5	22,285	53,106
1973	4322.8	225.4	7407.1	482.8			1640.9	154.3	1621.6	163.6	1024.6	184.0	15919	1210.2	22,560	53,642
1974	4320.8	225.3	7707.7	502.4			1616.9	152.0	1653.6	166.9	1088.8	195.5	16327	1242.1	22,875	54,301
1975	4316.4	225.1	8016.0	522.5			1592.4	149.7	1685.2	170.1	1156.3	207.6	16736	1275.0	23,209	54,936
1976	4334.3	226.0	8236.4	536.9			1578.0	148.4	1745.9	176.2	1229.0	220.7	17124	1308.1	23,518	55,623
1977	4218.0	220.0	8646.6	563.6			1594.2	149.9	1731.8	174.8	1302.4	233.9	17493	1342.1	23,796	56,400
1978	4274.4	222.9	8908.3	580.7			1521.7	143.1	1779.8	179.6	1354.9	243.3	17839	1369.5	24,036	56,979
1979	4274.6	222.9	9397.3	612.5			1335.0	125.5	1723.8	174.0	1452.1	260.7	18183	1395.7	24,277	57,490
1980	4188.0	218.4	9645.8	628.7			1411.6	132.7	1776.8	179.3	1527.4	274.3	18550	1433.4	24,593	58,286
1981	4167.3	217.3	9683.3	631.2			1509.6	141.9	1904.9	192.2	1618.3	290.6	18883	1473.3	24,900	59,167
1982	4056.8	211.5	9796.2	638.5			1600.9	150.5	2004.6	202.3	1718.3	308.5	19177	1511.5	25,202	59,974
1983	3988.8	208.0	9751.9	635.7			1712.2	161.0	2126.9	214.6	1853.5	332.8	19433	1552.1	25,456	60,972
1984	3913.8	204.1	9833.5	641.0			1781.9	167.5	2220.7	224.1	1930.6	346.7	19681	1583.4	25,702	61,605
1985	3773.9	196.8	9975.5	650.2			1847.3	173.7	2300.2	232.1	2032.6	365.0	19929	1617.8	25,942	62,363
1986	3694.5	192.7	10007.8	652.3			1904.9	179.1	2445.4	246.8	2129.5	382.4	20182	1653.3	26,204	63,092
1987	3584.0	186.9	10110.1	659.0			1896.2	178.3	2556.5	258.0	2285.6	410.4	20432	1692.6	26,550	63,751
1988	3569.2	186.1	10000.9	651.9			1982.0	186.4	2690.2	271.5	2447.2	439.4	20690	1735.3	26,895	64,521
1989	3490.9	182.0	10136.9	660.7			1999.2	188.0	2852.1	287.8	2488.6	446.9	20968	1765.5	27,379	64,482
1990	3125.1	163.0	4908.3	319.9	4395.1	343.8	1897.6	178.4	4643.1	468.6	2308.2	414.5	21277	1888.1	27,791	67,941
1991	3062.4	159.7	4943.7	322.2	4523.4	353.8	1918.5	180.4	4741.9	478.5	2422.9	435.1	21613	1929.7	28,120	68,625
1992	3001.8	156.5	4835.9	315.2	4676.1	365.8	1953.7	183.7	4904.0	494.9	2614.7	469.5	21986	1985.6	28,542	69,568
1993	2879.4	150.1	4721.9	307.8	4791.3	374.8	1997.5	187.8	5151.6	519.9	2829.7	508.1	22371	2048.5	28,947	70,768
1994	2958.1	154.3	4678.2	304.9	4513.0	353.0	1975.1	185.7	5585.9	563.7	3006.5	539.9	22717	2101.5	29,256	71,831
1995	2914.4	152.0	4644.7	302.8	4519.4	353.5	2042.8	192.1	5843.2	589.7	3062.9	550.0	23027	2140.0	29,615	72,260
1996	2872.6	149.8	4578.3	298.4	4620.2	361.4	2071.2	194.8	6040.6	609.6	3168.9	569.0	23352	2183.0	29,964	72,853
1997	2800.8	146.1	4484.7	292.3	4430.2	346.5	2158.5	203.0	6480.3	654.0	3332.0	598.3	23687	2240.1	30,287	73,964

Source: Labour Force Historical Review CDROM 71F0004XCB.

Note: Data on working age population from 1971 to 1975 were calculated on the basis of the data for 1976 and the growth rate from the historical labour force estimates from 1971 to 1975. Number of persons in each educational group from 1971 to 1975 were calculated on the the base of constant growth rate for this group from 1976 to 1981 and the share of this group from the total working age population for the same period.

Table A14: Canada's Net Foreign Debt in millions of dollars

	Population	Net Int'l Investment Position (mil \$)	GDP deflator 1992=100	Real Net Int'l Investment Position (mil 1992 \$)	Per Capita Real Net Int'l Investment Position (1992 \$)	Index 1971=100
Matrix Series D	1 d1	4180 d65219	d15612			
1961	18,238,000	-17,006	18.68	-91,063	-4,993	0.906
1962	18,583,000	-18,170	18.98	-95,758	-5,153	0.935
1963	18,931,000	-18,989	19.38	-98,008	-5,177	0.939
1964	19,277,200	-19,680	19.90	-98,894	-5,127	0.930
1965	19,633,500	-21,888	20.65	-105,995	-5,396	0.979
1966	19,997,500	-23,712	21.68	-109,398	-5,466	0.992
1967	20,363,700	-25,636	22.63	-113,308	-5,560	1.009
1968	20,692,000	-27,432	23.45	-116,981	-5,651	1.025
1969	20,994,200	-29,375	24.53	-119,776	-5,703	1.035
1970	21,287,500	-30,054	25.73	-116,828	-5,486	0.995
1971	21,779,600	-32,264	26.58	-121,407	-5,512	1.000
1972	22,253,000	-34,909	28.18	-123,901	-5,560	1.009
1973	22,521,300	-37,666	30.83	-122,193	-5,416	0.983
1974	22,839,300	-42,188	35.35	-119,344	-5,217	0.947
1975	23,168,800	-50,433	39.00	-129,315	-5,572	1.011
1976	23,481,900	-61,307	42.58	-143,998	-6,123	1.111
1977	23,764,100	-68,656	45.48	-150,975	-6,345	1.151
1978	24,008,400	-88,104	48.48	-181,751	-7,562	1.372
1979	24,245,300	-103,154	53.10	-194,264	-8,002	1.452
1980	24,548,200	-110,277	58.93	-187,148	-7,610	1.381
1981	24,864,400	-135,738	65.38	-207,630	-8,339	1.513
1982	25,167,300	-136,601	71.00	-192,396	-7,634	1.385
1983	25,425,200	-144,317	74.78	-193,002	-7,582	1.376
1984	25,670,900	-154,405	77.30	-199,748	-7,772	1.410
1985	25,912,100	-177,833	79.23	-224,466	-8,653	1.570
1986	26,171,000	-196,816	81.45	-241,640	-9,222	1.673
1987	26,502,500	-212,572	85.25	-249,351	-9,392	1.704
1988	26,855,800	-215,905	89.15	-242,182	-9,005	1.634
1989	27,318,300	-232,061	93.28	-248,792	-9,087	1.649
1990	27,733,000	-252,506	96.13	-262,685	-9,452	1.715
1991	28,085,700	-267,408	98.70	-270,930	-9,635	1.748
1992	28,481,300	-298,114	99.98	-298,189	-10,447	1.895
1993	28,858,300	-323,739	101.23	-319,821	-11,049	2.004
1994	29,219,500	-336,339	102.40	-328,456	-11,227	2.037
1995	29,573,600	-336,858	105.10	-320,512	-10,823	1.963
1996	29,917,500	-331,120	106.58	-310,692	-10,369	1.881
1997	30,241,100	-339,403	107.13	-316,829	-10,573	1.918

Sources: Net Debt is Net International Investment Position (D65219).

**Table A15: Penetration of
Selected Household Equipment
(% of households)**

Years	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Bath facilities	90.90	91.20	91.51	91.81	92.12	92.42	92.73	93.04	93.35	93.66	93.97	94.29
Flush toilets	94.30	94.47	94.63	94.80	94.96	95.13	95.29	95.46	95.63	95.80	95.96	96.13
Refrigerators	97.40	97.50	97.61	97.71	97.82	97.92	98.03	98.13	98.24	98.35	98.45	98.56
Telephones	92.30	92.77	93.25	93.72	94.20	94.85	95.50	95.95	96.40	96.40	96.40	96.70
Colour TVs	3.90	6.14	9.67	15.24	24.00	33.60	43.20	51.40	59.60	66.00	72.40	58.35
Microwave ovens	-	-	-	-	-	-	-	-	-	-	-	-
Video Recorders	-	-	-	-	-	-	-	-	-	-	-	-
Automatic wash. mach.	30.40	32.84	35.48	38.32	41.40	44.40	47.40	51.25	55.10	57.25	59.40	57.25
Clothes dryers	34.20	35.96	37.81	39.75	41.80	44.45	47.10	50.50	53.90	56.85	59.80	59.40
One or more automobiles	74.70	75.20	75.69	76.20	76.70	76.80	76.90	77.65	78.40	78.55	78.70	78.05
Freezers	28.40	29.77	31.21	32.72	34.30	36.70	39.10	41.05	43.00	45.20	47.40	50.90
Dishwashers	-	-	-	-	-	-	-	-	-	-	-	-
Home Computers	-	-	-	-	-	-	-	-	-	-	-	-
Air conditioners	-	-	-	-	-	-	-	-	-	-	-	-
Average Penetration Rate	39.04	39.70	40.49	41.45	42.66	44.02	45.38	46.75	48.12	49.15	50.18	49.26
Index 1971=1.00	0.94	0.96	0.98	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.21	1.19

Source: 1986 to 1996 from Statistics Canada *Household Facilities by Income and Other Characteristics*, Cat. No. 13-218.

Data for 1968, 1972, 1974, 1976, 1978, 1980, 1982, 1983, and 1995 is from occasional Statistics Canada publications of same title, Cat. No. 13-540, 13-560, 13-565, and 13-567. The data in bold are the actual observations taken from the publications. The remaining data are interpolations based on an assumption of constant growth between given data points. Where there was no value for an item before an actual observation, a 0.0 penetration rate was assumed.

**Table A15: Penetration of
Selected Household Equipment
(% of households)**

Years	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Bath facilities	94.60	96.70	98.80	98.80	98.90	99.00	99.00	99.10	99.40	99.40	99.40	99.40	99.50
Flush toilets	96.30	97.65	99.00	99.00	99.10	99.20	99.20	99.40	99.40	99.40	99.50	99.50	99.50
Refrigerators	98.66	98.77	98.87	98.98	99.09	99.19	99.30	99.10	99.60	99.40	99.50	99.70	99.40
Telephones	97.00	97.30	97.60	97.90	98.20	98.20	98.10	98.50	98.40	98.47	98.53	98.10	98.70
Colour TVs	73.50	79.20	84.90	87.30	89.30	91.30	93.30	94.40	95.20	96.20	96.90	97.20	97.50
Microwave ovens	-	-	10.20	12.50	17.75	23.00	33.60	43.20	53.80	63.40	68.20	73.50	76.00
Video Recorders	-	-	-	6.40	11.29	19.90	35.10	45.00	52.00	58.80	66.30	68.50	73.80
Automatic wash. mach.	55.10	61.00	66.90	67.00	68.40	69.80	70.40	71.00	72.50	74.10	75.10	75.20	75.80
Clothes dryers	59.00	62.80	66.60	66.10	67.50	68.50	68.60	69.50	71.00	72.80	73.40	73.40	74.00
One or more automobiles	77.40	78.80	80.20	79.20	78.15	77.10	77.30	78.30	78.30	78.20	77.80	77.60	76.50
Freezers	54.40	54.45	54.50	54.90	55.95	57.00	57.70	57.30	56.90	58.30	57.60	58.20	57.90
Dishwashers	14.70	23.90	33.10	33.90	35.50	37.10	37.90	39.40	41.30	42.50	42.00	43.70	44.20
Home Computers	-	-	-	-	-	-	10.30	11.45	12.60	14.45	16.30	18.60	20.00
Air conditioners	2.90	9.45	16.00	17.00	17.40	17.80	18.10	19.60	20.80	24.60	24.40	26.70	26.70
Average Penetration Rate	49.60	52.18	55.50	56.15	57.44	58.95	61.90	64.06	65.96	68.09	71.07	72.09	72.82
Index 1971=1.00	1.20	1.26	1.34	1.35	1.39	1.42	1.49	1.55	1.59	1.64	1.71	1.74	1.76

Source: 1986 to 1996 from Statistics Canada *Household Facilities by Income and Other Characteristics*, Cat. No. 13-218.
Data for 1968, 1972, 1974, 1976, 1978, 1980, 1982, 1983, and 1995 is from occasional Statistics Canada publications of same title, Cat. No. 13-540, 13-560, 13-565, and 13-567. The data in bold are the actual observations taken from the publications. The remaining data are interpolations based on an assumption of constant growth between given data points. Where there was no value for an item before an actual observation, a 0.0 penetration rate was assumed.

Source:
Income
Data for
occasional
13-560,
taken from
an assumption
was no value
was assumed

**Table A15: Penetration of
Selected Household Equipment
(% of households)**

Years	1993	1994	1995	1996
Bath facilities	99.50	99.70	99.80	99.80
Flush toilets	99.70	99.70	99.80	99.80
Refrigerators	99.80	99.40	99.70	99.60
Telephones	99.00	99.00	98.50	98.70
Colour TVs	97.70	98.20	98.50	98.50
Microwave ovens	79.10	81.50	83.40	85.30
Video Recorders	77.30	79.20	82.10	83.50
Automatic wash. mach.	76.90	77.10	77.60	78.00
Clothes dryers	75.10	75.40	76.00	76.50
One or more automobiles	77.50	75.20	74.50	73.90
Freezers	58.70	58.80	57.10	57.10
Dishwashers	45.20	46.40	47.10	47.70
Home Computers	23.30	25.00	28.80	31.60
Air conditioners	25.70	26.80	27.60	29.30
Average Penetration Rate	73.89	74.39	75.04	75.66
Index 1971=1.00	1.78	1.79	1.81	1.83

1986 to 1996 from Statistics Canada *Household Facilities by
and Other Characteristics*, Cat. No. 13-218.

1968, 1972, 1974, 1976, 1978, 1980, 1982, 1983, and 1995 is from
ral Statistics Canada publications of same title, Cat. No. 13-540,
13-565, and 13-567. The data in bold are the actual observations
om the publications. The remaining data are interpolations based on
mption of constant growth between given data points. Where there
value for an item before an actual observation, a 0.0 penetration rate
umed.

Table A16: Environmental Indicators

Year	Ozone Layer Over Canadian Centres in Dobson units.					Greenhouse Gas Emissions	
	Toronto	Edmonton	Resolute	Average	Index 1971=1.00	Carbon Dioxide Equivalents kilotons	Index 1971=1.00
1971	354	345	398	366	0.999	613,088	1.000
1972	360	346	408	371	1.015	613,088	1.000
1973	332	339	387	353	0.964	613,088	1.000
1974	352	355	382	363	0.992	613,088	1.000
1975	351	352	366	356	0.974	613,088	1.000
1976	347	338	371	352	0.962	613,088	1.000
1977	355	354	371	360	0.984	613,088	1.000
1978	337	333	380	350	0.956	613,088	1.000
1979	348	343	377	356	0.973	613,088	1.000
1980	351	349	375	358	0.979	613,088	1.000
1981	348	341	371	353	0.965	613,088	1.000
1982	344	359	370	358	0.977	587,299	1.044
1983	333	334	360	342	0.935	560,076	1.095
1984	339	340	357	345	0.944	583,282	1.051
1985	340	335	371	349	0.953	599,651	1.022
1986	336	334	424	365	0.996	590,233	1.039
1987	345	339	360	348	0.951	607,206	1.010
1988	342	330	359	344	0.939	649,919	0.943
1989	339	334	367	347	0.947	683,962	0.896
1990	330	332	354	339	0.925	653,845	0.938
1991	338	337	364	346	0.946	644,852	0.951
1992	333	328	342	334	0.913	664,019	0.923
1993	319	311	328	319	0.872		
1994	333	326	364	341	0.932		
1995							
1996							

Source: Ozone data is from Statistics Canada *Environmental Perspectives* Cat. No. 11-528-XPE. no.3.

Source: Greenhouse gas data is from Statistics Canada *Econnections* CD-ROM Cat. No. 16-200-XKE.

Note: Data in bold represents the earliest available data point for that series. This was assumed to be the value for all previous periods.

Table A17: Gini Coefficients for Canada, All Units

Year	Income before Transfers	Index 1971=1.00	Total Money Income	Index 1971=1.00	Income After Tax	Index 1971=1.00
1971	0.447	1.000	0.400	1.000	0.373	1.000
1972	0.446	0.998	0.395	0.988	0.368	0.987
1973	0.445	0.996	0.392	0.980	0.368	0.987
1974	0.441	0.987	0.389	0.973	0.363	0.973
1975	0.451	1.009	0.392	0.980	0.364	0.976
1976	0.462	1.034	0.402	1.005	0.374	1.003
1977	0.445	0.996	0.388	0.970	0.362	0.971
1978	0.445	0.996	0.394	0.985	0.367	0.984
1979	0.436	0.975	0.381	0.953	0.355	0.952
1980	0.442	0.989	0.383	0.958	0.358	0.960
1981	0.437	0.978	0.377	0.943	0.351	0.941
1982	0.453	1.013	0.381	0.953	0.353	0.946
1983	0.471	1.054	0.393	0.983	0.363	0.973
1984	0.469	1.049	0.389	0.973	0.359	0.962
1985	0.466	1.043	0.388	0.970	0.358	0.960
1986	0.467	1.045	0.389	0.973	0.359	0.962
1987	0.468	1.047	0.390	0.975	0.357	0.957
1988	0.469	1.049	0.390	0.975	0.355	0.952
1989	0.461	1.031	0.386	0.965	0.352	0.944
1990	0.470	1.051	0.389	0.973	0.352	0.944
1991	0.486	1.087	0.395	0.988	0.357	0.957
1992	0.491	1.098	0.394	0.985	0.356	0.954
1993	0.497	1.112	0.396	0.990	0.358	0.960
1994	0.495	1.107	0.394	0.985	0.354	0.949
1995	0.493	1.103	0.397	0.993	0.357	0.957
1996	0.498	1.114	0.403	1.008	0.362	0.971
1997	0.498	1.114	0.403	1.008	0.362	0.971

Source: Statistics Canada *Income after tax, distributions by size in Canada 1994 and 1993*.

Note: Data for 1997 assumed to be equal data for 1996.

**Table A18: Poverty Rate and Poverty Gap Ratios,
+ Poverty Intensity, Canada, 1971-1997**

Years	Poverty Rate	Index 1971=1.00	Income to need Ratio	Poverty Gap Ratio	Index of poverty gap	Poverty Intensity	Index of Poverty Intensity
	A	A'	B	C=1-B	C'	D=A*C	E=A'*C'
1971	14.5	1.000	0.65	0.35	1.000	0.051	1.000
1972	14.5	1.000	0.65	0.35	1.000	0.051	1.000
1973	14.5	1.000	0.65	0.35	1.000	0.051	1.000
1974	15.5	1.069	0.65	0.36	1.014	0.055	1.084
1975	16.5	1.138	0.64	0.36	1.029	0.059	1.170
1976	16.8	1.155	0.64	0.37	1.043	0.061	1.205
1977	17.0	1.172	0.63	0.37	1.057	0.063	1.239
1978	16.8	1.159	0.64	0.36	1.029	0.060	1.192
1979	16.6	1.145	0.65	0.35	1.000	0.058	1.145
1980	16.1	1.107	0.66	0.34	0.971	0.055	1.075
1981	15.5	1.069	0.67	0.33	0.943	0.051	1.008
1982	15.7	1.083	0.68	0.32	0.914	0.050	0.990
1983	15.8	1.090	0.67	0.33	0.943	0.052	1.027
1984	15.9	1.097	0.66	0.34	0.971	0.054	1.065
1985	15.1	1.041	0.67	0.33	0.943	0.050	0.982
1986	14.9	1.028	0.68	0.32	0.914	0.048	0.940
1987	14.5	1.000	0.68	0.32	0.914	0.046	0.914
1988	14.5	1.000	0.69	0.31	0.886	0.045	0.886
1989	14.2	0.979	0.69	0.31	0.886	0.044	0.867
1990	14.9	1.028	0.68	0.32	0.914	0.048	0.940
1991	14.8	1.021	0.68	0.32	0.914	0.047	0.933
1992	14.8	1.021	0.68	0.32	0.914	0.047	0.933
1993	15.0	1.034	0.69	0.31	0.886	0.047	0.916
1994	14.7	1.014	0.69	0.31	0.886	0.046	0.898
1995	15.1	1.041	0.68	0.32	0.914	0.048	0.952
1996	15.1	1.041	0.68	0.32	0.914	0.048	0.952
1997	15.1	1.041	0.68	0.32	0.914	0.048	0.952

Source: Statistics Canada *Income after tax, distributions by size in Canada*.

Note: Poverty is measured using Statistics Canada's LIM, 1996\$ base.

1974, 1976, 1978, 1980, 1983 are interpolations based on average of previous and subsequent years.

Data for 1971, 1972 were assumed to be equal 1973 data.

Data for 1996, 1997 were assumed to be equal 1995 data.

Table A19: Male-Female Earnings Ratios
(women's earnings as % of men's)

Year	Full-year full-time workers	Index 1971=1.00	All earners	Index 1971=1.00
1971	59.7	1.000	46.9	1.000
1972	59.8	1.002	46.1	0.983
1973	59.3	0.993	46.3	0.987
1974	59.6	0.998	47.4	1.011
1975	60.2	1.008	48.1	1.026
1976	59.1	0.990	46.7	0.996
1977	62.1	1.040	50.8	1.083
1978	63.0	1.055	50.8	1.083
1979	63.5	1.064	51.6	1.100
1980	64.4	1.079	51.7	1.102
1981	63.7	1.067	53.6	1.143
1982	64.0	1.072	55.1	1.175
1983	64.8	1.085	55.2	1.177
1984	65.6	1.099	57.5	1.226
1985	65.1	1.090	56.3	1.200
1986	65.8	1.102	57.5	1.226
1987	66.1	1.107	57.8	1.232
1988	65.4	1.095	57.5	1.226
1989	66.0	1.106	59.1	1.261
1990	67.7	1.134	59.8	1.275
1991	69.6	1.166	61.5	1.311
1992	71.9	1.204	63.9	1.362
1993	72.2	1.209	64.3	1.371
1994	69.8	1.169	62.3	1.328
1995	73.1	1.224	65.1	1.388

Source: Statistics Canada *Earnings of Men and Women* Cat. No. 13-217-XPB.

Table A20: Weights used for Economic Security Index

Year	% of Women and children at Risk of Widowhood	Normalized Weight of women at risk of single parent poverty	Pop 45-64, thousands	% 45-64 of Total Pop	Normalized Weight of 45-64 Pop at Risk of Elderly poverty	% of Pop affected of risk for health	Normalized Weight of Pop at risk for health	All Population (thousands), *d1	Pop 15-64, thousands	Pop 15-64 as % of total Pop	Normalized Weight of WAP at risk of unemployment	Total %
	A	B=A/L	C	D=C/H*100	E=D/L	F	G=F/L	H	I	J=I/H*100	K=J/L	L=A+D+F+J
1971	57.73	0.2413	4,023.3	18.47	0.0772	100.00	0.4180	21779.6	13,731.6	63.05	0.2635	239.25
1972	57.50	0.2405	4,101.3	18.43	0.0771	100.00	0.4183	22253.0	14,043.3	63.11	0.2640	239.04
1973	57.28	0.2390	4,170.9	18.52	0.0773	100.00	0.4173	22521.3	14,372.8	63.82	0.2663	239.61
1974	57.05	0.2374	4,245.4	18.59	0.0774	100.00	0.4162	22839.3	14,760.0	64.63	0.2690	240.26
1975	56.83	0.2359	4,322.8	18.66	0.0774	100.00	0.4150	23168.8	15,164.6	65.45	0.2717	240.94
1976	56.60	0.2356	4,397.5	18.73	0.0779	100.00	0.4162	23481.9	15,246.8	64.93	0.2703	240.26
1977	56.38	0.2343	4,450.5	18.73	0.0778	100.00	0.4157	23764.1	15,556.5	65.46	0.2721	240.57
1978	56.15	0.2331	4,501.8	18.75	0.0778	100.00	0.4151	24008.4	15,843.5	65.99	0.2739	240.89
1979	55.93	0.2319	4,535.4	18.71	0.0776	100.00	0.4147	24245.3	16,120.2	66.49	0.2757	241.12
1980	55.70	0.2309	4,569.8	18.62	0.0772	100.00	0.4146	24548.2	16,419.3	66.89	0.2773	241.20
1981	55.48	0.2301	4,604.2	18.52	0.0768	100.00	0.4147	24864.4	16,689.4	67.12	0.2784	241.11
1982	55.25	0.2291	4,709.3	18.71	0.0776	100.00	0.4146	25167.3	16,923.9	67.25	0.2788	241.21
1983	55.03	0.2282	4,765.2	18.74	0.0777	100.00	0.4147	25425.2	17,127.4	67.36	0.2794	241.13
1984	54.80	0.2274	4,823.7	18.79	0.0780	100.00	0.4149	25670.9	17,313.4	67.44	0.2798	241.03
1985	54.58	0.2266	4,859.0	18.75	0.0779	100.00	0.4153	25912.1	17,484.1	67.47	0.2802	240.80
1986	54.35	0.2259	4,906.8	18.75	0.0779	100.00	0.4157	26171.0	17,654.1	67.46	0.2804	240.56
1987	54.13	0.2256	4,928.7	18.60	0.0775	100.00	0.4168	26502.5	17,812.6	67.21	0.2801	239.93
1988	53.90	0.2250	5,008.3	18.65	0.0779	100.00	0.4175	26855.8	17,987.5	66.98	0.2796	239.53
1989	53.68	0.2247	5,092.0	18.64	0.0780	100.00	0.4187	27318.3	18,179.3	66.55	0.2786	238.86
1990	53.45	0.2241	5,187.0	18.70	0.0784	100.00	0.4193	27733.0	18,402.1	66.35	0.2782	238.51
1991	53.23	0.2232	5,296.5	18.86	0.0791	100.00	0.4193	28085.7	18,646.4	66.39	0.2784	238.47
1992	53.00	0.2216	5,619.0	19.73	0.0825	100.00	0.4181	28481.3	18,929.4	66.46	0.2779	239.19
1993	52.78	0.2204	5,791.0	20.07	0.0838	100.00	0.4176	28858.3	19,224.6	66.62	0.2782	239.46
1994	52.55	0.2192	6,003.9	20.55	0.0857	100.00	0.4170	29219.5	19,486.5	66.69	0.2781	239.79
1995	52.33	0.2181	6,188.2	20.92	0.0872	100.00	0.4168	29573.6	19,711.7	66.65	0.2778	239.90
1996	52.10	0.2170	6,379.7	21.32	0.0888	100.00	0.4165	29917.5	19,954.1	66.70	0.2778	240.12
1997	51.88	0.2158	6,569.8	21.72	0.0904	100.00	0.4160	30241.1	20,202.1	66.80	0.2779	240.40

Sources: Annual Demographic Statistics, Statistics Canada Cat. 91-213, Appendix Table A-24.

Table A21: Forecasts of Consumer Price Index Inflation 1975-1995

Year	Current Year Forecasts				Next Year Forecasts			
	Average Forecast	Actual Inflation	Magnitude of Error (act.-exp.)	Per Cent Error	Average Forecast	Actual Inflation	Magnitude of Error (act.-exp.)	Per Cent Error
1975	9.99	10.74	0.75	6.98	7.65	7.49	-0.16	-2.14
1976	8.16	7.49	-0.67	-8.95	7.24	8.02	0.78	9.73
1977	7.44	8.02	0.58	7.23	6.62	8.92	2.30	25.78
1978	8.62	8.92	0.30	3.36	7.24	9.15	1.91	20.87
1979	9.06	9.15	0.09	0.98	8.40	10.17	1.77	17.40
1980	9.99	10.17	0.18	1.77	10.58	12.45	1.87	15.02
1981	12.47	12.45	-0.02	-0.16	11.40	10.80	-0.60	-5.56
1982	10.90	10.80	-0.10	-0.93	8.43	5.82	-2.61	-44.85
1983	5.77	5.82	0.05	0.86	5.53	4.34	-1.19	-27.42
1984	4.97	4.34	-0.63	-14.52	5.64	3.95	-1.69	-42.78
1985	4.09	3.95	-0.14	-3.54	4.53	4.17	-0.36	-8.63
1986	3.93	4.17	0.24	5.76	4.18	4.36	0.18	4.13
1987	4.29	4.36	0.07	1.61	4.73	4.02	-0.71	-17.66
1988	4.16	4.02	-0.14	-3.48	4.62	5.00	0.38	7.60
1989	4.91	5.00	0.09	1.80	4.72	4.76	0.04	0.84
1990	4.74	4.76	0.02	0.42	5.92	5.62	-0.30	-5.34
1991	5.98	5.62	-0.36	-6.41	3.70	1.51	-2.19	-145.03
1992	2.02	1.51	-0.51	-33.77	2.74	1.84	-0.90	-48.91
1993	2.08	1.84	-0.24	-13.04	2.27	0.23	-2.04	-886.96
1994	0.75	0.19	-0.56	-294.74	1.91	2.12	0.21	9.91
1995	1.99	2.12	0.13	6.13	2.21	1.49	-0.72	-48.32

Source: David R. Johnson, "Expected Inflation in Canada 1988-1995: An Evaluation of Bank of Canada Credibility and the Effect of Inflation Targets," *Canadian Public Policy* vol.23, no. 3, September 1997.

Table A22: Police Reported Crime in Canada, 1962-1995

(Rates per 100,000 population)

Year	Violent Crime	Index 1971=1.00	Property Crime	Index 1971=1.00
1971	491	1.000	3,638	1.000
1972	496	0.990	3,623	1.004
1973	522	0.941	3,693	0.985
1974	551	0.891	4,139	0.879
1975	583	0.842	4,485	0.811
1976	582	0.844	4,520	0.805
1977	570	0.861	4,453	0.817
1978	578	0.849	4,565	0.797
1979	608	0.808	4,888	0.744
1980	634	0.774	5,427	0.670
1981	652	0.753	5,741	0.634
1982	669	0.734	5,821	0.625
1983	677	0.725	5,589	0.651
1984	698	0.703	5,481	0.664
1985	732	0.671	5,430	0.670
1986	782	0.628	5,528	0.658
1987	826	0.594	5,531	0.658
1988	865	0.568	5,419	0.671
1989	908	0.541	5,271	0.690
1990	970	0.506	5,593	0.650
1991	1,056	0.465	6,141	0.592
1992	1,077	0.456	5,868	0.620
1993	1,072	0.458	5,524	0.659
1994	1,038	0.473	5,212	0.698
1995	995	0.493	5,237	0.695

Source: Statistics Canada *Canadian Crime Statistics, 1995* Cat. No. 85-205XPE.

Note: Crime here excludes traffic offenses. Due to changes in counting procedures for Metro Toronto as of 1992, caution should be used when calculating year-to-year changes between 1991 and 1992 for Canada, Ontario, and Toronto. 1994 are revised crime data.

Table A23: Probability of Losing Life or Injury in Auto Accident

Year	Victims Killed	Victims Injured	Population (thousands) d44946	Probability of Auto		Index 1971=1.01	
				Death per 100,000 pop.	Injury	Death	Injury
1971	5,573	192,599	22,026	25.3	874.4	1.000	1.000
1972	6,221	215,705	22,285	27.9	967.9	0.906	0.903
1973	6,706	223,777	22,560	29.7	991.9	0.851	0.882
1974	6,290	229,641	22,875	27.5	1,003.9	0.920	0.871
1975	6,061	220,941	23,209	26.1	952.0	0.969	0.919
1976	5,307	199,735	23,518	22.6	849.3	1.121	1.030
1977	5,253	214,630	23,796	22.1	902.0	1.146	0.969
1978	5,429	239,640	24,036	22.6	997.0	1.120	0.877
1979	5,863	256,225	24,277	24.2	1,055.4	1.048	0.828
1980	5,461	262,977	24,593	22.2	1,069.3	1.139	0.818
1981	5,383	261,176	24,900	21.6	1,048.9	1.170	0.834
1982	4,169	225,717	25,202	16.5	895.6	1.530	0.976
1983	4,216	224,297	25,456	16.6	881.1	1.528	0.992
1984	4,120	237,455	25,702	16.0	923.9	1.578	0.946
1985	4,364	259,189	25,942	16.8	999.1	1.504	0.875
1986	4,068	264,481	26,204	15.5	1,009.3	1.630	0.866
1987	4,286	280,575	26,550	16.1	1,056.8	1.567	0.827
1988	4,154	278,618	26,895	15.4	1,035.9	1.638	0.844
1989	4,246	284,937	27,379	15.5	1,040.7	1.632	0.840
1990	3,965	262,604	27,791	14.3	944.9	1.773	0.925
1991	3,691	249,198	28,120	13.1	886.2	1.928	0.987
1992	3,500	249,821	28,542	12.3	875.3	2.063	0.999
1993	3,614	247,582	28,947	12.5	855.3	2.027	1.022
1994	3,260	244,975	29,256	11.1	837.3	2.271	1.044
1995	3,347	241,800	29,615	11.3	816.5	2.239	1.071
1996	3,082	230,885	29,964	10.3	770.5	2.460	1.135

Source: Traffic Injury Research Foundation.

Note: Index is base year 1971 divided by current year.

Table A24: Benefits, Jobless, Employment, Working Age Pop for Canada.

Year	Beneficiaries, All benefits, *D732896	Beneficiaries, Regular benefits, *D736531	Unemployment 15+	Unemployment 65+	Unemployment 15-64	Not in labour force 15+	Not in labour force 65+	Not in labour force 15-64	Jobless, 15-64, thousands	% of the unemployed people receiving reg.benefits	% of the jobless people receiving reg.benefits	Pop 15+, thousands	Pop 65+, thousands	Pop 15-64, thousands	Full Time Employed 15+, thousands	Full Time Employed 65+, thousands	Full Time Employed 15-64, thousands	Full Time Employed/Pop 15-64, %	Average weekly regular payment benefits, \$, 5704 / *D730479	Average weekly earnings, \$, 4288 / *L657711	Average weekly benefits/average weekly earnings (%)
	AA	A	B	C	D=B-C	E	F	G=E-F	H=D+G	I=A/D	J=A/H	K	L	M=K-L	N	O	P=N-O	Q=P/M	R	S	T=R/S
1971	1430714	394370.7			535.0			6233.0	6768.0	73.71	5.83	15476.0	1744.4	13731.6	8558.8	120.1	8438.7	61.45	52.60	168.33	31.25
1972	1904460	524957.0			553.0			6289.0	6842.0	94.93	7.67	15831.0	1787.7	14043.3	8558.8	120.1	8438.7	60.09	62.11	137.19	45.27
1973	2006620	553117.0			515.0			6250.0	6765.0	107.40	8.18	16207.0	1834.2	14372.8	8558.8	120.1	8438.7	58.71	68.24	146.30	46.64
1974	2067580	569920.4			514.0			6285.0	6799.0	110.88	8.38	16643.0	1883.0	14760.0	8558.8	120.1	8438.7	57.17	74.62	162.29	45.98
1975	2453930	676416.3			690.0			6498.0	7188.0	98.03	9.41	17099.0	1934.4	15164.6	8558.8	120.1	8438.7	55.65	84.92	186.60	45.51
1976		626530.8	753.9	3.9	750.0	6593.5	1698.4	4895.1	5645.1	83.54	11.10	17123.5	1876.7	15246.8	8558.8	120.1	8438.7	55.35	93.16	209.21	44.53
1977		668341.7	882.1	3.7	878.4	6632.7	1754.8	4877.9	5756.3	76.09	11.61	17493.0	1936.5	15556.5	8677.3	120.9	8556.4	55.00	101.37	229.44	44.18
1978		710172.5	944.5	3.1	941.4	6574.1	1810.5	4763.6	5705.0	75.44	12.45	17839.0	1995.5	15843.5	8947.7	123.8	8823.9	55.69	109.43	242.09	45.20
1979		614838.3	869.7	3.4	866.3	6552.4	1873.9	4678.5	5544.8	70.97	11.09	18182.7	2062.5	16120.2	9274.8	123.0	9151.8	56.77	107.50	261.00	41.19
1980		603634.2	900.4	2.9	897.5	6567.1	1940.2	4626.9	5524.4	67.26	10.93	18549.6	2130.3	16419.3	9491.5	121.0	9370.5	57.07	119.90	287.88	41.65
1981		619983.3	933.9	3.2	930.7	6551.4	2003.4	4548.0	5478.7	66.61	11.32	18883.3	2193.9	16689.4	9699.9	119.6	9580.3	57.40	128.90	321.13	40.14
1982		1031425.0	1362.8	4.8	1358.0	6778.9	2061.9	4717.0	6075.0	75.95	16.98	19176.8	2252.9	16923.9	9276.3	118.6	9157.7	54.11	143.69	362.02	39.69
1983		1119049.2	1504.2	3.8	1500.4	6823.4	2123.1	4700.3	6200.7	74.58	18.05	19433.3	2305.9	17127.4	9242.2	112.2	9130.0	53.31	153.85	382.78	40.19
1984		1066334.2	1450.2	3.6	1446.6	6827.9	2179.4	4648.5	6095.1	73.71	17.49	19680.5	2367.1	17313.4	9490.7	111.0	9379.7	54.18	160.04	398.66	40.14
1985		1020703.3	1380.8	3.7	1377.1	6806.7	2255.9	4550.8	5927.9	74.12	17.22	19929.5	2445.4	17484.1	9745.3	110.5	9634.8	55.11	169.07	412.75	40.96
1986		972473.3	1283.1	4.2	1278.9	6804.4	2347	4457.4	5736.3	76.04	16.95	20182.1	2528.0	17654.1	10045.1	105.9	9939.2	56.30	178.74	425.16	42.04
1987		909629.2	1208.2	5.1	1203.1	6801.7	2433.5	4368.2	5571.3	75.61	16.33	20432.4	2619.8	17812.6	10354.3	111.2	10243.1	57.50	187.17	441.23	42.42
1988		884798.3	1081.6	4	1077.6	6789.1	2510.3	4278.8	5356.4	82.11	16.52	20689.6	2702.1	17987.5	10666.9	111.7	10555.2	58.68	199.02	460.67	43.20
1989		889537.5	1065.3	3.6	1061.7	6816.3	2592.1	4224.2	5285.9	83.78	16.83	20967.6	2788.3	18179.3	10917.4	107.7	10809.7	59.46	212.47	484.23	43.88
1990		964290.0	1163.9	3.1	1160.8	6948.3	2672.7	4275.6	5436.4	83.07	17.74	21277.4	2875.3	18402.1	10929.0	109.5	10819.5	58.79	230.00	506.24	45.43
1991		1156039.2	1491.7	8	1483.7	7204.9	2762.8	4442.1	5925.8	77.92	19.51	21612.7	2966.3	18646.4	10573.6	108.9	10464.7	56.12	244.48	529.48	46.17
1992		1147640.8	1640.2	10.2	1630.0	7504	2851.6	4652.4	6282.4	70.41	18.27	21986.2	3056.8	18929.4	10467.2	111.8	10355.4	54.71	252.81	547.98	46.14
1993		1072370.0	1648.8	10.3	1638.5	7707.8	2943	4764.8	6403.3	65.45	16.75	22371.3	3146.7	19224.6	10534.4	109.7	10424.7	54.23	256.02	557.94	45.89
1994		895075.8	1540.7	10.8	1529.9	7884.4	3012.1	4872.3	6402.2	58.51	13.98	22716.8	3230.3	19486.5	10798.4	123.0	10675.4	54.78	251.80	568.27	44.31
1995		735888.3	1422.1	8.5	1413.6	8099.7	3107.6	4992.1	6405.7	52.06	11.49	23027.3	3315.6	19711.7	10996.8	116.3	10880.5	55.20	252.96	573.75	44.09
1996		706699.2	1469.2	8.2	1461.0	8206.5	3179.7	5026.8	6487.8	48.37	10.89	23351.8	3397.7	19954.1	11087.2	118.5	10968.7	54.97	255.32	586.06	43.57
1997		594238.9	1413.5	6.9	1406.6	8332.5	3261.9	5070.6	6477.2	42.25	9.17	23686.5	3484.4	20202.1	11291.3	123.9	11167.4	55.28	249.72	598.26	41.74

Source: Series # B,C,E,F,K,L,N,O are from Labour Force Historical Review CDROM 71F0004XCB.

Note: Data for series #N,O for 1971-1975 are assumed to be equal data for 1976.

Data for series #A for 1972-1974 were calculated assuming the same growth as for series # AA, data for 1971 based on the data for 1972 and growth rate for claimants in 1971-72 period from Historical Statistic of Canada, E168.

Jobless people is defined as unemployed people and people not in labour force.

Data for series #D,G for 1971-1974 are from Canadian Labour Force Estimates, 1946-1984.

Table A25: Greenhouse Gas Emissions Cost, Canada.

Year	Canada GDP, million of 1990 G-K Dollars)	World GDP, million of 1990 G-K Dollars)	Canada's share in the world GDP, %	World CO2 Emission (millions of metric tonnes)	World Emission CO2 Cost, mill. of 1990\$ (\$24.4 per metric ton)	Canada's share of World CO2 emission social cost (millions of 1990\$)	Population, thousands, *D1	Emission cost per capita, 1992\$
	A	B	C=A/B*100	D	E=D*24.4	F=C*E/100	G	H=F/G/0.96125
1961	156,283	8,137,175	1.9206	12,982	316,756	6,083.6	18,238	347.02
1962	167,399	8,512,768	1.9664	13,250	323,300	6,357.5	18,583	355.91
1963	176,033	8,884,930	1.9813	13,518	329,844	6,535.0	18,931	359.12
1964	187,778	9,557,792	1.9647	13,786	336,387	6,608.9	19,277	356.65
1965	200,184	10,071,305	1.9877	14,055	342,931	6,816.3	19,634	361.17
1966	213,814	10,649,074	2.0078	14,323	349,475	7,016.8	19,998	365.03
1967	220,497	11,016,274	2.0016	14,591	356,018	7,125.9	20,364	364.04
1968	231,844	11,580,161	2.0021	14,859	362,562	7,258.8	20,692	364.94
1969	244,250	12,227,815	1.9975	15,127	369,105	7,372.9	20,994	365.34
1970	250,734	12,869,817	1.9482	15,395	375,649	7,318.5	21,288	357.65
1971	265,192	13,389,468	1.9806	15,664	382,193	7,569.7	21,780	361.57
1972	280,277	13,988,567	2.0036	15,932	388,736	7,788.8	22,253	364.12
1973	301,880	14,921,483	2.0231	16,200	395,280	7,997.0	22,521	369.40
1974	315,080	15,226,809	2.0692	16,468	401,824	8,314.7	22,839	378.73
1975	323,252	15,428,144	2.0952	16,736	408,367	8,556.2	23,169	384.18
1976	343,102	16,110,275	2.1297	17,005	414,911	8,836.4	23,482	391.48
1977	355,375	16,783,237	2.1174	17,273	421,455	8,924.0	23,764	390.66
1978	371,652	17,531,398	2.1199	17,541	427,998	9,073.2	24,008	393.15
1979	386,142	18,118,245	2.1312	17,809	434,542	9,261.1	24,245	397.37
1980	391,866	18,500,325	2.1182	18,077	441,085	9,342.9	24,548	395.94
1981	406,323	18,871,756	2.1531	18,345	447,629	9,637.8	24,864	403.24
1982	393,255	19,074,172	2.0617	18,614	454,173	9,363.7	25,167	387.06
1983	405,827	19,660,980	2.0641	18,882	460,716	9,509.8	25,425	389.11
1984	431,697	20,619,078	2.0937	19,150	467,260	9,782.9	25,671	396.45
1985	452,109	21,429,086	2.1098	19,418	473,804	9,996.3	25,912	401.33
1986	466,864	22,263,660	2.0970	19,686	480,347	10,072.8	26,171	400.40
1987	486,218	23,138,044	2.1014	19,955	486,891	10,231.4	26,503	401.62
1988	510,368	24,275,251	2.1024	20,223	493,435	10,374.1	26,856	401.86
1989	522,476	25,047,613	2.0859	20,491	499,978	10,429.2	27,318	397.16
1990	521,517	25,555,255	2.0407	20,759	506,522	10,336.8	27,733	387.75
1991	512,518	25,711,179	1.9934	21,027	513,065	10,227.3	28,086	378.82
1992	516,356	26,078,852	1.9800	21,295	519,609	10,288.2	28,481	375.79
1993	527,703	26,078,852	2.0235	21,564	526,153	10,646.6	28,858	383.80
1994	549,340	26,078,852	2.1065	21,832	532,696	11,221.0	29,220	399.51
1995			2.1065	22,100	539,240	11,358.9	29,574	399.57
1996			2.1065	22,368	545,784	11,496.7	29,918	399.77
1997			2.1065	22,636	552,327	11,634.5	30,241	400.24

Sources: Data on Greenhouse Gas emission in Canada for 1973 and 1995 are from International Energy Agency Data for the years between 1973 and 1995 were interpolated assuming a constant linear growth trend over the period. This trend was extrapolated backwards and forwards outside. Data on GDP for Canada and the World are from Monitoring the World Economy, Angus Maddison, 1995, P.181, 211.

Data for 1995-1997 GDP share for Canada assumed to be equal to data for 1994.

Recalculation into 1992\$ were made with GDP IPI 1990=96.125 1992=100, Source: *D15612.

Table A26: Canada, Underground consumption.

Year	All workers	Total Self Employed Workers	% of Self Employed Workers	Index of Self Employed Workers 1971=1.00	% of Underground Consumption
1971			11.18	1.000	2.595
1972			11.40	1.020	2.647
1973			11.63	1.040	2.700
1974			11.86	1.061	2.754
1975			12.10	1.082	2.809
1976	9776.2	1206.6	12.34	1.104	2.865
1977	9978.2	1280.0	12.83	1.148	2.978
1978	10320.4	1360.2	13.18	1.179	3.060
1979	10760.6	1423.0	13.22	1.183	3.070
1980	11082.2	1462.3	13.20	1.180	3.063
1981	11398.1	1521.5	13.35	1.194	3.099
1982	11035.1	1537.1	13.93	1.246	3.234
1983	11105.6	1594.2	14.35	1.284	3.333
1984	11402.4	1628.8	14.28	1.278	3.316
1985	11741.9	1677.0	14.28	1.278	3.316
1986	12094.5	1681.6	13.90	1.244	3.228
1987	12422.4	1746.1	14.06	1.257	3.263
1988	12818.9	1820.9	14.20	1.271	3.298
1989	13086.0	1809.1	13.82	1.237	3.209
1990	13165.1	1889.3	14.35	1.284	3.332
1991	12916.1	1919.9	14.86	1.330	3.451
1992	12842.0	1936.1	15.08	1.349	3.500
1993	13014.7	2056.4	15.80	1.413	3.668
1994	13291.6	2111.4	15.89	1.421	3.688
1995	13505.5	2135.6	15.81	1.415	3.671
1996	13676.2	2266.6	16.57	1.483	3.848
1997	13940.6	2487.9	17.85	1.596	4.143

Source: Labour Force Historical Review CDROM 71F0004XCB.

Note: Share of self employed workers for 1971-75 were extrapolated assuming a constant growth trend for next 5 years.

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



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A Comparison of the Economic Well-Being of Canadians and Americans

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Economic Policy Institute

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Centre for the Study of Living Standards

Session 1 "Trends in Economic Well-Being"

October 30 9:15 AM - 10:15 AM

A Comparison of the Economic Well-being of Canadians and Americans

Paper presented at the CSLS Conference on the State of Living Standards
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A Comparison of the Economic Well-being of Canadians and Americans

The objective of this paper is to compare trends and levels of the economic well-being of Canadians and Americans using a new framework for measuring economic well-being. This framework, conceptualized by Osberg (1985) and developed and estimated for Canada in Osberg and Sharpe (1998), identifies four components or dimensions of economic well-being: consumption flows, stocks of wealth, inequality, and economic security. This paper provides preliminary estimates for these components of economic well-being in the United States over the 1960-97 period and compares trends over the 1971-97 period and levels in 1997 between Canada and the United States. A key finding of the paper is that while the United States enjoyed greater increases in economic well-being than Canada over the 1971-97 period and particularly in the 1990s, the level of economic well-being in 1997 appears higher in Canada when importance is given inequality and economic security aspects of economic well-being.

I Trends in the Components of Economic Well-being in the United States¹

Consumption flows

The consumption flow component consists of three sub-components: personal consumption; government spending on current goods and services including defense, but excluding interest payments; and unpaid labour. All sub-components are measured in real terms (1992 dollars) and on a per capita basis to control for population growth.

Personal consumption

The starting point for personal consumption flows is the estimate of this category from the national accounts. The methodology then allows for adjustment for a number of factors: underestimation of consumption due to growth of the underground economy; the impact of increased life expectancy on consumption; the impact of reduced family size of household economies of scale in consumption; and expenditures on regrettables.

In Canada, the estimate of consumption not captured by official statistics due to the underground economy is based on a Statistics Canada benchmark estimate for 1992 and the trend in the share of the self-employed, considered a proxy for growth in the underground economy given the greater opportunities for

¹ See Mishel, Bernstein and Schmitt (1999) for comprehensive data and discussion of indicators of economic well-being in the United States, including family income, taxes, wages, jobs, wealth, and poverty.

the self-employed to shield transactions from the government compared to paid workers. The overall upward adjustment to consumption was quite small (4.1 per cent in 1997). The share of the self-employed in total employment has been falling over the 1971-97 period, in contrast to a rise in Canada. In addition, the Bureau of Economic Analysis has not provided a benchmark estimate of the size of the underground economy in the United States. For these two reasons, at this time no adjustment has been made to personal consumption for underestimation of consumption.

Life expectancy for both sexes in the United States has increased from an average 71.1 years in 1971 to 76.1 years in 1997, a 7.0 per cent increase or 0.26 per cent per year. Personal consumption has been adjusted upward to reflect this development (see Table 1).

Average family size in the United States has fallen from 3.57 in 1971 to 3.19 in 1997, a 10.6 per cent drop. Smaller family size means that fixed household expenses are spread over a smaller number of persons reducing equivalent income, although not at the same rate as the fall in family size. We have assumed that one half the change in family size translates into reduced equivalent income, so the index of equivalent income is down 5.3 per cent between 1971 and 1997 (see Table 1).

Certain consumption expenditures are defensive in nature or regrettable and do not add to consumer utility or economic well-being. While the list of such expenditures is somewhat arbitrary, we have included commuting costs, costs of auto accidents, cost of home pollution abatement equipment, and costs of crime. In 1997, these costs totaled \$1,391 per capita (1992 dollars), or 7.6 per cent of total personal consumption (see Table 1). There was little change in the relative importance of these regrettables over the 1971-97 period (8.3 per cent in 1971). These expenditures are subtracted from personal consumption to obtain adjusted personal consumption.

Between 1971 and 1997, personal consumption increased 65.6 per cent, while adjusted personal consumption was up 69.2 per cent. The slightly greater increase in the latter is explained by the positive impact of increased life expectancy and the small fall in the relative expenditures on regrettables. These two developments more than offset the fall in equivalent income from declining family size.

Government spending

In contrast to personal consumption, growth in per capita government spending on current goods and services including defense but excluding interest payments has been very slow over the 1971-97 period, up only 11.2 per cent (see Table 2). In relative importance, this category of total consumption flows in 1997 represented less than one quarter the size of personal consumption.

Unpaid Work

Unfortunately, neither US statistical agencies (unlike Statistics Canada) nor private researchers at this time produce estimates of the value of unpaid household and volunteer work. Consequently, no estimates of this category of consumption flows are now included in the paper.

Total consumption flows

Adding together personal adjusted consumption and government spending on goods and services gives total consumption flows. Over the 1971-97 period, this variable rose 54.0 per cent (see Table 2 and Chart 1).

Stocks of Wealth

Stocks of wealth are defined to include stocks of physical capital, stocks of research and development capital, the value of natural resources, and stocks of human capital, with deductions for the net international investment position and the social cost of environmental degradation.

Table 3 shows the following developments in the above stocks:

- the per capita net capital stock, including residential and non-residential, increased 52.7 per cent over the 1971-97 period from \$52,170 (\$1992) in 1971 to \$79,648 in 1997, according to statistics produced by the Bureau of Economic Analysis (BEA);
- the per capita real stock of R&D rose 58.5 per cent from \$3,459 to \$5,481 over the same period; according to experimental estimates produced by the BEA and extrapolated by the CSLS;
- the per capita real stock of natural resources fell 39.5 per cent from \$3,713 in 1971 to \$2,247 in 1997, according to experimental estimates produced by the BEA and extrapolated by the CSLS;
- the per capita real stock of human capital rose 47.1 per cent from \$35,283 in 1971 to \$51,887 in 1997, according to estimates compiled by the CSLS based on a crude cost of education methodology;
- the real net international investment position of the United States declined from a creditor position of \$683 per capita in 1971 to a debtor position of 4,389 per capita in 1997 according to BEA statistics;
- the real social costs of CO2 emissions, measured on a world scale with country allocations based on GDP shares, rose 7.8 per cent from \$379 per

capita in 1971 to \$409 per capita in 1997 according to CSL S estimates based on the widely used figure for CO2 social costs of \$20 US per ton..

-the total stock of capital rose 41.7 per cent from \$94,930 (\$1992) in 1971 to \$134,465 in 1997 (Chart 1).

Inequality

The inequality component used in the construction of the index of economic well-being is in principle based on the Gini coefficient for after-tax income of all persons and a measure of poverty intensity (poverty rate x average percentage poverty gap), with the former given a weight of one quarter and the latter three quarters. Because of the lack of availability of the necessary data on the poverty gap at this time, the poverty rate has been used instead of poverty intensity. The poverty rate used is the official poverty rate produced by the US government (Weinberg, 1996).

The Gini coefficient for household income in the United States rose 14.9 per cent between 1971 and 1997 (see Table 4). The poverty rate for all persons rose 9.6 per cent from 12.5 per cent to 13.7 per cent over the period. Based on the weights mentioned above, the overall index of inequality rose 10.9 per cent over the period (Chart 1).

Economic Security

The economic security component of the index of economic well-being is composed of four sub-components: the risk of unemployment, the risk of illness, the risk of single-parent poverty, and the rise of poverty in old age. These sub-components are weighted by the relative shares of the populations concerned by the risks to calculate the overall index of economic security.

The risk of unemployment is determined by the employment rate or employment -population ratio, the proportion of the unemployed covered by unemployment insurance (UI), and the ratio of UI benefits to the average industrial wage. Between 1971 and 1997, the employment rate rose 12.7 per cent from 56.6 per cent to 63.8 per cent, the UI coverage rate fell 32.4 per cent from 52.0 per cent to 35.2 per cent, and the UI benefits ratio rose 7.1 per cent from 42.3 per cent to 45.4 per cent (see Table 5). The net effect of these developments, calculated by multiplying the indexes of the three variables, is that the risk of unemployment increased 18.4 per cent over the period.

Trends in the risk imposed by illness is defined by developments in the share of disposable income that goes to medical care. This share rose 30.5 per cent from 10.5 per cent in 1971 to 13.6 per cent in 1997, indicating an important increase in insecurity in the case of illness (see Table 6).

The risk of single-parent poverty is determined by the probability of family breakup, that is the divorce rate, and the poverty rate of single female parents. The divorce rate rose 29.7 per cent over the 1971-97 period (see Table 7). The official poverty rate for families headed by lone females actually fell 3.2 percent from 33.9 per cent to 32.8 per cent. These two trends are multiplied to obtain the overall risk of single parent poverty, which rose 25.5 per cent.

The risk of poverty in old age is determined by the official elderly poverty rate, which fell 50 per cent from 21.6 per cent in 1971 to 10.8 per cent in 1997 (see Table 8).

The overall index of economic security is calculated by weighting the four sub-components by the relative importance of the population concerned. These weights in 1997 are (see Table A13): risk of unemployment (0.3440); risk of illness (0.4537); risk of single parent poverty (0.1083); and risk of elderly poverty (0.0939). It is important to note that the constant 2 has been added to the indexes for risk of illness, risk of single parent poverty, and risk of elderly poverty to normalize these indices with that for the risk of unemployment where increases in the index indicate an increase in economic security. The overall index of economic security fell 18.2 per cent between 1971 and 1997, reflecting the declines in security in the areas of unemployment, health, and single parent poverty (see Table 9 and Chart 1).

Index of Economic Well-being

The index of economic well-being is calculated as a weighted average of the indexes of consumption flows, stocks of wealth, equality (the inequality index plus 2), and economic security where the weights reflect the importance accorded each component by the compiler, in turn based on the values of the compiler. We have assigned the following weights for our base case index: consumption flows (0.4); stocks of wealth (0.1); equality (0.25); and economic security (0.25).

Over the 1971-97 period, the index of economic well-being rose 18.5 per cent (see Table 10 and Chart 1). The increase was relatively steady over the period: from 1971 to 1980 it was up 4.4 per cent, from 1980 to 1989 9.8 per cent, and from 1989 to 1997 3.4 per cent. Over the 1971-97, real GDP per capita rose 58.8 per cent, more than three times the rate of advance of the index of economic well-being (Chart 2).

The rate of change in the index of economic well-being is very sensitive to the weights given the four components. If greater weight is given to consumption and less to equality and economic security, the index shows a larger increase. For example, with weights of 0.7 for consumption and 0.1 for equality, economic security and wealth, the index advanced nearly 40 per cent over the 1971-97 period, double the rate of increase with the weights used above (Chart 3).

Table 1: Components of Personal Consumption in the United States

Year	Personal Consumption per capita, (1992 \$) (A)	% of Self Employed in Total Employment (B)	Index of Share of Self Employed Workers 1971=1.00 (C)	Index of Life Expectancy 1971=1.00 (D)	Average Family Size, Persons (E)	Index of Equivalent Income 1971=1.00 (F)	Real Personal Consumption per capita, (1992 \$) G=A*D*F	Total Regrettable Cost Per Capita, (1992 \$) (H)	Adjusted Personal Consumption, (1992\$) (G-H)	Index of Adjusted Personal Consumption 1971=1.00
1960	7,929	13.83	1.551	0.955	3.67	1.014	7,682	659	7,024	0.698
1961	7,956	13.76	1.542	0.957	3.70	1.018	7,752	645	7,108	0.706
1962	8,222	13.20	1.479	0.958	3.67	1.014	7,991	668	7,323	0.728
1963	8,437	12.60	1.413	0.960	3.68	1.015	8,224	687	7,537	0.749
1964	8,819	12.32	1.381	0.961	3.70	1.018	8,634	708	7,925	0.788
1965	9,259	11.81	1.324	0.963	3.70	1.018	9,079	748	8,330	0.828
1966	9,676	11.15	1.250	0.964	3.69	1.017	9,489	765	8,724	0.867
1967	9,856	9.64	1.081	0.966	3.67	1.014	9,655	770	8,885	0.883
1968	10,315	9.33	1.047	0.967	3.63	1.008	10,063	810	9,253	0.920
1969	10,596	9.18	1.029	0.969	3.60	1.004	10,310	854	9,457	0.940
1970	10,718	8.94	1.002	0.971	3.58	1.001	10,417	877	9,540	0.948
1971	10,977	8.92	1.000	1.000	3.57	1.000	10,977	914	10,063	1.000
1972	11,510	8.71	0.977	1.001	3.53	0.994	11,462	974	10,488	1.042
1973	11,951	8.53	0.956	1.004	3.48	0.987	11,851	1,002	10,849	1.078
1974	11,759	8.59	0.963	1.013	3.44	0.982	11,691	959	10,732	1.067
1975	11,900	8.65	0.970	1.021	3.42	0.979	11,895	988	10,908	1.084
1976	12,449	8.37	0.938	1.025	3.39	0.975	12,442	1,052	11,390	1.132
1977	12,849	8.36	0.937	1.031	3.37	0.972	12,875	1,111	11,764	1.169
1978	13,261	8.38	0.939	1.034	3.33	0.966	13,247	1,149	12,098	1.202
1979	13,420	8.48	0.951	1.039	3.31	0.964	13,440	1,146	12,295	1.222
1980	13,216	8.70	0.976	1.037	3.29	0.961	13,162	1,094	12,068	1.199
1981	13,247	8.70	0.975	1.042	3.27	0.958	13,226	1,077	12,149	1.207
1982	13,272	8.94	1.002	1.048	3.25	0.955	13,283	1,044	12,239	1.216
1983	13,831	9.06	1.016	1.049	3.26	0.957	13,881	1,085	12,797	1.272
1984	14,418	8.89	0.997	1.051	3.24	0.954	14,448	1,145	13,303	1.322
1985	14,956	8.65	0.970	1.051	3.23	0.952	14,965	1,198	13,767	1.368
1986	15,411	8.51	0.954	1.051	3.21	0.950	15,375	1,195	14,180	1.409
1987	15,742	8.56	0.960	1.053	3.19	0.947	15,701	1,185	14,516	1.442
1988	16,214	8.63	0.967	1.053	3.17	0.944	16,123	1,215	14,908	1.481
1989	16,433	8.53	0.956	1.056	3.16	0.943	16,361	1,213	15,147	1.505
1990	16,532	8.50	0.953	1.060	3.17	0.944	16,550	1,250	15,300	1.520
1991	16,252	8.73	0.978	1.062	3.18	0.945	16,315	1,212	15,103	1.501
1992	16,523	8.41	0.942	1.066	3.17	0.944	16,629	1,240	15,389	1.529
1993	16,830	8.55	0.958	1.062	3.16	0.943	16,845	1,270	15,575	1.548
1994	17,214	8.65	0.970	1.065	3.20	0.948	17,378	1,302	16,076	1.598
1995	17,470	8.39	0.941	1.066	3.19	0.947	17,634	1,331	16,303	1.620
1996	17,759	8.28	0.928	1.070	3.20	0.948	18,023	1,361	16,662	1.656
1997	18,177	8.11	0.910	1.070	3.19	0.947	18,420	1,391	17,029	1.692

Sources: Self Employed Workers: Bureau of Labor Statistics, <http://stats.bls.gov/webapps/legacy/cpsatab4.htm>;

Average Family Size: Census Data, <http://www.census.gov/population/socdemo/hh-fam/htabHH-6.txt>;

Personal consumption: Appendix Table A1; Index of Life Expectancy: Appendix Table A4;

Total Regrettable Cost Per Capita: Appendix Table A3.

Note: Index of Equivalent Income was calculated on the basis of one half rate of change of family size.

Table 2: Components of Total Consumption in the United States

Year	Adjusted Personal Consumption per capita (1992 \$)	Total Gov't Real Current Expenditure Per Capita (1992 \$)	Total Consumption Flows Per Capita (1992 \$)	Index 1971=1.01
1960	7,024	2,821	9,845	0.7214
1961	7,108	2,860	9,968	0.7304
1962	7,323	2,998	10,321	0.7563
1963	7,537	3,053	10,590	0.7760
1964	7,925	3,068	10,993	0.8055
1965	8,330	3,139	11,469	0.8404
1966	8,724	3,383	12,107	0.8872
1967	8,885	3,631	12,516	0.9171
1968	9,253	3,765	13,018	0.9539
1969	9,457	3,755	13,212	0.9681
1970	9,540	3,652	13,192	0.9666
1971	10,063	3,584	13,647	1.0000
1972	10,488	3,546	14,034	1.0283
1973	10,849	3,481	14,330	1.0500
1974	10,732	3,510	14,242	1.0436
1975	10,908	3,528	14,435	1.0578
1976	11,390	3,496	14,886	1.0908
1977	11,764	3,518	15,282	1.1198
1978	12,098	3,553	15,651	1.1469
1979	12,295	3,548	15,843	1.1609
1980	12,068	3,564	15,633	1.1455
1981	12,149	3,586	15,734	1.1530
1982	12,239	3,617	15,856	1.1619
1983	12,797	3,659	16,456	1.2058
1984	13,303	3,687	16,990	1.2450
1985	13,767	3,830	17,597	1.2894
1986	14,180	3,968	18,148	1.3298
1987	14,516	4,019	18,535	1.3581
1988	14,908	4,063	18,971	1.3901
1989	15,147	4,132	19,279	1.4127
1990	15,300	4,184	19,484	1.4277
1991	15,103	4,180	19,283	1.4130
1992	15,389	4,130	19,518	1.4302
1993	15,575	4,075	19,650	1.4399
1994	16,076	4,052	20,128	1.4749
1995	16,303	4,009	20,312	1.4884
1996	16,662	3,972	20,634	1.5120
1997	17,029	3,985	21,014	1.5398

Sources: Adjusted Personal consumption: Table 1;

Total Government Current Real Expenditures per capita: Appendix Table A2.

Table 3: Stocks of Wealth in the United States

Year	Total Per Capita Net Capital Stock (1992 \$)	Per Capita Depreciated Accumulated Stock GERD (1992 \$)	Total Real Per Capita Value of Nat. Res. (1992 \$)	Human Capital per capita (1992 \$)	Per Capita Real Net Int'l Investment Position (1992 \$)	Per Capita Greenhouse Gas Emis- sion Cost (1992 \$)	Total Real Per Capita Wealth (1992 \$)	Index 1971=1.00
1960	40,093	1,840	3,722	33,902	-	384.9	79,171	0.8340
1961	40,698	2,001	3,698	33,345	-	384.5	79,357	0.8360
1962	41,499	2,155	3,678	33,409	-	392.2	80,348	0.8464
1963	42,417	2,306	3,642	33,512	-	394.4	81,483	0.8583
1964	43,499	2,471	3,643	33,652	-	390.9	82,874	0.8730
1965	44,797	2,643	3,661	33,842	-	396.9	84,547	0.8906
1966	46,200	2,811	3,654	33,940	-	402.7	86,202	0.9081
1967	47,471	2,981	3,641	34,110	-	402.4	87,801	0.9249
1968	48,859	3,140	3,571	34,408	-	403.4	89,575	0.9436
1969	50,216	3,281	3,442	34,642	-	397.1	91,184	0.9605
1970	51,175	3,394	3,827	34,856	935.6	379.5	93,808	0.9882
1971	52,170	3,459	3,713	35,283	683.8	378.8	94,930	1.0000
1972	53,619	3,501	3,567	36,116	528.0	385.5	96,945	1.0212
1973	55,164	3,536	3,438	36,911	640.3	385.1	99,304	1.0461
1974	56,280	3,565	3,340	37,747	714.1	378.0	101,267	1.0668
1975	56,964	3,578	3,218	38,591	794.7	372.1	102,772	1.0826
1976	57,899	3,573	3,089	39,219	860.4	368.8	104,272	1.0984
1977	59,098	3,572	3,083	39,867	1,824.5	383.8	107,060	1.1278
1978	60,507	3,574	2,997	40,531	2,016.9	388.3	109,237	1.1507
1979	61,864	3,584	2,983	41,218	2,614.6	388.2	111,876	1.1785
1980	62,688	3,606	2,983	41,893	2,856.8	381.3	113,645	1.1971
1981	63,555	3,648	2,926	42,695	2,465.4	385.8	114,904	1.2104
1982	64,051	3,708	2,845	43,553	1,626.2	376.3	115,406	1.2157
1983	64,873	3,783	2,781	44,424	1,489.7	381.2	116,970	1.2322
1984	66,285	3,876	2,764	45,314	736.3	389.8	118,585	1.2492
1985	67,850	3,998	2,754	46,186	506.5	389.4	120,904	1.2736
1986	69,410	4,145	2,697	46,832	508.3	387.3	123,206	1.2979
1987	70,842	4,290	2,677	47,446	241.6	386.4	125,109	1.3179
1988	71,088	4,429	2,598	48,009	41.2	383.9	125,781	1.3250
1989	73,542	4,563	2,566	48,536	-221.4	382.8	128,602	1.3547
1990	74,361	4,682	2,554	48,983	-712.9	379.3	129,488	1.3640
1991	74,745	4,801	2,477	49,351	-1,070.1	373.3	129,929	1.3687
1992	75,230	4,918	2,442	49,685	-1,780.1	376.3	130,119	1.3707
1993	75,980	5,030	2,400	49,995	-680.9	388.8	132,336	1.3940
1994	76,976	5,145	2,360	50,343	-850.6	405.0	133,569	1.4070
1995	78,159	5,259	2,321	50,963	-1,894.7	406.2	134,401	1.4158
1996	78,790	5,372	2,284	51,445	-2,541.7	407.4	134,942	1.4215
1997	79,648	5,481	2,247	51,887	-4,389.4	408.5	134,465	1.4165

Sources: Total per Capita Net Capital Stock: Appendix Table A5;

Per Capita Depreciated Accumulated Stock GERD: Appendix Table A6;

Total Real per Capita Value of Natural Resources: Appendix Table A9;

Human Capital Per Capita: Appendix Table A8;

Real Net International Net Investment Position per Capita: Appendix Table A10.

Table 4: Index of Economic Equality for the United States

Year	Poverty Rate	Gini Coefficient	Overall index of Equality
1960	-1.776	-1.048	-1.594
1961	-1.752	-1.071	-1.582
1962	-1.680	-1.043	-1.521
1963	-1.560	-1.035	-1.429
1964	-1.520	-1.038	-1.399
1965	-1.384	-1.030	-1.296
1966	-1.176	-1.028	-1.139
1967	-1.136	-1.008	-1.104
1968	-1.024	-0.980	-1.013
1969	-0.968	-0.987	-0.973
1970	-1.008	-0.995	-1.005
1971	-1.000	-1.000	-1.000
1972	-0.952	-1.013	-0.967
1973	-0.888	-1.003	-0.917
1974	-0.896	-0.997	-0.921
1975	-0.984	-1.003	-0.989
1976	-0.944	-1.005	-0.959
1977	-0.928	-1.015	-0.950
1978	-0.912	-1.015	-0.938
1979	-0.936	-1.020	-0.957
1980	-1.040	-1.018	-1.034
1981	-1.120	-1.025	-1.096
1982	-1.200	-1.040	-1.160
1983	-1.216	-1.045	-1.173
1984	-1.152	-1.048	-1.126
1985	-1.120	-1.058	-1.105
1986	-1.088	-1.073	-1.084
1987	-1.072	-1.076	-1.073
1988	-1.040	-1.078	-1.050
1989	-1.024	-1.088	-1.040
1990	-1.080	-1.081	-1.080
1991	-1.136	-1.081	-1.122
1992	-1.184	-1.096	-1.162
1993	-1.208	-1.146	-1.193
1994	-1.160	-1.152	-1.158
1995	-1.104	-1.136	-1.112
1996	-1.096	-1.149	-1.109
1997	-1.096	-1.149	-1.109

Sources: Poverty Rate: Appendix Table A11; GINI Coefficient: Appendix Table A10.

Note: Weights are 0.75 for Poverty Rate, 0.25 for Gini Coefficient.

Table 5: Risk imposed by unemployment in the United States

Year	Empl oyment rate	Insured Unempl oyment weekly, Average, Thous.	Unempl oyed, Thousa nds	% of the unempl oyed claiming regular benefits	Average weekly benefits paid, Current dollars	Average weekly earnings, total, Current dollars	Average weekly benefits/ average earnings (%)	ER Index	UI coverage	UI benefits	multi- plicative
1960	56.1	2,071	3,852	53.8	32.87	80.67	40.75	0.9912	1.0341	0.9603	0.9842
1961	55.4	2,994	4,714	63.5	33.80	82.60	40.92	0.9788	1.2216	0.9644	1.1531
1962	55.5	1,946	3,911	49.8	34.56	85.91	40.23	0.9806	0.9570	0.9481	0.8897
1963	55.4	1,973	4,070	48.5	35.27	88.46	39.87	0.9788	0.9324	0.9396	0.8575
1964	55.7	1,753	3,786	46.3	35.92	91.33	39.33	0.9841	0.8905	0.9269	0.8123
1965	56.2	1,450	3,366	43.1	37.19	95.45	38.96	0.9929	0.8285	0.9182	0.7554
1966	56.9	1,129	2,875	39.3	39.75	98.82	40.22	1.0053	0.7553	0.9480	0.7198
1967	57.3	1,270	2,975	42.7	41.25	101.84	40.50	1.0124	0.8210	0.9546	0.7934
1968	57.5	1,187	2,817	42.1	43.43	107.73	40.31	1.0159	0.8104	0.9501	0.7822
1969	58.0	1,177	2,832	41.6	46.17	114.61	40.28	1.0247	0.7993	0.9494	0.7777
1970	57.4	2,070	4,093	50.6	50.34	119.83	42.01	1.0141	0.9727	0.9900	0.9766
1971	56.6	2,608	5,016	52.0	54.02	127.31	42.43	1.0000	1.0000	1.0000	1.0000
1972	57.0	2,192	4,882	44.9	56.76	136.90	41.46	1.0071	0.8636	0.9771	0.8498
1973	57.8	1,793	4,365	41.1	59.00	145.39	40.58	1.0212	0.7900	0.9564	0.7716
1974	57.8	2,558	5,156	49.6	64.25	154.76	41.52	1.0212	0.9542	0.9784	0.9534
1975	56.1	4,937	7,929	62.3	70.23	163.53	42.95	0.9912	1.1976	1.0121	1.2014
1976	56.8	3,846	7,406	51.9	75.16	175.45	42.84	1.0035	0.9988	1.0096	1.0119
1977	57.9	3,308	6,991	47.3	78.79	189.00	41.69	1.0230	0.9101	0.9825	0.9147
1978	59.3	2,645	6,202	42.6	83.67	203.70	41.08	1.0477	0.8202	0.9680	0.8319
1979	59.9	2,592	6,137	42.2	89.67	219.91	40.78	1.0583	0.8123	0.9610	0.8261
1980	59.2	3,837	7,637	50.2	98.95	235.10	42.09	1.0459	0.9663	0.9919	1.0025
1981	59.0	3,410	8,273	41.2	106.70	255.20	41.81	1.0424	0.7928	0.9854	0.8143
1982	57.8	4,592	10,678	43.0	119.34	267.26	44.65	1.0212	0.8271	1.0523	0.8889
1983	57.9	3,774	10,717	35.2	123.59	280.70	44.03	1.0230	0.6773	1.0376	0.7189
1984	59.5	2,560	8,539	30.0	123.47	292.86	42.16	1.0512	0.5766	0.9936	0.6023
1985	60.1	2,699	8,312	32.5	128.14	299.09	42.84	1.0618	0.6245	1.0097	0.6696
1986	60.7	2,739	8,237	33.3	135.65	304.85	44.50	1.0724	0.6395	1.0487	0.7193
1987	61.5	2,369	7,425	31.9	140.55	312.50	44.98	1.0866	0.6136	1.0600	0.7067
1988	62.3	2,135	6,701	31.9	144.97	322.02	45.02	1.1007	0.6128	1.0610	0.7156
1989	63.0	2,205	6,528	33.8	151.73	334.24	45.40	1.1131	0.6496	1.0698	0.7736
1990	62.8	2,575	7,047	36.5	161.56	345.35	46.78	1.1095	0.7028	1.1025	0.8597
1991	61.7	3,406	8,628	39.5	169.88	353.98	47.99	1.0901	0.7592	1.1310	0.9361
1992	61.5	3,348	9,613	34.8	173.64	363.61	47.75	1.0866	0.6698	1.1254	0.8191
1993	61.7	2,845	8,940	31.8	179.62	373.64	48.07	1.0901	0.6121	1.1329	0.7559
1994	62.5	2,746	7,996	34.3	182.16	385.86	47.21	1.1042	0.6605	1.1126	0.8115
1995	62.9	2,639	7,404	35.6	187.29	394.34	47.49	1.1113	0.6855	1.1193	0.8527
1996	63.2	2,656	7,236	36.7	189.51	406.26	46.65	1.1166	0.7060	1.0993	0.8666
1997	63.8	2,369	6,739	35.2	192.73	424.20	45.43	1.1272	0.6761	1.0707	0.8160

Sources: Economic Report of the President 1998, Statistical Tables B-36; B-39, B-42, B-45, B-47;

Secular trend labor force participation rate: Table B-39; Unemployment Rate: Table B-42; Unemployed: Table B-36;

Insured Unemployment, Average weekly benefits for 1965-1997: Statistical Table B-45;

Average weekly earnings: Table B-47; (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

Insured Unemployment, Average weekly benefits for 1960-1964: Economic Report of the President 1986, Table B-39.

Table 6: Risk imposed by Illness in the United States

Year	Personal Disposable Income (Billions of 1992\$)	Personal Medical Care Expenditures (Billions of 1992\$)	% of Disposable income	Index
1960	1,565.4	136.7	8.73	-0.836
1961	1,615.8	141.7	8.77	-0.839
1962	1,693.7	153.3	9.05	-0.866
1963	1,755.5	162.7	9.27	-0.887
1964	1,881.9	180.5	9.59	-0.918
1965	2,000.2	188.9	9.44	-0.904
1966	2,106.6	197.6	9.38	-0.898
1967	2,198.4	204.8	9.32	-0.892
1968	2,298.2	220.8	9.61	-0.920
1969	2,373.6	237.2	9.99	-0.957
1970	2,465.6	250.8	10.17	-0.974
1971	2,568.3	268.3	10.45	-1.000
1972	2,685.7	286.4	10.66	-1.021
1973	2,875.2	307.6	10.70	-1.024
1974	2,854.2	320.2	11.22	-1.074
1975	2,903.6	337.3	11.62	-1.112
1976	3,017.6	353.5	11.71	-1.121
1977	3,115.4	371.2	11.92	-1.141
1978	3,276.0	385.7	11.77	-1.127
1979	3,365.5	401.1	11.92	-1.141
1980	3,385.7	415.5	12.27	-1.175
1981	3,464.9	436.4	12.59	-1.206
1982	3,495.6	442.2	12.65	-1.211
1983	3,592.8	459.7	12.80	-1.225
1984	3,855.4	472.4	12.25	-1.173
1985	3,972.0	490.7	12.35	-1.183
1986	4,101.0	510.3	12.44	-1.191
1987	4,168.2	537.3	12.89	-1.234
1988	4,332.1	561.3	12.96	-1.240
1989	4,416.8	575.8	13.04	-1.248
1990	4,498.2	602.8	13.40	-1.283
1991	4,500.0	621.6	13.81	-1.322
1992	4,626.7	646.6	13.98	-1.338
1993	4,703.9	655.3	13.93	-1.334
1994	4,805.1	662.1	13.78	-1.319
1995	4,964.2	674.9	13.60	-1.301
1996	5,076.9	688.1	13.55	-1.297
1997P	5,222.7	711.8	13.63	-1.305

Sources: All data for 1982-1997 are from Economic Report of the President 1998, Statistical Tables B-17, B31 (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

All data for 1960-1981 are from Economic Report of the President 1997, Statistical Tables B-15, B-29. (<http://www.umsl.edu/services/govdocs/erp/1997/contents.htm>)

Table 7: Risk imposed by "widowhood" in the United States

Year	Divorce rate (% of legally married couples) (A)	Poverty rate (%) for single women with children under 18 (B)	Index of A (A')	Index of B (B')	Multiplicative index $A*B'^{-1}$ (1)
1960	0.92	42.4	0.582	1.251	-0.7283
1961	0.96	42.1	0.608	1.242	-0.7546
1962	0.94	42.9	0.595	1.265	-0.7529
1963	0.96	40.4	0.608	1.192	-0.7241
1964	1.00	36.4	0.633	1.074	-0.6796
1965	1.06	38.4	0.671	1.133	-0.7599
1966	1.09	33.1	0.690	0.976	-0.6736
1967	1.12	33.3	0.709	0.982	-0.6963
1968	1.25	32.3	0.791	0.953	-0.7538
1969	1.34	32.7	0.848	0.965	-0.8181
1970	1.49	32.5	0.943	0.959	-0.9041
1971	1.58	33.9	1.000	1.000	-1.0000
1972	1.70	32.7	1.076	0.965	-1.0379
1973	1.82	32.2	1.152	0.950	-1.0941
1974	1.93	32.1	1.222	0.947	-1.1567
1975	2.03	32.5	1.285	0.959	-1.2318
1976	2.11	33.0	1.335	0.973	-1.3000
1977	2.11	31.7	1.335	0.935	-1.2488
1978	2.19	31.4	1.386	0.926	-1.2839
1979	2.28	30.4	1.443	0.897	-1.2941
1980	2.26	32.7	1.430	0.965	-1.3797
1981	2.26	34.6	1.430	1.021	-1.4599
1982	2.17	36.3	1.373	1.071	-1.4707
1983	2.13	36.0	1.348	1.062	-1.4316
1984	2.15	34.5	1.361	1.018	-1.3848
1985	2.17	34.0	1.373	1.003	-1.3775
1986	2.12	34.6	1.342	1.021	-1.3695
1987	2.08	34.2	1.316	1.009	-1.3281
1988	2.07	33.4	1.310	0.985	-1.2908
1989	2.04	32.2	1.291	0.950	-1.2264
1990	2.09	33.4	1.323	0.985	-1.3033
1991	2.09	35.6	1.323	1.050	-1.3891
1992	2.12	35.4	1.342	1.044	-1.4011
1993	2.05	35.6	1.297	1.050	-1.3625
1994	2.05	34.6	1.297	1.021	-1.3243
1995	2.05	32.4	1.297	0.956	-1.2401
1996	2.05	32.6	1.297	0.962	-1.2477
1997	2.05	32.8	1.297	0.968	-1.2554

Sources: Data on Poverty rate for single women for 1978-1997 are from Economic Report of the President 1998, Statistical Table B-33 (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

Data for 1960-1977 are from Economic Report of the President 1986, Statistical Table B-29.

Divorce rate for 1960-1990 are from the National Center for Health Statistics:

<http://www.cdc.gov/nchswww/fastats/PDF/43-9s-t1.pdf>

Divorce rate for 1991-1994 are Census Data: <http://www.census.gov/prod/2/gen/96statab/vitlstat.pdf>

Data for 1995, 1996, 1997 assumed to be equal to 1994 data.

Table 8: Risk imposed by Old Age in the United States

Year	Elderly poverty rate (2)	Poverty Rate (2) <i>Index</i>
1959	35.2	-1.630
1960	34.2	-1.581
1961	33.1	-1.534
1962	32.2	-1.489
1963	31.2	-1.444
1964	30.3	-1.401
1965	29.4	-1.360
1966	28.5	-1.319
1967	29.5	-1.366
1968	25.0	-1.157
1969	25.3	-1.171
1970	24.6	-1.139
1971	21.6	-1.000
1972	18.6	-0.861
1973	16.3	-0.755
1974	14.6	-0.676
1975	15.3	-0.708
1976	15.0	-0.694
1977	14.1	-0.653
1978	14.0	-0.648
1979	15.2	-0.704
1980	15.7	-0.727
1981	15.3	-0.708
1982	14.6	-0.676
1983	13.8	-0.639
1984	12.4	-0.574
1985	12.6	-0.583
1986	12.4	-0.574
1987	12.5	-0.579
1988	12.0	-0.556
1989	11.4	-0.528
1990	12.2	-0.565
1991	12.4	-0.574
1992	12.9	-0.597
1993	12.2	-0.565
1994	11.7	-0.542
1995	10.5	-0.486
1996	10.8	-0.500
1997	10.8	-0.500

Source: Elderly Poverty Rate are Census data: <http://www.census.gov/hhes/poverty/histpov/hstpov3.html>

Note: Elderly Poverty rate for 1997 assumed to be equal to 1996 data.

Table 9: Index of Economic Security for the United States

Year	Index 1 Women	Index 2 Old Age	Index 3 Health	Index 4 Unemployment	Weighted Index 1 Women	Weighted Index 2 Old Age	Weighted Index 3 Health	Weighted Index 4 Unemployment	Average Weighted Index
1960	1.2717	0.4188	1.1641	0.9842	0.2131	0.0378	0.5240	0.2875	1.0624
1961	1.2454	0.4658	1.1605	1.1531	0.2101	0.0419	0.5225	0.3356	1.1101
1962	1.2471	0.5114	1.1336	0.8897	0.2129	0.0459	0.5098	0.2577	1.0264
1963	1.2759	0.5556	1.1128	0.8575	0.2220	0.0496	0.4978	0.2481	1.0175
1964	1.3204	0.5985	1.0819	0.8123	0.2310	0.0534	0.4829	0.2352	1.0024
1965	1.2401	0.6402	1.0960	0.7554	0.2172	0.0571	0.4883	0.2191	0.9817
1966	1.3264	0.6806	1.1021	0.7198	0.2265	0.0613	0.4933	0.2099	0.9910
1967	1.3037	0.6343	1.1082	0.7934	0.2206	0.0574	0.4961	0.2321	1.0063
1968	1.2462	0.8426	1.0803	0.7822	0.2081	0.0767	0.4835	0.2303	0.9986
1969	1.1819	0.8287	1.0434	0.7777	0.1946	0.0758	0.4668	0.2306	0.9678
1970	1.0959	0.8611	1.0263	0.9766	0.1779	0.0789	0.4589	0.2919	1.0076
1971	1.0000	1.0000	1.0000	1.0000	0.1617	0.0912	0.4460	0.3011	1.0000
1972	0.9621	1.1389	0.9792	0.8498	0.1523	0.1036	0.4358	0.2597	0.9515
1973	0.9059	1.2454	0.9759	0.7716	0.1389	0.1133	0.4353	0.2389	0.9264
1974	0.8433	1.3241	0.9261	0.9534	0.1286	0.1199	0.4119	0.2977	0.9580
1975	0.7682	1.2917	0.8880	1.2014	0.1137	0.1167	0.3957	0.3796	1.0058
1976	0.7000	1.3056	0.8786	1.0119	0.0942	0.1189	0.3964	0.3270	0.9365
1977	0.7512	1.3472	0.8594	0.9147	0.1015	0.1215	0.3866	0.2971	0.9067
1978	0.7161	1.3519	0.8730	0.8319	0.0940	0.1213	0.3937	0.2729	0.8819
1979	0.7059	1.2963	0.8592	0.8261	0.0913	0.1154	0.3877	0.2731	0.8673
1980	0.6203	1.2731	0.8252	1.0025	0.0773	0.1127	0.3739	0.3346	0.8985
1981	0.5401	1.2917	0.7944	0.8143	0.0685	0.1129	0.3588	0.2721	0.8122
1982	0.5293	1.3241	0.7891	0.8889	0.0641	0.1152	0.3587	0.2998	0.8378
1983	0.5684	1.3611	0.7752	0.7189	0.0664	0.1180	0.3541	0.2442	0.7827
1984	0.6152	1.4259	0.8271	0.6023	0.0722	0.1226	0.3773	0.2050	0.7772
1985	0.6225	1.4167	0.8174	0.6696	0.0730	0.1209	0.3730	0.2284	0.7953
1986	0.6305	1.4259	0.8089	0.7193	0.0726	0.1210	0.3697	0.2467	0.8099
1987	0.6719	1.4213	0.7661	0.7067	0.0781	0.1198	0.3495	0.2427	0.7900
1988	0.7092	1.4444	0.7597	0.7156	0.0816	0.1223	0.3467	0.2461	0.7967
1989	0.7736	1.4722	0.7521	0.7736	0.0899	0.1245	0.3428	0.2657	0.8229
1990	0.6967	1.4352	0.7172	0.8597	0.0782	0.1215	0.3279	0.2974	0.8250
1991	0.6109	1.4259	0.6777	0.9361	0.0676	0.1210	0.3106	0.3242	0.8233
1992	0.5989	1.4028	0.6622	0.8191	0.0658	0.1216	0.3032	0.2831	0.7737
1993	0.6375	1.4352	0.6665	0.7559	0.0693	0.1262	0.3051	0.2612	0.7618
1994	0.6757	1.4583	0.6810	0.8115	0.0739	0.1301	0.3110	0.2798	0.7948
1995	0.7599	1.5139	0.6986	0.8527	0.0828	0.1372	0.3186	0.2936	0.8322
1996	0.7523	1.5000	0.7026	0.8666	0.0802	0.1385	0.3205	0.2988	0.8381
1997	0.7446	1.5000	0.6954	0.8160	0.0807	0.1409	0.3155	0.2807	0.8178

Sources: Indexes: Tables 5,6,7,8; Weights: Table A13.

Table 10: Overall Economic Well being Index for the United States, 1960-1997

Year	Consumption Flows 0.4	Wealth Stocks 0.1	Inequality Measures 0.25	Economic Security 0.25	Well-being Index
1960	0.7214	0.8340	0.4060	1.0624	0.7390
1961	0.7304	0.8360	0.4183	1.1101	0.7579
1962	0.7563	0.8464	0.4793	1.0264	0.7636
1963	0.7760	0.8583	0.5712	1.0175	0.7934
1964	0.8055	0.8730	0.6005	1.0024	0.8103
1965	0.8404	0.8906	0.7044	0.9817	0.8468
1966	0.8872	0.9081	0.8611	0.9910	0.9087
1967	0.9171	0.9249	0.8961	1.0063	0.9349
1968	0.9539	0.9436	0.9871	0.9986	0.9723
1969	0.9681	0.9605	1.0272	0.9678	0.9820
1970	0.9666	0.9882	0.9953	1.0076	0.9862
1971	1.0000	1.0000	1.0000	1.0000	1.0000
1972	1.0283	1.0212	1.0328	0.9515	1.0095
1973	1.0500	1.0461	1.0834	0.9264	1.0271
1974	1.0436	1.0668	1.0786	0.9580	1.0333
1975	1.0578	1.0826	1.0114	1.0058	1.0357
1976	1.0908	1.0984	1.0407	0.9365	1.0405
1977	1.1198	1.1278	1.0502	0.9067	1.0499
1978	1.1469	1.1507	1.0622	0.8819	1.0598
1979	1.1609	1.1785	1.0429	0.8673	1.0598
1980	1.1455	1.1971	0.9656	0.8985	1.0439
1981	1.1530	1.2104	0.9037	0.8122	1.0112
1982	1.1619	1.2157	0.8399	0.8378	1.0058
1983	1.2058	1.2322	0.8266	0.7827	1.0079
1984	1.2450	1.2492	0.8740	0.7772	1.0357
1985	1.2894	1.2736	0.8955	0.7953	1.0658
1986	1.3298	1.2979	0.9157	0.8099	1.0931
1987	1.3581	1.3179	0.9271	0.7900	1.1043
1988	1.3901	1.3250	0.9504	0.7967	1.1253
1989	1.4127	1.3547	0.9599	0.8229	1.1462
1990	1.4277	1.3640	0.9198	0.8250	1.1437
1991	1.4130	1.3687	0.8778	0.8233	1.1273
1992	1.4302	1.3707	0.8380	0.7737	1.1121
1993	1.4399	1.3940	0.8074	0.7618	1.1077
1994	1.4749	1.4070	0.8421	0.7948	1.1399
1995	1.4884	1.4158	0.8879	0.8322	1.1670
1996	1.5120	1.4215	0.8908	0.8381	1.1791
1997	1.5398	1.4165	0.8908	0.8178	1.1847

Sources: Tables 2,3,4,9.

Chart 1: Economic Well-being Index and Components for the United States, 1960-1997

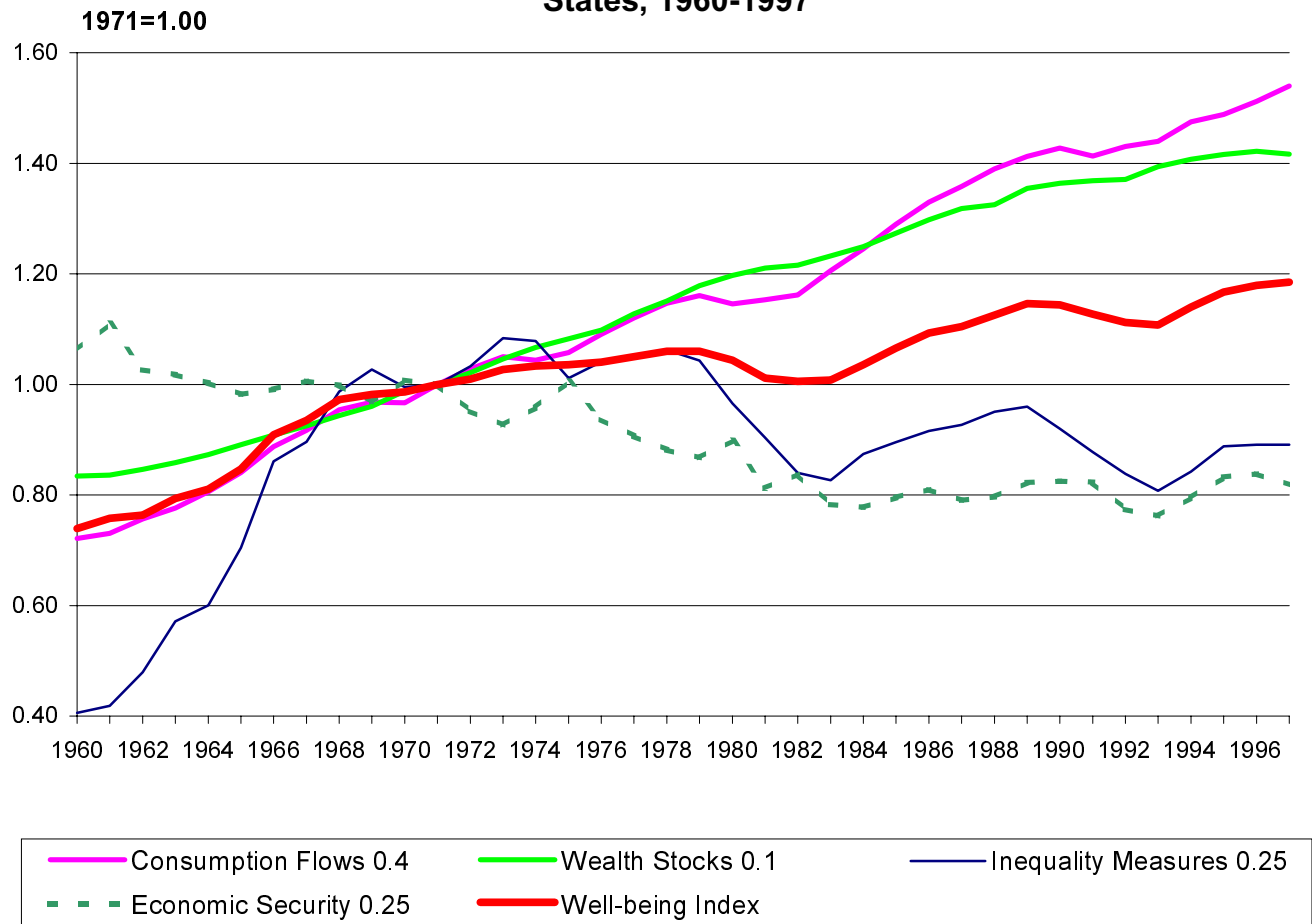


Chart 2: Economic Well-Being Index and GDP per Capita Index, United States

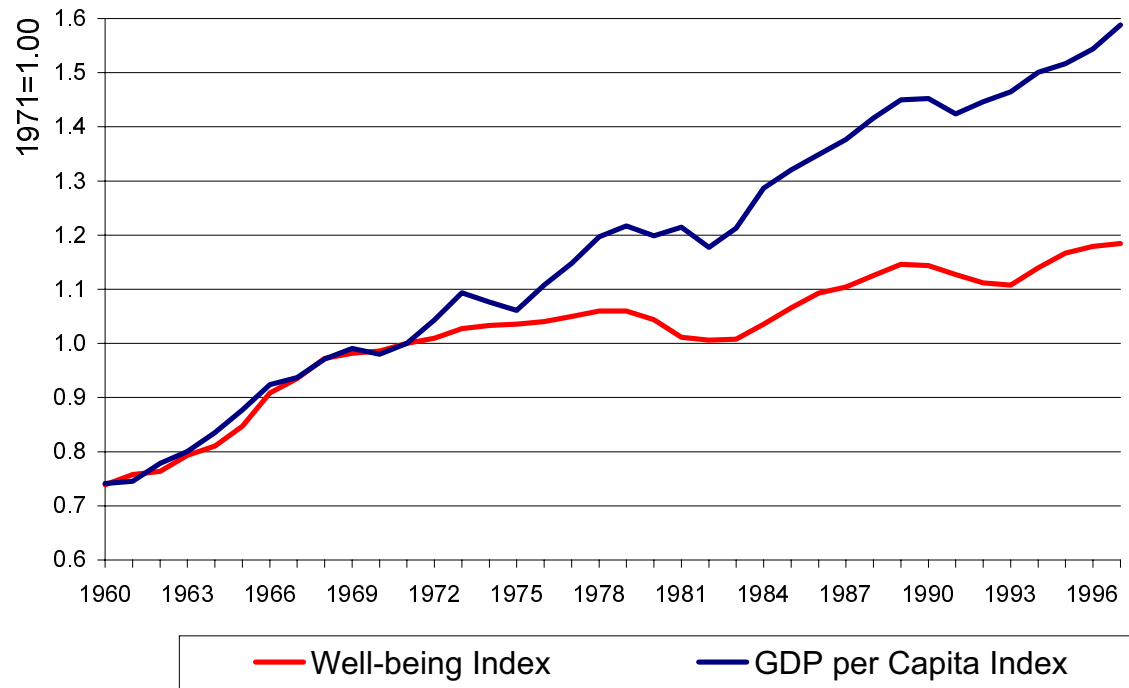
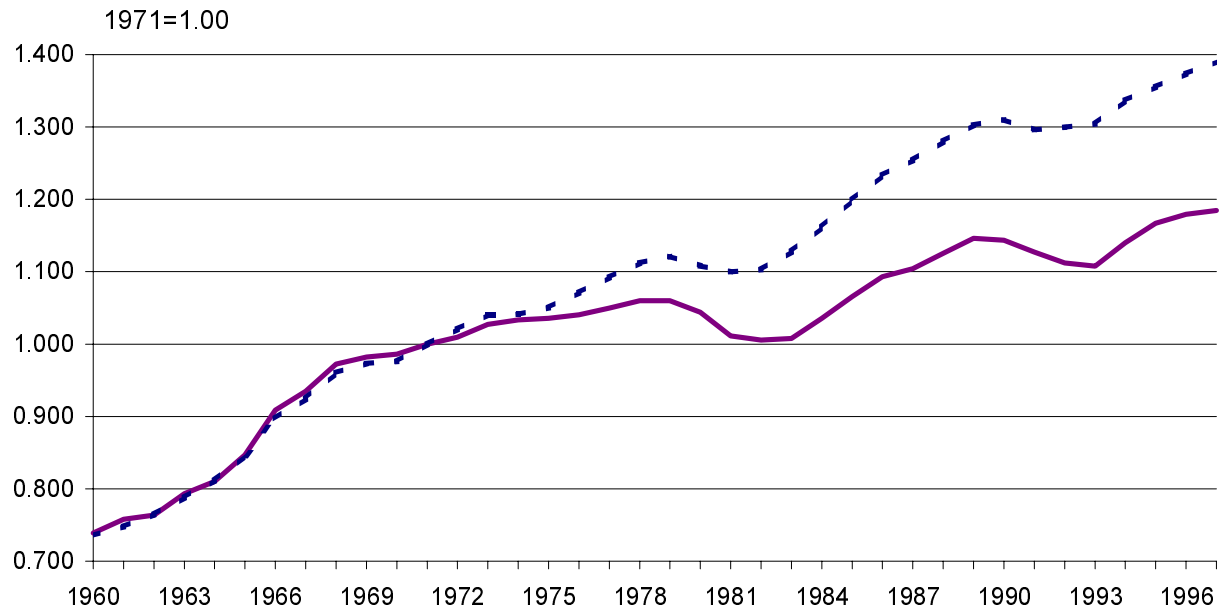


Chart 3: Economic Well Being Index, United States



— Well Being Index = $0.4 \times \text{Consumption} + 0.1 \times \text{Wealth} + 0.25 \times \text{Inequality} + 0.25 \times \text{Security}$
- - Well Being Index = $0.7 \times \text{Consumption} + 0.1 \times \text{Wealth} + 0.1 \times \text{Inequality} + 0.1 \times \text{Security}$

II Comparisons of Trends in Economic Well-being in Canada and the United States

Table 11 provides a comparison of the growth rate of the index of economic well-being and its components for Canada and the United States over the 1971-97 period and in the 1971-80, 1980-89, and 1989-97 sub-periods. The value of unpaid labour has been removed from the total consumption series for Canada to ensure consistency across countries. Overall the 26 year period covered economic well-being by this measure increased 18.5 per cent in the United States versus 9.9 per cent in Canada (Chart 4). The rate of progress was somewhat greater in Canada in both the 1970s and 1980s, but diverged sharply in the 1990s. Between 1989 and 1997, the index fell 9.6 per cent in Canada, but continued to advance in the United States, albeit at a slower pace (3.4 per cent).

Over the 1971-97 period, the United States outperformed Canada in three of the four components of economic well-being (Charts 5-8): consumption (54 per cent versus 45.9 per cent); stocks of wealth (41.7 per cent versus 36.7 per cent); and economic security (-18.2 per cent versus -49.1 per cent). Only for the equality component did Canada outperform the United States, with equality rising 4.3 per cent compared to a 10.9 decline in the United States.

The growing gap in the growth rates of economic well-being in the 1990s between the two countries is largely explained by the massive deterioration in economic security in Canada (-44.9 per cent). This variable was more or less stable in the United States (-0.6 per cent).

Table 11

Trend in Economic Well-being in Canada and the United States, 1971-97
(per cent change)

	Canada	United States
Overall Index of Economic Well-being		
1971-97	9.9	18.5
1971-80	8.4	4.4
1980-89	12.2	9.8
1989-97	-9.6	3.4
Consumption Flows		
1971-97	45.9	54.0
1971-80	28.0	15.3
1980-89	14.9	23.3
1989-97	-0.7	9.0
Stocks of Wealth		
1971-97	34.3	41.7
1971-80	26.1	19.7
1980-89	-0.4	13.2
1989-97	6.9	4.6
Equality		
1971-97	4.3	-10.9
1971-80	-4.6	-3.4
1980-89	16.8	-0.6
1989-97	-6.3	-7.2
Economic Security		
1971-97	-49.1	-18.2
1971-80	-21.6	-10.1
1980-89	12.7	-8.4
1989-97	-41.0	-0.6

Source: Canadian data from Osberg and Sharpe (1998)

Note: The data on consumption and overall well-being for Canada differ from those in Osberg and Sharpe (1998) because the value of unpaid labour has been omitted to ensure consistency with the US data.

III Level Comparisons of Economic Well-being between Canada and the United States

In addition to comparisons of the trends in various components of economic well-being between Canada and the United States, the index of economic well-being developed in this paper permits comparisons in the actual level of well-being. This section develops these level comparisons. Changes in relative levels over time in principle reflect differential movements in the indexes in the two countries. But caution should be exercised in this regard with the data in this paper because for data comparability reasons, different series have been used for US poverty rates. We hope this problem will be rectified in a revised version of this paper.

Table 12

Canada-US Level Comparisons of Per Capita Consumption and Wealth, 1997

	Canada PPP=84.7		US	Can/US
	\$Can	\$US		
Total Consumption	18,840	15,957	21,014	75.9
personal adj. cons.	13,450	11,392	17,029	66.9
gov. curr. spending	5,390	4,565	3,985	114.6
Stocks of Wealth	115,679	97,980	134,873	72.6
capital stock	41,795	35,400	79,648	44.4
R&D stock	1,856	1,572	5,481	28.7
natural res. stock	9,159	7,758	2,247	345.3
human capital	73,964	62,647	51,887	120.7
net inter'l invest.	-10,573	-8,955	-4,389	-204.0
CO2 emissions (tons per capita)		16	20	80.0

Note: All figures are expressed in 1992 dollars.

Consumption Flows

Table 1 shows that in 1997 total per capita consumption flows, expressed in US dollars at Statistics's Canada purchasing power parity estimate of 84.7 US per Canadian dollar, in Canada were 75.9 per cent of those in the United States. As estimates for the value of unpaid labour were not available for the United

States, this component of consumption has been excluded. Relative adjusted personal consumption is even lower in Canada at 66.9 per cent of the US level while government current spending was higher at 114.6 per cent of the US level. This in part reflects the greater government provision of health and education in Canada.

Stocks of Wealth

Per capita stocks of wealth were also lower in Canada than in the United States in 1997, at 72.6 per cent. Again there were large differences among the wealth sub-components. Canada's capital stock was relatively much smaller than the US stock at 44.4 per cent of the US level. Canada's human capital stock was higher than the US level (120.7 per cent), despite the historical higher proportion of persons who have attended university in the United States. Measurement comparability problems may explain this difference.

Canada's R&D stock in 1997 was 28.7 per cent of that in the United States, Canada's level of foreign debt was 204.0 that of the United States, and Canada's per capita stock of natural resources was over three times that of the United States (345.3 per cent). CO2 emissions in Canada were 80 per cent of the per capita US level.

Table 13

A Comparison of Inequality Between Canada and the United States, 1994

	Canada	US	adj. CAN/US
Gini coefficient	0.287	0.371	1.23
Poverty intensity	0.054	0.125	1.41
Overall inequality index			1.37

NOTE: Both Gini coefficient and poverty intensity are for equivalent income for all persons. The poverty measure is one half median income. The adjusted CAN/US ratio is calculated as $(1 - (\text{Can}/\text{US})) + 1$

Source: Osberg, Journal of Human Resources, forthcoming.

Inequality

Table 2 compares inequality levels in Canada and the United States in 1994 (the latest year for which data are available) using comparable definitions of the Gini coefficient and poverty (one half median income). The Gini coefficient is much lower in Canada, indicating greater income equality. The poverty rate is also much lower in Canada.

In order that inequality relatives are consistent in interpretation with the consumption and wealth relatives, Canada's lower inequality relative to the United States must indicate Canada is doing relatively better. (A Canada/US ratio below 1 indicates lower inequality and greater economic well-being in Canada while a lower ratio for consumption indicates lower per capita consumption and lower economic well-being in Canada). To achieve consistency, the Canada/US ratio is transformed or normalized by being subtracted from unity and then adding unity to it $[(1-\text{Can/US})+1]$.

In 1994, inequality as measured by the Gini coefficient for all persons, was 23 per cent less in Canada than in the United States. The poverty rate was 41 per cent less. The weights given poverty rate in the construction of the overall equality index is 0.75 and that given the Gini coefficient 0.25. This means that the level of the overall equality index was 37 per cent higher in Canada than in the US in 1994.

Economic Security

The economic security index consists of four sub-components, the risk of unemployment, the risk of single parent poverty, the risk of illness, and the risk of poverty in old age. The first two of the risks are determined by more than one variable: the employment/population ratio, the UI coverage ratio, and the UI benefits ratio for the risk of unemployment; and the divorce rate and the rate of poverty for female lone-parents for the risk of "widowhood".

In 1997, the employment/population ratio was lower in Canada than in the United States- 58.9 per cent versus 63.0 per cent or 93.5 per cent the US level. Equally, the UI benefits ratio has also lower in Canada at 41.7 per cent versus 45.0 per cent or 92.9 per cent of the US level. On the other hand, the UI coverage ratio has higher in Canada: 42.3 per cent versus 35.0 per cent or 120.9 per cent of the US level. The overall risk of unemployment is a probability function and is calculated by multiplying the ratios of the three probabilities for the two countries, giving a ratio of 1.051. (An alternative way is to calculate the overall probability of the risk of unemployment for each country and then take the Canadian figure as a proportion of the US figure).

In 1997, the divorce rate was higher in the United States than in Canada: 1.23 per cent versus 2.05 per cent, or 166.7 per cent of the Canadian level. The poverty rate for families headed by a lone female was also higher in the United States Canada, based on comparable definition of poverty (percentage of families below one half median income): 60.7 per cent versus 42.5 per cent. (Data are for 1994, the most recent available.) As noted with the inequality index, the Canada-US relatives are normalized by subtracted the Can-US ratio from unity and then adding unity in order to make them consistent with Canada-US relatives where a higher ratio indicates better economic well-being in Canada. The overall risk of single parent poverty is a probability function and it is calculated by multiplying

Table 14

A Comparison of Economic Security in Canada and the United States, 1997

	Canada	US	Canada/US
Employment/Pop ratio	0.589	0.630	93.5
UI/EI coverage ratio	0.423	0.350	120.9
UI/EI benefits ratio	0.417	0.450	92.9
Risk of unemployment	0.104	0.099	1.051
Divorce Rate	0.0123	0.0205	1.40
Poverty Rate for female lone-parents (1994)	0.425	0.607	1.30
Risk of Single Parent Poverty	0.0052	0.0124	1.58
Risk of Illness	4.66	13.63	1.66
Risk of Poverty In old-Age (1991)	8.6	26.1	1.67
Overall Economic Security			1.478

Source: L. Osberg and A. Sharpe, "An Index of Economic Well-being for Canada" for all series except single parent poverty and elderly poverty. Elderly poverty intensity from K. Vandembosch and I. Marx (1996) "Trends in Family Poverty in OECD Countries", Luxembourg Income Study, Working Paper 148, December. Single female poverty rate from Shelly Phipps, "Best Mix", mimeo, Department of Economics, Dalhousie University.

the ratios of the two probabilities for the two countries, giving a ratio of 1.58 (1.3×1.4).

In 1997, the risk of illness, defined as the proportion of disposable income doing to medical expenses, was almost three times (2.92) greater in the United States than in Canada (13.63 per cent versus 4.66 per cent). The Canada-US relative is 1.66, calculated by the $(1 - (4.66/13.63) + 1)$.

The risk of poverty in old age was much greater in the United States than in Canada, again according to comparable poverty measures based on one half median income: 26.1 per cent versus 8.6 per cent. (Data are for 1991). The Canada-US relative is 1.67, calculated as $(1 - (8.6/26.1) + 1)$.

The overall index of economic security is calculated by combining the four sub-components where the weights are the relative importance of the populations affected by each risk. These weights in 1997 were 0.4085 for illness, 0.2729 for unemployment, 0.2119 for single parent poverty, and 0.1068 for elderly poverty. This procedure shows that the average level of economic security was greater in Canada than in the United States (1.478 per cent).

Table 15

A Comparison of the Index of Economic Well-being in Canada and the United States, 1997

	Relative Canada/US	Weights	Weights
Consumption Flows	75.9	0.4	0.7
Stocks of Wealth	72.6	0.1	0.1
Inequality	137.0	0.25	0.1
Economic Security	147.8	0.25	0.1
Index of Economic Well-being		108.8	88.9

Overall Index of Economic Well-being

The Canada/US relative index of economic well-being is a weighted average of the ratios for the four index sub-components where the weights are based on one's judgements concerning the relative importance of the sub-components. Based on a weighting scheme of 0.4 for consumption flows, 0.1 for stocks of wealth, and 0.25 for inequality and economic security, the index shows that in 1997 economic well-being was 8.8 per cent higher in Canada. A second weighting scheme that gives greater weight to consumption (0.7) flows and less to inequality and insecurity (0.1) shows that Canada has a lower level of economic well-being than the United States (88.9 per cent). Again the importance of the weights given the four components of economic well-being comes through.

**Chart 4: Economic Well-being Index for the United States and Canada,
1960-1997**

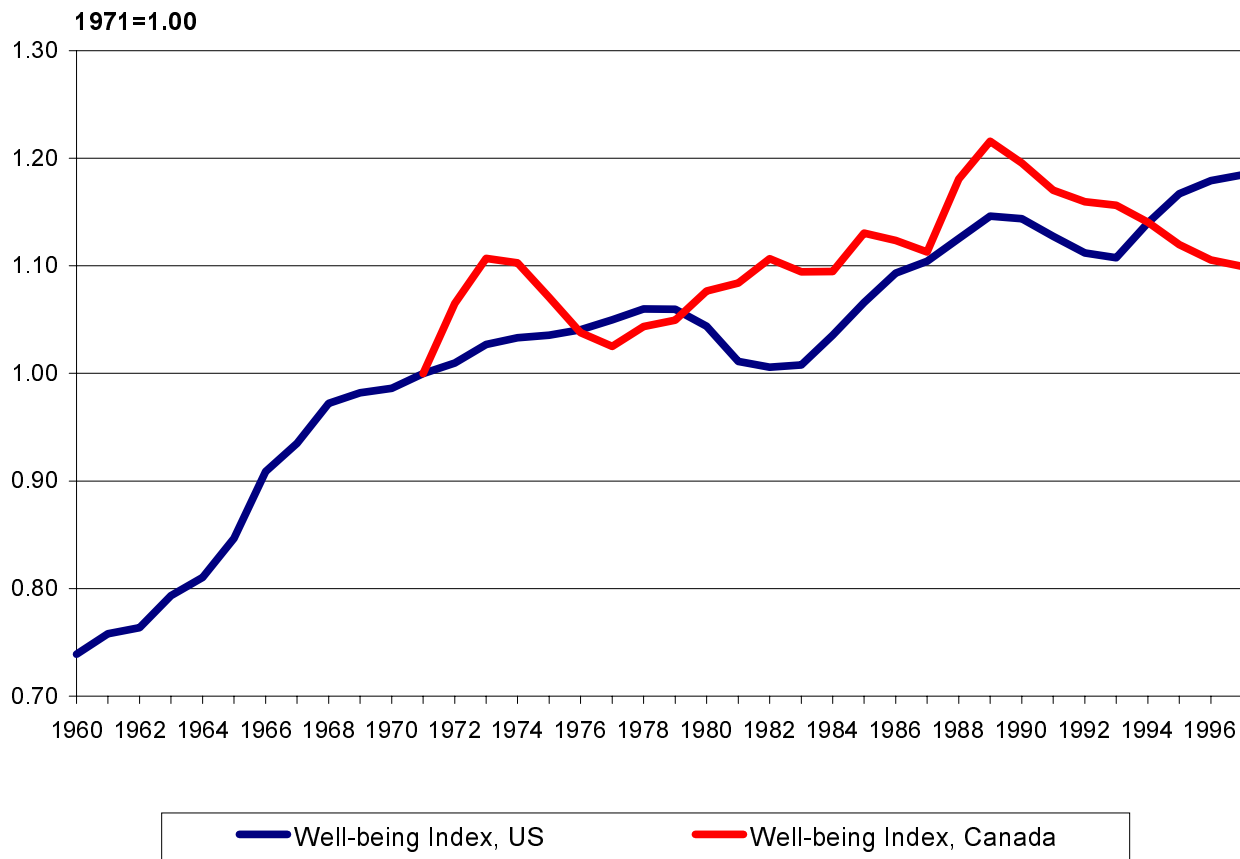


Chart 5: Consumption Indexes in the United States and Canada, 1960-1997

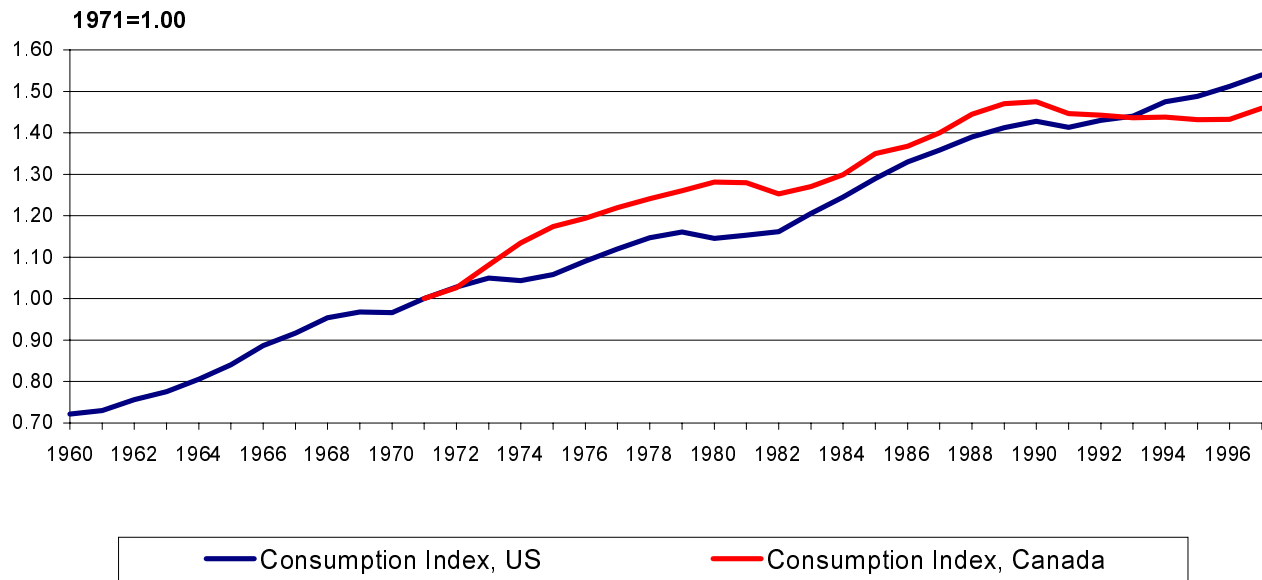


Chart 6: Wealth Stocks Indexes in the United States and Canada, 1960-1997

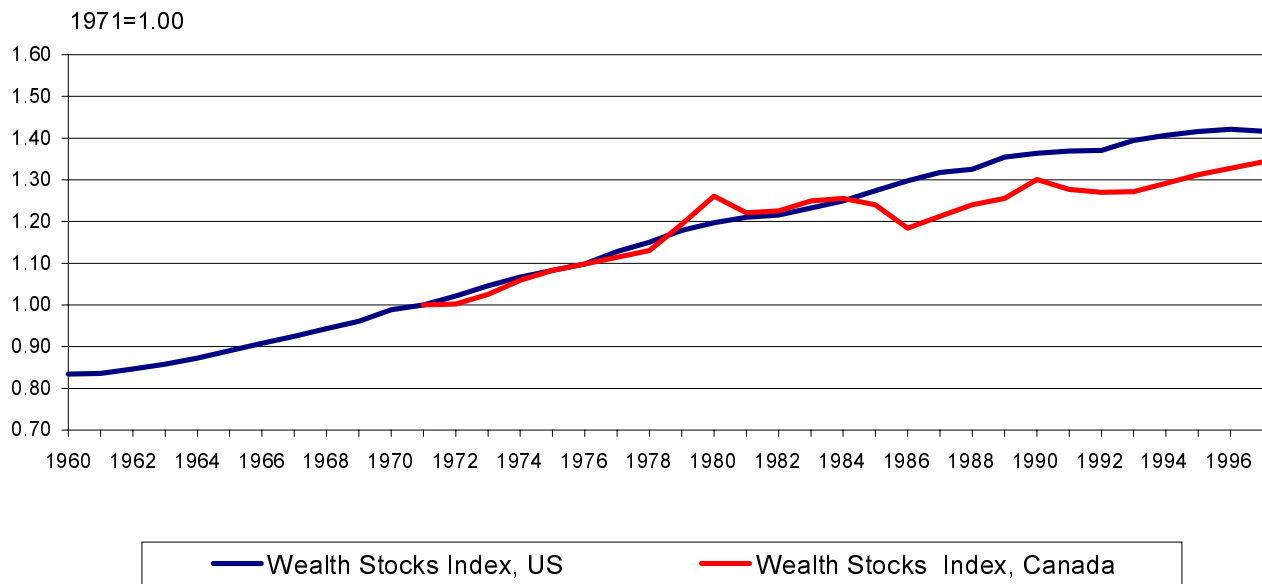


Chart 7: Equality Indexes in the United States and Canada, 1960-1997

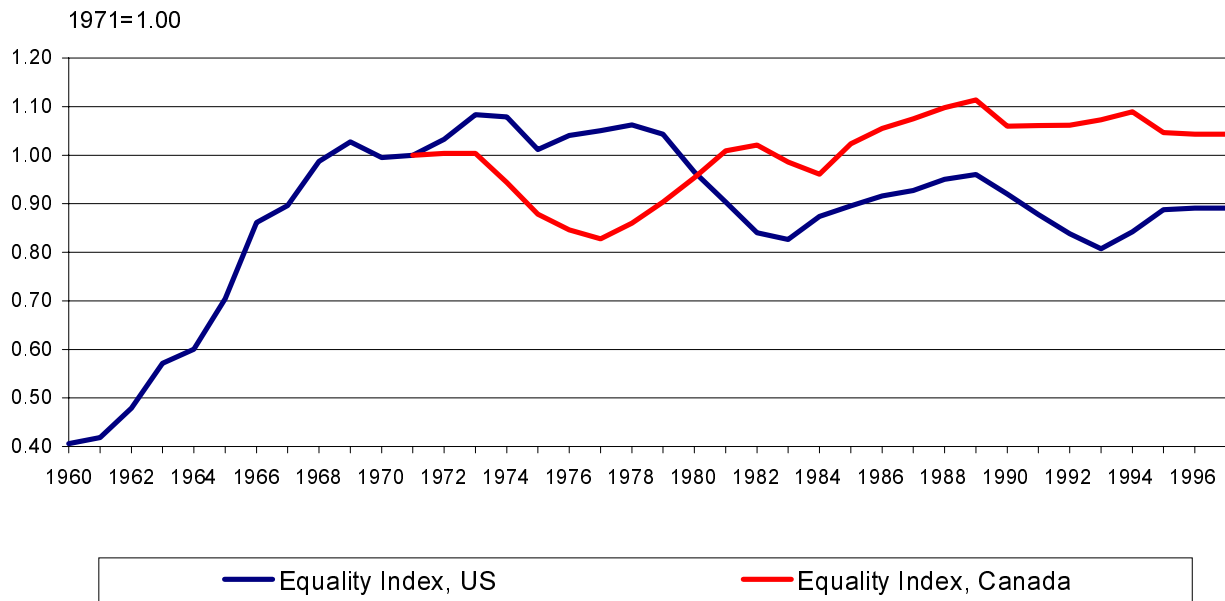
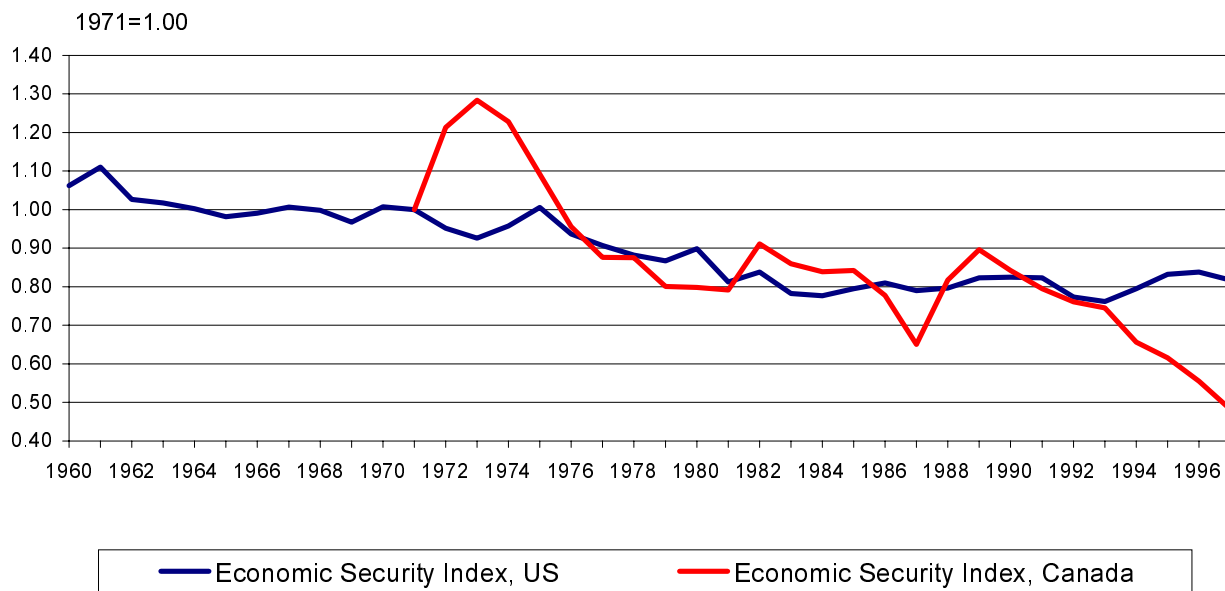


Chart 8: Economic Security Indexes in the United States and Canada, 1960-1997



Conclusion

The data presented in this paper indicate Canadians live in a more egalitarian and secure society than Americans. In total, they enjoy lower levels on material well-being, but Canada's more equal distribution of income means that the bottom one third of Canadians are better off than their American counterparts Murphy and Wolfson (1998).

In the 1970s and 1980s Canadians were increasing their economic well-being at a rate somewhat superior to that of Americans. In the 1990s, this situation was reversed, largely because of increased economic security due to slower economic growth and higher unemployment.

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Table A1: Personal Consumption on Goods and Services in the United States.

Year	Personal Consumption (billions of 1992 \$)	Population (thousands)	Personal Consumption per capita (1992 \$)	Index 1971=1.00
1959	1,394.6	177,830	7,842	0.714
1960	1,432.6	180,671	7,929	0.722
1961	1,461.5	183,691	7,956	0.725
1962	1,533.8	186,538	8,222	0.749
1963	1,596.6	189,242	8,437	0.769
1964	1,692.3	191,889	8,819	0.803
1965	1,799.1	194,303	9,259	0.844
1966	1,902.0	196,560	9,676	0.882
1967	1,958.6	198,712	9,856	0.898
1968	2,070.2	200,706	10,315	0.940
1969	2,147.5	202,677	10,596	0.965
1970	2,197.8	205,052	10,718	0.976
1971	2,279.5	207,661	10,977	1.000
1972	2,415.9	209,896	11,510	1.049
1973	2,532.6	211,909	11,951	1.089
1974	2,514.7	213,854	11,759	1.071
1975	2,570.0	215,973	11,900	1.084
1976	2,714.3	218,035	12,449	1.134
1977	2,829.8	220,239	12,849	1.171
1978	2,951.6	222,585	13,261	1.208
1979	3,020.2	225,055	13,420	1.223
1980	3,009.7	227,726	13,216	1.204
1981	3,046.4	229,966	13,247	1.207
1982	3,081.5	232,188	13,272	1.209
1983	3,240.6	234,307	13,831	1.260
1984	3,407.6	236,348	14,418	1.313
1985	3,566.5	238,466	14,956	1.362
1986	3,708.7	240,651	15,411	1.404
1987	3,822.3	242,804	15,742	1.434
1988	3,972.7	245,021	16,214	1.477
1989	4,064.6	247,342	16,433	1.497
1990	4,132.2	249,949	16,532	1.506
1991	4,105.8	252,636	16,252	1.481
1992	4,219.8	255,382	16,523	1.505
1993	4,343.6	258,089	16,830	1.533
1994	4,486.0	260,602	17,214	1.568
1995	4,595.3	263,039	17,470	1.592
1996	4,714.1	265,453	17,759	1.618
1997	4,869.7	267,901	18,177	1.656

Data for 1982-1997 are from Economic Report of the President 1998,
Statistical Tables B-17, B34 (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

Data for 1959-1981 are from Economic Report of the President 1997, Statistical Tables B-15.
(<http://www.umsl.edu/services/govdocs/erp/1997/contents.htm>)

Table A2: Government Spending, all levels: (all aggregates in millions)

Year	Real Current Expenditure (1992 \$)	Population (thousands)	Real Current Expenditure Per Capita (1992 \$)	Index 1971=1.00
1960	509.7	180,671	2,821	0.787
1961	525.3	183,691	2,860	0.798
1962	559.3	186,538	2,998	0.837
1963	577.8	189,242	3,053	0.852
1964	588.7	191,889	3,068	0.856
1965	609.9	194,303	3,139	0.876
1966	665.0	196,560	3,383	0.944
1967	721.5	198,712	3,631	1.013
1968	755.6	200,706	3,765	1.050
1969	761.1	202,677	3,755	1.048
1970	748.8	205,052	3,652	1.019
1971	744.2	207,661	3,584	1.000
1972	744.3	209,896	3,546	0.989
1973	737.7	211,909	3,481	0.971
1974	750.6	213,854	3,510	0.979
1975	761.9	215,973	3,528	0.984
1976	762.2	218,035	3,496	0.975
1977	774.8	220,239	3,518	0.982
1978	790.9	222,585	3,553	0.991
1979	798.6	225,055	3,548	0.990
1980	811.7	227,726	3,564	0.995
1981	824.6	229,966	3,586	1.000
1982	839.9	232,188	3,617	1.009
1983	857.4	234,307	3,659	1.021
1984	871.5	236,348	3,687	1.029
1985	913.4	238,466	3,830	1.069
1986	955.0	240,651	3,968	1.107
1987	975.8	242,804	4,019	1.121
1988	995.4	245,021	4,063	1.134
1989	1,022.0	247,342	4,132	1.153
1990	1,045.9	249,949	4,184	1.168
1991	1,056.1	252,636	4,180	1.166
1992	1,054.7	255,382	4,130	1.152
1993	1,051.7	258,089	4,075	1.137
1994	1,056.0	260,602	4,052	1.131
1995	1,054.6	263,039	4,009	1.119
1996	1,054.4	265,453	3,972	1.108
1997	1,067.5	267,901	3,985	1.112

Data for 1982-1997 are from Economic Report of the President 1998, Statistical Tables B-21, B34 (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

Data for 1960-1981 are from Economic Report of the President 1997, Statistical Tables B-19. (<http://www.umsl.edu/services/govdocs/erp/1997/contents.htm>)

Table A3: Costs of Various Regrettables

Year	Population	Cost of Commuting (bil 1982 \$)	Cost of Commuting Per Capita (1982 \$)	Cost of Crime (bil 1982 \$)	Cost of Crime Per Capita (1982 \$)	Cost of House Pollution Abatement (bil 1982 \$)	Cost of House Pollution Abatement Per Capita (1982 \$)	Cost of Auto Accidents (bil 1982 \$)	Cost of Auto Accidents Per Capita (1982 \$)	Total Regrettable Cost Per Cap. (1982 \$)	Total Regrettable Cost Per Cap. (1992 \$)	Index 1971=1.00
1960	180,671	45.7	253	8.3	46	0.6	3	25.6	142	444	659	0.721
1961	183,691	44.8	244	8.6	47	0.8	4	25.6	139	434	645	0.705
1962	186,538	46.7	250	8.9	48	1.1	6	27.3	146	450	668	0.731
1963	189,242	48.4	256	9.2	49	1.3	7	28.7	152	463	687	0.751
1964	191,889	49.8	260	9.5	50	1.4	7	30.9	161	477	708	0.775
1965	194,303	53.2	274	9.8	50	1.6	8	33.4	172	504	748	0.819
1966	196,560	55.1	280	10.2	52	1.7	9	34.4	175	516	765	0.837
1967	198,712	56.1	282	10.5	53	1.9	10	34.6	174	519	770	0.842
1968	200,706	59.6	297	10.9	54	2.2	11	36.9	184	546	810	0.886
1969	202,677	62.1	306	11.3	56	2.4	12	40.8	201	575	854	0.934
1970	205,052	62.0	302	11.6	57	2.7	13	44.9	219	591	877	0.959
1971	207,661	66.1	318	12.1	58	3.0	14	46.7	225	616	914	1.000
1972	209,896	71.1	339	12.5	60	3.3	16	50.9	243	657	974	1.066
1973	211,909	75.2	355	12.9	61	4.3	20	50.7	239	675	1,002	1.096
1974	213,854	74.3	347	13.4	63	4.7	22	45.8	214	646	959	1.049
1975	215,973	74.1	343	13.9	64	5.9	27	49.9	231	666	988	1.081
1976	218,035	80.4	369	14.4	66	6.4	29	53.4	245	709	1,052	1.151
1977	220,239	86.2	391	14.9	68	6.8	31	57.0	259	749	1,111	1.215
1978	222,585	90.1	405	15.4	69	7.1	32	59.8	269	775	1,149	1.257
1979	225,055	93.4	415	15.9	71	6.8	30	57.7	256	772	1,146	1.254
1980	227,726	92.9	408	16.5	72	7.0	31	51.5	226	737	1,094	1.197
1981	229,966	94.6	411	16.4	71	8.1	35	47.9	208	726	1,077	1.179
1982	232,188	92.3	398	16.7	72	8.1	35	46.3	199	704	1,044	1.142
1983	234,307	97.9	418	17.0	73	9.7	41	46.7	199	731	1,085	1.187
1984	236,348	105.1	445	17.4	74	10.6	45	49.3	209	772	1,145	1.253
1985	238,466	111.1	466	17.8	75	11.3	47	52.4	220	808	1,198	1.311
1986	240,651	109.3	454	18.2	76	12.2	51	54.2	225	806	1,195	1.308
1987	242,804	109.6	451	18.6	77	10.3	42	55.5	229	799	1,185	1.297
1988	245,021	114.4	467	19.0	78	11.5	47	55.8	228	819	1,215	1.330
1989	247,342	116.6	471	19.6	79	9.9	40	56.2	227	818	1,213	1.328
1990	249,949	116.7	467	19.9	80	8.3	33	65.7	263	843	1,250	1.368
1991	252,636	111.8	443	20.1	80	6.4	25	68.1	270	817	1,212	1.326
1992	255,382	115.5	452	20.1	79	6.7	26	71.2	279	836	1,240	1.357
1993	258,089	119.3	462	20.2	78	7.0	27	74.4	288	856	1,270	1.389
1994	260,602	123.5	474	20.5	79	7.2	28	77.5	297	878	1,302	1.425
1995	263,039											1.456
1996	265,453											1.489
1997	267,901											1.522

Source: "The Genuine Progress Indicator" by C.Cobb, T.Halstead, J.Rowe; Redefining Progress,1995.

Note: Chaintype price index for GDP, Personal Consumption Expenditures 1992=100, 1982=67.4; Source:

Economic Report of the President 1997, Statistical Tables B-3; <http://www.umsi.edu/services/govdocs/erp/1997/B003.WK1>

Note: Total regrettable cost per capita data for 1995-1997 were extrapolated on the the basis of 1991-1994 data, as a linear trend.

Table A4: Life Expectancy at Birth in the United States

Year	Life Expectancy			Index 1971=1.00
	Male	Female	Both Sexes	
1960	66.6	73.1	69.7	0.955
1961		73.3	69.8	0.957
1962		73.4	69.9	0.958
1963		73.6	70.0	0.960
1964		73.7	70.1	0.961
1965		73.9	70.2	0.963
1966		74.1	70.4	0.964
1967		74.2	70.5	0.966
1968		74.4	70.6	0.967
1969		74.5	70.7	0.969
1970	67.1	74.7	70.8	0.971
1971	67.4	75.0	71.1	1.000
1972	67.4	75.1	71.2	1.001
1973	67.6	75.3	71.4	1.004
1974	68.2	75.9	72.0	1.013
1975	68.8	76.6	72.6	1.021
1976	69.1	76.8	72.9	1.025
1977	69.5	77.2	73.3	1.031
1978	69.6	77.3	73.5	1.034
1979	70.0	77.8	73.9	1.039
1980	70.0	77.4	73.7	1.037
1981	70.4	77.8	74.1	1.042
1982	70.8	78.1	74.5	1.048
1983	71.0	78.1	74.6	1.049
1984	71.1	78.2	74.7	1.051
1985	71.1	78.2	74.7	1.051
1986	71.2	78.2	74.7	1.051
1987	71.4	78.3	74.9	1.053
1988	71.4	78.3	74.9	1.053
1989	71.7	78.5	75.1	1.056
1990	71.8	78.8	75.4	1.060
1991	72.0	78.9	75.5	1.062
1992	72.3	79.1	75.8	1.066
1993	72.2	78.8	75.5	1.062
1994	72.4	79.0	75.7	1.065
1995	72.5	78.9	75.8	1.066
1996	73.0	79.0	76.1	1.070
1997	73.0	79.0	76.1	1.070

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(<http://www.cdc.gov/nchswww/fastats/pdf/4511s205.pdf>)

Note: For 1997 Index of Life expectancy is assumed to be the same as in 1996.

Table A5: Net Year-End Capital Stock in the United States

Year	Population thousands	non-res. Capital Stock (Bill. 1992 \$)	non-res. Capital Stock Per Capita (1992 \$)	Housing Capital Stock (Bill. 1992\$)	Housing Per Capita Capital Stock (1992\$)	Government Owned fixed Capital (Bill. 1992\$)	Government Owned fixed Capital per capita (1992\$)	Durable Goods Owned by Consumers (Bill. 1992\$)	Durable Goods Owned by Consumers per capita (1992\$)	Total Per Capita Net Capital Stock (1992 \$)	Total Per Capita Net Capital Stock Index 1971=1.00
1960	180,671	2,390.1	13,229.0	2,532.0	14,014.4	1,903.4	10,535.2	418.1	2,314	40,092.8	0.769
1961	183,691	2,449.3	13,333.8	2,617.4	14,248.9	1,984.3	10,802.4	424.8	2,313	40,697.7	0.780
1962	186,538	2,521.0	13,514.7	2,712.5	14,541.3	2,066.5	11,078.2	441.1	2,365	41,498.8	0.795
1963	189,242	2,598.3	13,730.0	2,821.6	14,910.0	2,144.3	11,331.0	462.8	2,446	42,416.6	0.813
1964	191,889	2,696.2	14,050.8	2,938.2	15,312.0	2,222.5	11,582.2	490.0	2,554	43,498.6	0.834
1965	194,303	2,827.6	14,552.5	3,048.9	15,691.5	2,300.3	11,838.7	527.4	2,714	44,797.0	0.859
1966	196,560	2,977.8	15,149.6	3,144.6	15,998.2	2,389.3	12,155.6	569.4	2,897	46,200.1	0.886
1967	198,712	3,110.7	15,654.3	3,234.7	16,278.3	2,481.4	12,487.4	606.3	3,051	47,471.2	0.910
1968	200,706	3,247.7	16,181.4	3,340.9	16,645.7	2,564.7	12,778.4	652.9	3,253	48,858.5	0.937
1969	202,677	3,395.8	16,754.7	3,449.7	17,020.7	2,637.2	13,011.8	694.9	3,429	50,215.9	0.963
1970	205,052	3,524.6	17,188.8	3,547.5	17,300.5	2,697.4	13,154.7	724.1	3,531	51,175.3	0.981
1971	207,661	3,641.8	17,537.2	3,682.7	17,734.2	2,745.3	13,220.1	763.8	3,678	52,169.6	1.000
1972	209,896	3,798.0	18,094.7	3,845.3	18,320.0	2,795.3	13,317.5	815.9	3,887	53,619.4	1.028
1973	211,909	3,969.2	18,730.7	4,005.1	18,900.1	2,836.7	13,386.4	878.7	4,147	55,163.8	1.057
1974	213,854	4,123.8	19,283.2	4,117.2	19,252.4	2,878.0	13,457.8	916.7	4,287	56,280.0	1.079
1975	215,973	4,228.3	19,577.9	4,205.1	19,470.5	2,919.6	13,518.4	949.7	4,397	56,964.1	1.092
1976	218,035	4,337.9	19,895.4	4,326.5	19,843.1	2,958.5	13,568.9	1,001.0	4,591	57,898.5	1.110
1977	220,239	4,477.0	20,327.9	4,484.8	20,363.3	2,991.5	13,583.0	1,062.3	4,823	59,097.6	1.133
1978	222,585	4,655.4	20,915.2	4,655.5	20,915.6	3,031.4	13,619.1	1,125.6	5,057	60,506.8	1.160
1979	225,055	4,855.3	21,573.8	4,814.0	21,390.3	3,076.7	13,670.9	1,176.9	5,229	61,864.4	1.186
1980	227,726	5,032.5	22,098.9	4,921.4	21,611.1	3,123.8	13,717.4	1,198.0	5,261	62,688.1	1.202
1981	229,966	5,217.7	22,689.0	5,012.4	21,796.3	3,165.5	13,765.1	1,220.0	5,305	63,555.5	1.218
1982	232,188	5,358.6	23,078.7	5,071.9	21,843.9	3,203.9	13,798.7	1,237.4	5,329	64,050.7	1.228
1983	234,307	5,479.0	23,383.9	5,186.7	22,136.3	3,249.0	13,866.4	1,285.6	5,487	64,873.4	1.244
1984	236,348	5,667.5	23,979.5	5,329.1	22,547.7	3,306.4	13,989.5	1,363.3	5,768	66,284.9	1.271
1985	238,466	5,875.6	24,639.2	5,471.1	22,942.9	3,378.2	14,166.4	1,455.0	6,101	67,849.9	1.301
1986	240,651	6,044.0	25,115.2	5,640.6	23,438.9	3,458.0	14,369.4	1,561.1	6,487	69,410.5	1.330
1987	242,804	6,194.7	25,513.2	5,808.4	23,922.2	3,541.4	14,585.4	1,656.2	6,821	70,841.9	1.358
1988	245,021	6,348.2	25,908.8	5,696.4	23,248.6	3,616.8	14,761.2	1,756.7	7,170	71,088.2	1.363
1989	247,342	6,502.0	26,287.5	6,144.8	24,843.3	3,693.2	14,931.6	1,850.0	7,480	73,541.9	1.410
1990	249,949	6,649.5	26,603.4	6,240.0	24,965.1	3,777.8	15,114.3	1,919.2	7,678	74,361.2	1.425
1991	252,636	6,742.8	26,689.8	6,334.9	25,075.2	3,855.5	15,261.1	1,950.0	7,719	74,744.7	1.433
1992	255,382	6,830.0	26,744.2	6,448.3	25,249.6	3,935.7	15,411.0	1,998.4	7,825	75,230.0	1.442
1993	258,089	6,946.5	26,915.1	6,586.6	25,520.7	4,009.9	15,536.9	2,066.7	8,008	75,980.4	1.456
1994	260,602	7,094.5	27,223.5	6,737.6	25,854.0	4,076.3	15,641.9	2,151.8	8,257	76,976.4	1.476
1995	263,039	7,279.8	27,675.7	6,890.9	26,197.3	4,147.2	15,766.5	2,240.9	8,519	78,158.8	1.498
1996	265,453										1.510
1997	267,901										1.527

Economic Report of the President 1998, Statistical Table B34 - Population

(http://www.gpo.ucop.edu/catalog/erp98_appen_b.html). Survey of Current Business, May 1997, P.92 -Capital Stock.

Note: Data on Total per Capita Net Capital Stock for 1996-1997 were extrapolated on the basis of 1991-1995 years data as a linear trend.

Table A6: Expenditures and Stocks of R&D Investment

Year	Net stock of R&D fixed intangible capital (mil.1987\$)	Net stock of R&D fixed intangible capital (mil.1992\$)	Population thousands	Net stock of R&D fixed intangible capital per capita (1992\$)	Index 1971=1.00
1960	277,674	332,376	180,671	1,840	0.532
1961	307,086	367,582	183,691	2,001	0.579
1962	335,754	401,898	186,538	2,155	0.623
1963	364,615	436,444	189,242	2,306	0.667
1964	396,042	474,062	191,889	2,471	0.714
1965	429,103	513,636	194,303	2,643	0.764
1966	461,585	552,517	196,560	2,811	0.813
1967	494,897	592,392	198,712	2,981	0.862
1968	526,509	630,231	200,706	3,140	0.908
1969	555,591	665,042	202,677	3,281	0.949
1970	581,351	695,877	205,052	3,394	0.981
1971	600,037	718,244	207,661	3,459	1.000
1972	613,820	734,743	209,896	3,501	1.012
1973	626,039	749,369	211,909	3,536	1.022
1974	636,843	762,301	213,854	3,565	1.031
1975	645,486	772,647	215,973	3,578	1.034
1976	650,799	779,006	218,035	3,573	1.033
1977	657,202	786,671	220,239	3,572	1.033
1978	664,625	795,556	222,585	3,574	1.033
1979	673,792	806,529	225,055	3,584	1.036
1980	686,000	821,142	227,726	3,606	1.042
1981	700,876	838,949	229,966	3,648	1.055
1982	719,288	860,988	232,188	3,708	1.072
1983	740,530	886,414	234,307	3,783	1.094
1984	765,220	915,968	236,348	3,876	1.120
1985	796,389	953,278	238,466	3,998	1.156
1986	833,320	997,484	240,651	4,145	1.198
1987	870,166	1,041,589	242,804	4,290	1.240
1988	906,578	1,085,174	245,021	4,429	1.280
1989	942,794	1,128,524	247,342	4,563	1.319
1990	977,584	1,170,168	249,949	4,682	1.353
1991	1,013,185	1,212,782	252,636	4,801	1.388
1992	1,049,195	1,255,886	255,382	4,918	1.422
1993		1,298,212	258,089	5,030	1.454
1994		1,340,780	260,602	5,145	1.487
1995		1,383,349	263,039	5,259	1.520
1996		1,425,917	265,453	5,372	1.553
1997		1,468,485	267,901	5,481	1.585

Source: Survey of Current Business, November 1994, P.61.

Note: Data for R&D fixed intangible capital in 1992\$ were calculated using the Implicit Price Deflator for R&D Expenditures for the 1987-1992 period on the base of 1987\$ data.

Note: Data for 1993-1997 were extrapolated on the basis of 1988-1993 period data as a linear trend.

Table A7: Value of Natural Resources.

Year	Population	Value of Oil (Bill. Of current \$) Current Rent Method 1 (Rate of Return) (A)	Value of Gas (Bill. Of current \$) Current Rent Method 1 (Rate of Return) (B)	Value of Coal (Bill. Of current \$) Current Rent Method 1 (Rate of Return) (C)	Value of All Metals (Bill. Of current \$) Current Rent Method 1 (Rate of Return) (D)	Value of Other Minerals (Bill. Of current \$) Current Rent Method 1 (Rate of Return) (E)	SUM A+B+C+ D+E	Value of All Subsoil Assets (Bill. Of current \$)	Value of All Subsoil Assets (Bill. Of 1987 \$)	Value of All Subsoil Assets (Bill. Of 1992 \$)	Value of All Subsoil Assets per capita (1992 \$)
1960	180,671	42.1	7.7	12.5	29.6	16.6	108.5	117.2	558.5	672.4	3,722
1961	183,691	41.8	9.7	13.0	29.8	17.3	111.6	120.1	564.2	679.3	3,698
1962	186,538	40.8	11.2	14.4	38.2	18.1	122.7	125.4	569.8	686.0	3,678
1963	189,242	42.0	13.9	16.3	38.4	18.8	129.4	135.8	572.5	689.3	3,642
1964	191,889	41.3	14.3	16.2	40.9	19.1	131.8	141.7	580.7	699.1	3,643
1965	194,303	40.4	13.9	16.0	44.8	19.3	134.4	141.8	590.9	711.4	3,661
1966	196,560	40.0	13.3	15.3	50.7	19.8	139.1	142.7	596.6	718.3	3,654
1967	198,712	42.5	14.3	14.1	52.1	19.7	142.7	140.0	600.9	723.5	3,641
1968	200,706	41.6	14.2	13.0	54.3	18.0	141.1	138.4	595.3	716.7	3,571
1969	202,677	40.5	14.2	13.1	49.3	15.7	132.8	139.5	579.5	697.7	3,442
1970	205,052	55.7	15.8	15.6	51.6	13.8	152.5	159.7	651.8	784.7	3,827
1971	207,661	55.3	15.0	15.3	56.1	12.1	153.8	152.1	640.4	771.0	3,713
1972	209,896	51.2	11.6	16.8	58.8	11.4	149.8	147.9	621.8	748.6	3,567
1973	211,909	77.9	14.0	24.9	54.3	12.6	183.7	195.7	605.1	728.5	3,438
1974	213,854	86.8	15.8	41.9	56.9	16.5	217.9	233.1	593.2	714.2	3,340
1975	215,973	104.7	21.1	61.5	66.3	20.4	274.0	277.8	577.2	694.9	3,218
1976	218,035	118.7	38.2	75.1	72.1	24.9	329.0	337.1	559.5	673.6	3,089
1977	220,239	124.1	51.7	77.5	70.2	26.8	350.3	322.6	564.0	679.0	3,083
1978	222,585	137.9	59.1	66.2	80.2	26.6	370.0	339.5	554.0	667.0	2,997
1979	225,055	192.5	77.9	83.3	42.6	29.2	425.5	398.1	557.6	671.3	2,983
1980	227,726	295.4	86.7	92.2	49.7	31.4	555.4	448.3	564.3	679.4	2,983
1981	229,966	298.3	41.3	91.9	15.2	31.7	478.4	379.4	558.9	672.9	2,926
1982	232,188	382.4	61.5	100.4	*	25.9	570.2	285.2	548.6	660.5	2,845
1983	234,307	481.6	161.6	103.2	*	28.0	774.4	600.6	541.3	651.7	2,781
1984	236,348	454.1	209.8	127.0	*	31.4	822.3	741.3	542.7	653.4	2,764
1985	238,466	332.1	140.9	134.4	*	30.3	637.7	594.4	545.5	656.8	2,754
1986	240,651	226.1	105.1	140.7	*	28.4	500.3	471.6	539.1	649.0	2,697
1987	242,804	144.7	78.6	143.0	38.5	32.8	437.6	437.5	539.8	649.9	2,677
1988	245,021	80.2	30.3	138.3	90.1	32.2	371.1	371.1	528.7	636.5	2,598
1989	247,342	91.2	24.7	134.9	125.6	32.8	409.2	409.9	527.1	634.6	2,566
1990	249,949	123.3	35.3	137.5	141.9	33.2	471.2	471.2	530.3	638.5	2,554
1991	252,636	126.8	31.1	134.4	154.5	33.9	480.7	480.6	519.7	625.7	2,477
1992	255,382										2,442
1993	258,089										2,400
1994	260,602										2,360
1995	263,039										2,321
1996	265,453										2,284
1997	267,901										2,247

Source: Survey of Current Business, April 1994.

Notes:

1. Metals include: iron ore, copper, lead, zinc, gold, silver and molybdenum.

Other minerals include: phosphate rock, sulfur, boron, diatomite, gypsum and potash.

2. Value of metals for 1982-1987 is negative.

3. GDP deflator for 1987 = 83.06 if 1992=100.

4. Data for 1992-1997 were extrapolated on the basis of 1986-1991 data as a linear trend.

5. Method 1, current rent method I, utilizes an estimate of a normal, or average, rate of return to investment to estimate the return to the associated capital invested in the mining industry and then derives the resource rent as a residual.

Table A8: Estimates of the costs of Human Capital by educational attainment level

Year	Pop 25 and over (thousands)	Pop with less than High school %	Pop with High school %	Pop with Colleges %	Pop with less than High school	Pop with High school	Pop with Colleges	Human capital less than High school (in billions of 1992 \$)	Human Capital High school (in billions of 1992 \$)	Human Capital Colleges (in billions of 1992 \$)	Total Human capital (in billions of 1992 \$)	Pop (Thousands)	Cost of Human Capital per Capita (in 1992 \$)	Index 1971=1.00
1960	100018	58.9	33.4	7.7	58911	33406	7701	2703.1	2299.2	1016.1	6018.4	180,671	33902.1	0.973
1961	100895							2658.7	2399.7	1066.7	6125.1	183,691	33344.7	0.957
1962	101725							2609.5	2503.3	1119.2	6232.0	186,538	33408.8	0.958
1963	102554							2556.5	2611.1	1174.3	6341.9	189,242	33512.1	0.961
1964	103423							2500.6	2724.5	1232.5	6457.5	191,889	33652.1	0.965
1965	104279	51.0	39.6	9.4	53182	41294	9802	2440.2	2842.2	1293.2	6575.6	194,303	33842.2	0.971
1966	105290							2433.0	2898.1	1340.0	6671.2	196,560	33939.8	0.974
1967	106458							2428.3	2959.3	1390.5	6778.1	198,712	34110.1	0.979
1968	107932							2429.3	3030.0	1446.7	6906.0	200,706	34408.3	0.987
1969	109181							2423.8	3095.4	1501.9	7021.0	202,677	34641.6	0.994
1970	110579	47.7	41.6	10.7	52746	46001	11832	2420.2	3166.1	1561.0	7147.3	205,052	34856.2	1.000
1971	111979							2353.8	3307.5	1665.7	7327.0	207,661	35283.3	1.012
1972	114400							2301.7	3485.7	1793.1	7580.6	209,896	36116.0	1.036
1973	116509							2235.3	3662.1	1924.3	7821.7	211,909	36910.7	1.059
1974	118634							2160.9	3846.7	2064.7	8072.3	213,854	37746.8	1.083
1975	120799	37.5	48.6	13.9	45300	58708	16791	2078.5	4040.7	2215.3	8334.5	215,973	38590.6	1.107
1976	123138							2075.4	4147.4	2328.4	8551.2	218,035	39219.3	1.125
1977	125603							2071.8	4259.6	2448.9	8780.3	220,239	39867.0	1.144
1978	128188							2067.4	4377.2	2577.0	9021.7	222,585	40531.3	1.163
1979	130903							2062.2	4500.8	2713.4	9276.4	225,055	41218.3	1.183
1980	133681	33.5	50.3	16.2	44783	67242	21656	2054.8	4628.0	2857.2	9540.0	227,726	41892.6	1.202
1981	136249							2006.3	4793.2	3019.0	9818.4	229,966	42695.2	1.225
1982	138941							1953.9	4966.9	3191.6	10112.5	232,188	43553.0	1.250
1983	141568							1894.8	5142.6	3371.4	10408.8	234,307	44423.9	1.274
1984	144160							1829.2	5321.5	3559.1	10709.8	236,348	45313.8	1.300
1985	146691	26.1	54.5	19.4	38286	79947	28458	1756.7	5502.5	3754.5	11013.7	238,466	46185.8	1.325
1986	149319							1738.8	5637.6	3893.9	11270.3	240,651	46832.3	1.344
1987	151818							1717.0	5769.3	4033.7	11520.0	242,804	47445.8	1.361
1988	154190							1691.5	5897.6	4174.0	11763.2	245,021	48008.8	1.377
1989	156507							1663.1	6025.3	4316.7	12005.1	247,342	48536.2	1.392
1990	158738	22.4	56.3	21.3	35557	89369	33811	1631.5	6151.0	4460.8	12243.3	249,949	48983.3	1.405
1991	160976							1591.2	6310.7	4565.8	12467.7	252,636	49350.5	1.416
1992	163144							1547.8	6470.6	4670.3	12688.7	255,382	49685.0	1.425
1993	165205	19.8	58.3	21.9	32711	96315	36180	1500.9	6629.0	4773.3	12903.2	258,089	49995.2	1.434
1994	167225	19.1	58.7	22.2	31940	98161	37124	1465.5	6756.1	4897.9	13119.5	260,602	50343.1	1.444
1995	169331	18.2	58.8	23.0	30818	99567	38946	1414.1	6852.8	5138.3	13405.2	263,039	50962.7	1.462
1996	171448							1369.8	6974.2	5312.2	13656.2	265,453	51445.0	1.476
1997	173299							1318.2	7079.6	5502.8	13900.6	267,901	51887.0	1.489

Source: Data on Population are from Economic Report of the President 1998, Statistical Table B-34. http://www.gpo.ucop.edu/catalog/erp98_appen_b.html

Data on School Enrolment, School expenditures & Educational Attainment are Census data: "1996 Statistical Abstract of US", <http://www.census.gov/prod/2/gen/96statab/96statab.html>

Note: 1. Cost of Human Capital were calculated on the basis of 1992 data for average expenditures per student which were calculated on school enrolment and school expenditures.

1992 cost per one student was \$5735.6 in school and \$12621.2 in college

Total cost of human capital were calculated for persons with Less than High School on the basis of 8 years, for persons with High School on the basis of 12 years, and for persons with College on the basis of 12 years in high school + 5 years in college.

2. All data in italic font were interpolated.

Table A9: Net International Investment Position of the United States

Year	Net Int'l Investment Position (millions \$) Market Value	GDP deflator 1992=100	Real Net Int'l Investment Position (mil 1992 \$)	Population (thousands)	Per Capita Real Net Int'l Investment Position (1992 \$)	Index 1982=1.00
1970	58,473	30.48	191,841	205,052	936	0.590
1971	45,511	32.05	142,000	207,661	684	0.431
1972	37,036	33.42	110,820	209,896	528	0.333
1973	47,894	35.30	135,677	211,909	640	0.404
1974	58,731	38.46	152,707	213,854	714	0.450
1975	72,240	42.09	171,632	215,973	795	0.501
1976	83,578	44.55	187,605	218,035	860	0.543
1977	190,548	47.42	401,830	220,239	1,825	1.150
1978	228,421	50.88	448,941	222,585	2,017	1.272
1979	324,929	55.22	588,426	225,055	2,615	1.649
1980	392,547	60.34	650,559	227,726	2,857	1.801
1981	374,254	66.01	566,966	229,966	2,465	1.554
1982	264,991	70.18	377,588	232,188	1,626	1.025
1983	255,356	73.16	349,038	234,307	1,490	0.939
1984	132,115	75.92	174,019	236,348	736	0.464
1985	94,846	78.53	120,777	238,466	506	0.319
1986	98,569	80.58	122,324	240,651	508	0.320
1987	48,729	83.06	58,667	242,804	242	0.152
1988	8,691	86.10	10,094	245,021	41	0.026
1989	-49,140	89.72	-54,770	247,342	-221	-0.140
1990	-166,845	93.64	-178,177	249,949	-713	-0.449
1991	-263,096	97.32	-270,341	252,636	-1,070	-0.675
1992	-454,604	100.00	-454,604	255,382	-1,780	-1.122
1993	-180,371	102.64	-175,732	258,089	-681	-0.429
1994	-232,943	105.09	-221,660	260,602	-851	-0.536
1995	-537,064	107.76	-498,389	263,039	-1,895	-1.195
1996	-743,656	110.22	-674,702	265,453	-2,542	-1.603
1997p	-1,322,455	112.46	-1,175,934	267,901	-4,389	-2.768

Sources: Net Debt is Net International Investment Position.

1983-1997 - Survey of Current Business, July 1998, Table 3.

<http://www.bea.doc.gov/bea/ai/0798iip.pdf>

1981-1982 - Survey of Current Business, July 1996, Table 3,P.44.

1977-1980 - Survey of Current Business, June 1992, Table 3, P.49.

1973-1976 - Survey of Current Business, June 1988, Table 2,P.78.

1970-1971 - Survey of Current Business, June 1986, Table 2,P.28.

GDP Deflator - Economic Report of the President 1998, Statistical Table B-7

Population - Economic Report of the President 1998, Statistical Table B-34.

http://www.gpo.ucop.edu/catalog/erp98_appen_b.html

Note: For 1970-1981 Net international Investment position of the United States are with direct investment position at current cost.

Table A10: Gini Coefficient for US, All Units

Year	Household Income Gini Coefficient	Family Income Gini Coefficient	Gini Ratios for Household Income 1971=1.00
1960	0.415	0.364	1.0480
1961	0.424	0.374	1.0707
1962	0.413	0.362	1.0429
1963	0.410	0.362	1.0354
1964	0.411	0.361	1.0379
1965	0.408	0.356	1.0303
1966	0.407	0.349	1.0278
1967	0.399	0.358	1.0076
1968	0.388	0.348	0.9798
1969	0.391	0.349	0.9874
1970	0.394	0.353	0.9949
1971	0.396	0.355	1.0000
1972	0.401	0.359	1.0126
1973	0.397	0.356	1.0025
1974	0.395	0.355	0.9975
1975	0.397	0.357	1.0025
1976	0.398	0.358	1.0051
1977	0.402	0.363	1.0152
1978	0.402	0.363	1.0152
1979	0.404	0.365	1.0202
1980	0.403	0.365	1.0177
1981	0.406	0.369	1.0253
1982	0.412	0.380	1.0404
1983	0.414	0.382	1.0455
1984	0.415	0.383	1.0480
1985	0.419	0.389	1.0581
1986	0.425	0.392	1.0732
1987	0.426	0.393	1.0758
1988	0.427	0.395	1.0783
1989	0.431	0.401	1.0884
1990	0.428	0.396	1.0808
1991	0.428	0.397	1.0808
1992	0.434	0.404	1.0960
1993	0.454	0.429	1.1465
1994	0.456	0.426	1.1515
1995	0.450	0.421	1.1364
1996	0.455	0.425	1.1490
1997	0.455	0.425	1.1490

: The Twentieth Century Record of Inequality and Poverty in the United States,
 Robert D. Plotnick, Eugene Smolensky, Eirik Evenhouse and Siabohan Reilly;
<http://csde.washington.edu/lib/wps/98-1.pdf>

: Data for 1997 assumed to be equal to 1996 data.

The family income Gini coefficients and share of the top 5% and bottom 40% of families are from
 U.S. Census Bureau [1996c, Historical Income Tables F-2, F-4 [<http://www.census.gov/hhes/income/histinc>].
 The household income Gini coefficients are from the U.S. Census Bureau [1996b, table B-3] for 1967-1995
 from the U.S. Census Bureau, Current Population Reports, Series P-60 No. 193, Money Income in the United
 States: 1995 (Washington DC: U.S. GPO) , table B-3 for 1967-1995, and those computed by Smolensky
 and Danziger [1977] for 1947-1966.

Table A11: USA, All Persons, Poverty Rate, 1970-1997

Years	Poverty Rate	Index 1971=1.00
1960	22.2	1.776
1961	21.9	1.752
1962	21.0	1.680
1963	19.5	1.560
1964	19.0	1.520
1965	17.3	1.384
1966	14.7	1.176
1967	14.2	1.136
1968	12.8	1.024
1969	12.1	0.968
1970	12.6	1.008
1971	12.5	1.000
1972	11.9	0.952
1973	11.1	0.888
1974	11.2	0.896
1975	12.3	0.984
1976	11.8	0.944
1977	11.6	0.928
1978	11.4	0.912
1979	11.7	0.936
1980	13.0	1.040
1981	14.0	1.120
1982	15.0	1.200
1983	15.2	1.216
1984	14.4	1.152
1985	14.0	1.120
1986	13.6	1.088
1987	13.4	1.072
1988	13.0	1.040
1989	12.8	1.024
1990	13.5	1.080
1991	14.2	1.136
1992	14.8	1.184
1993	15.1	1.208
1994	14.5	1.160
1995	13.8	1.104
1996	13.7	1.096
1997	13.7	1.096

USA poverty rate for 1960-1970 are from Economic Report of the President 1986, Statistical Table B-29;
USA poverty rate for 1971-1977 are from Economic Report of the President 1991, Statistical Table B-30;
USA poverty rate for 1978-1996 are from Economic Report of the President 1998, Statistical Table B-33.
(http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

Note: Poverty rate for 1997 assumed to be equal to 1996 data.

Table A12: Male-Female Earnings Ratios
(women's earnings as % of men's)

Year	Full-year full-time workers	Index 1971=1.01	All earners	Index 1971=1.01
1960	60.6	1.024	30.9	0.886
1961	59.0	0.997	30.5	0.875
1962	59.3	1.002	30.7	0.880
1963	58.6	0.990	30.4	0.872
1964	59.0	0.998	31.2	0.894
1965	57.8	0.977	30.3	0.868
1966	57.9	0.978	30.9	0.885
1967	57.6	0.973	32.4	0.930
1968	58.5	0.988	33.8	0.968
1969	58.6	0.990	33.2	0.951
1970	59.2	1.001	33.5	0.961
1971	59.2	1.000	34.9	1.000
1972	57.4	0.970	34.9	1.000
1973	56.6	0.956	35.1	1.005
1974	59.0	0.997	36.5	1.045
1975	59.7	1.008	38.2	1.096
1976	60.0	1.013	37.9	1.087
1977	58.5	0.988	38.9	1.116
1978	60.0	1.014	37.2	1.066
1979	60.3	1.018	36.9	1.059
1980	60.5	1.021	39.3	1.126
1981	60.2	1.017	40.5	1.161
1982	63.1	1.066	42.2	1.210
1983	64.4	1.088	43.7	1.252
1984	64.2	1.085	44.0	1.262
1985	65.0	1.098	44.2	1.268
1986	65.0	1.099	44.5	1.275
1987	65.8	1.112	46.6	1.337
1988	67.8	1.146	47.0	1.347
1989	69.1	1.167	48.4	1.387
1990	71.1	1.200	49.6	1.423
1991	70.0	1.183	51.2	1.467
1992	71.7	1.211	52.4	1.502
1993	72.3	1.221	52.3	1.501
1994	73.6	1.243	52.8	1.513
1995	73.8	1.247	53.8	1.541
1996	74.3	1.256	53.8	1.541

All data for 1978-1996 are from Economic Report of the President 1998, Statistical Table B-33 (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).
All data for 1970-1977 are from Economic Report of the President 1991, Statistical Table B-30.
All data for 1960-1969 are from Economic Report of the President 1986, Statistical Table B-29.

Table A13: Weights used for Economic Security Index

Year	Women & Children at Risk of Widowhood as % of total Pop	Normalized Weight of women at risk of widowhood	45-64 Pop as % of Total Pop	Normalized Weight of 45-64 Pop at Risk of Elderly poverty	% of Pop affected of risk for health	Normalized Weight of Pop at risk for health	WAP as % of total Pop	Normalized Weight of WAP at risk of unemployment	Total %
1960	37.23	0.1676	20.04	0.0902	100.00	0.4501	64.89	0.2921	222.17
1961	37.47	0.1687	19.99	0.0900	100.00	0.4502	64.66	0.2911	222.12
1962	37.95	0.1707	19.97	0.0898	100.00	0.4498	64.41	0.2897	222.34
1963	38.89	0.1740	19.96	0.0893	100.00	0.4473	64.69	0.2894	223.55
1964	39.19	0.1749	19.98	0.0892	100.00	0.4463	64.87	0.2896	224.05
1965	39.32	0.1752	20.03	0.0892	100.00	0.4455	65.11	0.2901	224.45
1966	38.14	0.1707	20.11	0.0900	100.00	0.4476	65.15	0.2916	223.41
1967	37.80	0.1692	20.23	0.0905	100.00	0.4477	65.36	0.2926	223.38
1968	37.31	0.1670	20.35	0.0911	100.00	0.4475	65.78	0.2944	223.44
1969	36.81	0.1647	20.44	0.0915	100.00	0.4473	66.28	0.2965	223.54
1970	36.30	0.1623	20.48	0.0916	100.00	0.4471	66.85	0.2989	223.64
1971	36.25	0.1617	20.46	0.0912	100.00	0.4460	67.52	0.3011	224.23
1972	35.57	0.1583	20.44	0.0910	100.00	0.4451	68.67	0.3056	224.67
1973	34.38	0.1534	20.40	0.0910	100.00	0.4460	69.41	0.3096	224.20
1974	34.28	0.1525	20.35	0.0905	100.00	0.4448	70.20	0.3122	224.83
1975	33.21	0.1480	20.28	0.0904	100.00	0.4456	70.91	0.3160	224.41
1976	29.83	0.1346	20.18	0.0911	100.00	0.4512	71.62	0.3231	221.63
1977	30.04	0.1351	20.05	0.0902	100.00	0.4498	72.21	0.3248	222.30
1978	29.10	0.1312	19.90	0.0897	100.00	0.4510	72.74	0.3281	221.73
1979	28.65	0.1293	19.72	0.0890	100.00	0.4512	73.25	0.3305	221.63
1980	27.51	0.1246	19.54	0.0885	100.00	0.4531	73.66	0.3337	220.71
1981	28.07	0.1268	19.35	0.0874	100.00	0.4517	73.98	0.3341	221.41
1982	26.66	0.1212	19.15	0.0870	100.00	0.4545	74.19	0.3372	220.00
1983	25.58	0.1168	18.98	0.0867	100.00	0.4568	74.35	0.3396	218.91
1984	25.75	0.1174	18.85	0.0860	100.00	0.4562	74.63	0.3404	219.22
1985	25.69	0.1172	18.70	0.0854	100.00	0.4564	74.73	0.3410	219.12
1986	25.18	0.1151	18.56	0.0848	100.00	0.4571	75.04	0.3430	218.78
1987	25.48	0.1162	18.47	0.0843	100.00	0.4562	75.27	0.3433	219.22
1988	25.20	0.1150	18.56	0.0847	100.00	0.4564	75.35	0.3439	219.10
1989	25.50	0.1162	18.55	0.0845	100.00	0.4558	75.36	0.3435	219.41
1990	24.54	0.1122	18.52	0.0847	100.00	0.4572	75.68	0.3460	218.74
1991	24.14	0.1106	18.51	0.0848	100.00	0.4582	75.57	0.3463	218.23
1992	24.00	0.1099	18.93	0.0867	100.00	0.4578	75.50	0.3456	218.43
1993	23.74	0.1087	19.22	0.0880	100.00	0.4578	75.49	0.3456	218.45
1994	23.94	0.1093	19.53	0.0892	100.00	0.4566	75.52	0.3449	219.00
1995	23.89	0.1090	19.87	0.0906	100.00	0.4561	75.50	0.3443	219.26
1996	23.38	0.1066	20.24	0.0924	100.00	0.4562	75.57	0.3448	219.18
1997	23.88	0.1083	20.70	0.0939	100.00	0.4537	75.82	0.3440	220.40

Source: Married women with children under 18: <http://www.census.gov/population/socdemo/hh-fam/htabFM-3.txt>

Pop 45-64, WAP are from Economic Report of the President 1998,

Statistical Tables B-35, B-34 (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

Note: Married women with children under 18 includes both: women and children under 18.

Table A14: Greenhouse Gas Emissions Cost, United States

Year	US GDP, million of 1990 G-K Dollars)	World GDP, million of 1990 G-K Dollars)	US share in the world GDP, %	World CO2 Emission (millions of metric tones)	World Emission CO2 Cost, mill. of 1990\$ (\$20 per metric ton)	US share of World CO2 emission social cost (millions of 1990\$)	Population, thousands, *D1	Emission cost per capita, 1992\$
	A	B	C=A/B*100	D	E=D*20	F=C*E/100	G	H=F/G/0.9364
1960	2,022,233	7,896,098	25.61	12,714	254,273	65,121	180,671	384.92
1961	2,072,996	8,137,175	25.48	12,982	259,636	66,144	183,691	384.54
1962	2,200,422	8,512,768	25.85	13,250	265,000	68,498	186,538	392.15
1963	2,296,768	8,884,930	25.85	13,518	270,364	69,889	189,242	394.40
1964	2,434,553	9,557,792	25.47	13,786	275,727	70,233	191,889	390.87
1965	2,587,360	10,071,305	25.69	14,055	281,091	72,213	194,303	396.90
1966	2,755,189	10,649,074	25.87	14,323	286,455	74,113	196,560	402.66
1967	2,826,672	11,016,274	25.66	14,591	291,818	74,878	198,712	402.41
1968	2,954,097	11,580,161	25.51	14,859	297,182	75,811	200,706	403.38
1969	3,045,781	12,227,815	24.91	15,127	302,545	75,360	202,677	397.08
1970	3,045,781	12,869,817	23.67	15,395	307,909	72,870	205,052	379.51
1971	3,147,826	13,389,468	23.51	15,664	313,273	73,650	207,661	378.75
1972	3,326,014	13,988,567	23.78	15,932	318,636	75,761	209,896	385.46
1973	3,519,224	14,921,483	23.58	16,200	324,000	76,415	211,909	385.10
1974	3,499,023	15,226,809	22.98	16,468	329,364	75,686	213,854	377.95
1975	3,468,461	15,428,144	22.48	16,736	334,727	75,251	215,973	372.09
1976	3,567,010	16,110,275	22.14	17,005	340,091	75,300	218,035	368.82
1977	3,845,558	16,783,237	22.91	17,273	345,455	79,154	220,239	383.81
1978	4,043,948	17,531,398	23.07	17,541	350,818	80,923	222,585	388.25
1979	4,161,014	18,118,245	22.97	17,809	356,182	81,800	225,055	388.15
1980	4,161,014	18,500,325	22.49	18,077	361,545	81,317	227,726	381.34
1981	4,273,418	18,871,756	22.64	18,345	366,909	83,085	229,966	385.83
1982	4,191,575	19,074,172	21.98	18,614	372,273	81,807	232,188	376.26
1983	4,354,742	19,660,980	22.15	18,882	377,636	83,643	234,307	381.23
1984	4,644,817	20,619,078	22.53	19,150	383,000	86,278	236,348	389.84
1985	4,797,624	21,429,086	22.39	19,418	388,364	86,948	238,466	389.38
1986	4,935,409	22,263,660	22.17	19,686	393,727	87,281	240,651	387.32
1987	5,093,396	23,138,044	22.01	19,955	399,091	87,852	242,804	386.40
1988	5,286,606	24,275,251	21.78	20,223	404,455	88,081	245,021	383.90
1989	5,419,212	25,047,613	21.64	20,491	409,818	88,667	247,342	382.83
1990	5,464,795	25,555,255	21.38	20,759	415,182	88,783	249,949	379.33
1991	5,399,010	25,711,179	21.00	21,027	420,545	88,309	252,636	373.29
1992	5,510,378	26,078,852	21.13	21,295	425,909	89,993	255,382	376.32
1993	5,681,315	26,078,852	21.79	21,564	431,273	93,953	258,089	388.76
1994	5,903,015	26,078,852	22.64	21,832	436,636	98,834	260,602	405.01
1995			22.64	22,100	442,000	100,048	263,039	406.19
1996			22.64	22,368	447,364	101,262	265,453	407.38
1997			22.64	22,636	452,727	102,476	267,901	408.49

Sources: Data on Greenhouse Gas emission in the World for 1973 and 1995 are from International Energy Agency
 Data for the years between 1973 and 1995 were interpolated assuming a constant linear growth trend over the period
 This trend was extrapolated backwards and forwards outside. Data on GDP for the US and the World are from Monit
 World Economy, Angus Maddison, 1995, P.181, 211.

Data for 1995-1997 GDP share for the US assumed to be equal to data for 1994.

Recalculation into 1992\$ were made with GDP IPI 1990=93.64 1992=100, Source: Economic Report of the President
 Statistical Tables B-7 (http://www.gpo.ucop.edu/catalog/erp98_appen_b.html).

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Chateau Laurier Hotel, Ottawa, Ontario



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GDP and Its Derivatives as Welfare Measure: A Selective Look at the Literature

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Statistics Canada

Session 2: "Indicators of Well-being"
October 30 10:30 AM - 11:30 AM

GDP AND ITS DERIVATIVES AS WELFARE MEASURES:
A SELECTIVE LOOK AT THE LITERATURE

Abraham Tarasofsky

Statistics Canada

Paper prepared for the Centre for the Study of Living Standards Conference on the State of Living Standards and Quality of Life, Ottawa, Ontario, October 30-31, 1998. Helpful comments were received from Hans Adler, Zvi Griliches, Kishori Lal, Hans Messinger, Robin Rowley, David Slater, Neil Swan, Bert Waslander, Stewart Wells, and Miles Wisenthal. Patricia Sherar provided indispensable editorial assistance.

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INTRODUCTION

Considerable work was done at Statistics Canada in the wake of the widely-read Cobb, Halstead and Rowe (1995), who reject GDP as an adequate welfare measure and propose their so-called "genuine progress indicator" (GPI) as an alternative. I participated in this work, which largely consisted in reproducing GPI and some other well known alternatives to GDP on the basis of Canadian data and became unhappy with some aspects of their respective rationales.

Remembering from my student days that a good deal of relevant discussion had taken place some decades ago, some of it involving illustrious theorists, it occurred to me that at least some of the matters that bothered me had been addressed in that literature.

It should, of course, never be suggested that the last word has been said, or ever could be said, on any subject, but so rich is this discussion and so varied the arguments advanced, that it is hard to imagine much that is both new and of fundamental analytical importance being said in the foreseeable future on the subject of GDP's or any derivative measure's adequacy as a measure of economic welfare. At the very least, it can be confidently asserted that there is a great deal to be learned from a review of the diverse methodologies and arguments set forth in this literature.

Whilst this paper is by no means an exercise in the history of the relevant economic thought, it selectively draws upon that history in order to convey a sense of some of these methodologies and arguments and, more specifically, to advance the following four propositions.

- 1) Being first and foremost a measure of output, GDP can only be conceived of as a measure of economic welfare in a limited, and ultimately unsatisfactory, sense;
- 2) none of the better-known alternative measures, derived from GDP, fares better; indeed, each, in its own way, fares worse;
- 3) there is no such thing as a single, and satisfactory, measure of economic welfare; only a set of complementary variables, one of which could be GDP, has the potential for conveying an

adequate sense of a country's economic welfare; and

4) there is no such thing as an entirely objective set of complementary variables; some cannot be estimated in monetary terms and subjective factors cannot be eliminated.

The paper is in four parts. After defining GDP, Part I summarizes the methodologies and rather discouraging results of four well-known investigations of whether, and under what conditions, changes in GDP qualify as valid measures of changes in welfare. Part II focuses on a well-known example of a genre of analyses that explicitly maintains that GDP is not a sound measure of economic welfare and modifies it in various ways with a view to producing one. Some of the most important adjustments that collectively comprise this overall modification involve government expenditures included in GDP, so some of their rationales are discussed. Part III presents various defences of the *status quo*, and the concluding Part IV deals with the questions and answers underpinning the four above propositions.

PART I

GDP DEFINED

GDP and its forerunner, GNP (henceforth, the term "GDP" will be used exclusively, although the terms actually used in most of the following references are either "GNP" or "national income"), have been conceived along very similar lines since their inception. As set forth in its latest authoritative definition (in the 1993 United Nations System of National Accounts (1993 SNA)), GDP may alternatively be conceived of as four equivalent sums:

- (a) final results at market prices of the production activity of resident producer units;
- (b) gross value added namely, defined as the difference between output and intermediate consumption;
- (c) final uses of goods and services (all except intermediate consumption) measured in purchasers' prices, less the value of imports of goods and services; and
- (d) primary incomes distributed by resident producer units.

Foreshadowing an issue that was soon to emerge, and which has loomed large down the generations to this day, Kuznets (1933) warns against the temptation of attempting to translate GDP into a welfare measure. A welfare measure:

...runs in terms of subjective feelings, whose commensurability for various individuals is to be doubted and whose relation to the objectively perceptible economic goods is not, in the present state of knowledge, determined with sufficient precision to permit even purely qualitative economic analysis. Consequently, the concept of *income enjoyed* has to be abandoned....(p. 7, emphasis added)

As will be seen below, Kuznets's views on this issue evolved over the years (and they also evolved on other, related issues). Kuznets (1941), for example, attributes an objective character to the foregoing subjective evaluations.

...Market prices are of course a far from perfect measure of how well goods satisfy society's needs. But they are the sole practicable basis *if the estimator is to follow the consensus of social opinion*. (p. 55, emphasis added)

GDP is defined above with a view to confining it to marketed economic activities that are

"productive," the latter criterion serving to exclude a variety of transfers not made as recompense for productive activity. It is also implicit in these alternative versions of GDP that the primary focus is upon the measurement of specified transactions and categorizing them within an accounting framework. Whilst this focus does not, in itself, necessarily preclude welfare inferences, neither does it necessarily foster them.

SOME INVESTIGATIONS OF THE QUESTION: DOES A GIVEN CHANGE IN GDP REPRESENT A CHANGE IN WELFARE?

THREE QUALIFIED AFFIRMATIVE ANSWERS

Hicks

Hicks (1940) is one of the earliest attempts rigorously to examine whether changes in GDP necessarily imply analogous changes in welfare. By means of both an indifference map and index numbers, two situations are compared. These situations first involve an individual choosing among many combinations of two commodities; they then involve a group of individuals choosing among combinations of many commodities. Subject to the condition that everyone's wants remain constant throughout, Hicks contends that the combination located on the higher indifference curve (Situation II) is preferable to the combination located on the lower (Situation I), provided the following additional criterion is also met:

...Let us say that the real income of society is higher in Situation II than in Situation I, if it is impossible to make everyone as well off as he is in Situation II by any redistribution of the actual quantities acquired in Situation I. (p. 111, emphasis added)

Restating the argument in terms of index numbers, Hicks argues that the above welfare result unambiguously holds only if the ratio of Situation II's total expenditures to those of Situation I (designated as "E") exceeds both the corresponding Laspeyre's and Passche price indexes. Any other relationship either implies that Situation II is inferior to Situation I or that the relationship between the two situations is ambiguous. The argument is set out more fully in Appendix I. Hicks also assigns a crucial role to commodity prices as weights in welfare measurement: with one or two exceptions (e.g., supply-restricted or new commodities), they are

deemed proxies for the corresponding marginal utilities.

Prompted by the "apparent inconsistency" (which he considers justified) of valuing private goods and services at market prices and public services at cost, Hicks also looks at the welfare implications, now conceived in terms of productivity, of an increase in GDP from the standpoint of factor cost. He finds that so long as constant returns (namely, straight-line substitution curves) and unchanging technology are assumed the preceding index-number result holds: otherwise, it does not. Nor does it hold under conditions of perfect competition and universal diminishing returns. Now, the substitution curves are not only concave to the axis, they also intersect, a serious problem.

...Thus even if E is greater than both the price-indexes, we cannot be certain that there has been a *definite* increase in productivity. (p. 121, emphasis in text)

Matters are "much worse" when imperfect competition and increasing returns are contemplated. In sum, and contrary to what is widely believed:

The measurement of economic welfare and the measurement of productivity are in fact quite different things; their coincidence under optimum conditions is a special property of that particular state of affairs. (pp. 122-123)

Kuznets

Before summarizing the comments of Kuznets (1948) on the preceding analysis, it is worth briefly citing a important caveat in the earlier Kuznets (1946) concerning income distribution.

...[GDP] as a whole retains meaning only in so far as the national distribution by size of personal income shown tendencies towards stable patterns. But from any point of view such a frequency distribution is an indispensable complement of national income estimates if these are to throw any light on the welfare of the nation. Welfare is an actuality only within the experience of every individual and varies materially with the size of a person's income. (pp. 33-34, emphasis added)

This caveat is especially important because Kuznets proceeds to report that empirical analyses of historical distributional patterns of various countries find that the required tendency toward stability does not exist. This finding strengthens his already substantial doubts as to whether intertemporal comparisons of a country's GDP are likely to provide a satisfactory basis for tracking its welfare trends. (His doubts about the soundness of international comparisons for

this purpose are even stronger.) The notion of reporting additional, distributional data alongside GDP, as a complement to it, has important implications that will be discussed in due course.

Suppressing his doubts, Kuznets (1948) considers Hicks's analysis and argues that two problems render insufficient his criterion for Situation II's superiority over Situation I (that no redistribution in Situation I may result in higher total welfare than the total welfare achieved in Situation II). The first problem is that nothing normative can be said until the total-expenditure comparison has been reformulated in per capita terms; the second, and more important, problem is that the comparison must also be subjected to what Kuznets calls a "base reversal" test. This test determines whether it is impossible to make *everyone* as well off as he is in Situation I by any redistribution of the actual quantities acquired in *Situation II*. If it is impossible to accomplish this, Situation I is superior to Situation II. Since a comparison that produces this result may satisfy Hicks's criterion that renders Situation II superior to Situation I, there is a clear contradiction. To illustrate how such a contradiction could arise, Kuznets divides the population into two groups, rich and poor, and postulates that although both groups consume goods called "necessities," other goods called "luxuries" are only consumed by the rich. He then conjures up circumstances in which the satisfaction of Hicks's criterion proves to be insufficient to establish unambiguously an increase in total welfare, even though the total-expenditure ratio exceeds both the corresponding Laspeyre's and Paasche indexes. The essence of these circumstances is that the poor are worse off in Situation II than in Situation I and the rich are better off (proportionately more so). Since the poor do not consume "luxuries," redistributing these goods among the rich cannot restore the poor to their Situation I condition. The only way the poor can be so restored is by breaking down the distinction between necessities and luxuries and then making the necessary redistribution. Thus:

...If we are to determine unequivocally an increase in welfare in Situation II over Situation I we must assume not only a constancy of wants in the sense of a constancy of each individual's appraisal of different goods but also that either (a) all goods can be substituted for one another in the full range or (b) the structure of the goods aggregate in the two situations is such that no specific good, to the extent that it cannot be replaced by another, is reduced in output....(p. 4)

This finding has two important implications. First, drastic and regressive distributional

changes during the interval between the two situations, which cause a large decrease in the production of "necessities," are ruled out. They may render inapplicable Kuznets's "base reversal test" and, thereby, obscure the fact that an unambiguous normative judgment cannot be made. Second, although government output is deemed ultimately to flow from consumers' decisions, drastic changes in the distribution of output between the private and public sectors are also precluded for much the same reason.

Little

The discussion is extended by Little (1957), who argues that Kuznets's requirement of full mutual substitutability of goods is unrealistic. Little's main focus, however, is on more fundamental issues, such as the very meaning of questions about welfare. He asserts that, strictly speaking, there is no objective measure capable of capturing changes in the level of total welfare. Although he generally prefers Kuznets's formulation to Hicks's, he emphasizes that serious problems remain, especially when the patently unrealistic implicit assumption that the community has not changed, even over a short period, is abandoned. People are constantly dying and being born. Hence:

...If we are considering whether we are better off than our grandfathers, it is silly to ask whether everyone could be made as well off as they were before. Logically, it is just as silly to ask the same question when we are considering whether the welfare of the community has increased over last year. *If a group is changing in composition, one cannot seriously consider the question of its welfare without making interpersonal comparisons....* (p. 17-18, emphasis added)

And, of course, interpersonal comparisons are impermissible, and the previously-noted caveats concerning demographics and substitutability of goods also apply.

TWO FIRMLY NEGATIVE ANSWERS

Samuelson

Samuelson (1950) presents an ostensibly more comprehensive model than the Hicks-Kuznets models that rely upon index numbers. Its conceptual heart consists in two aggregate

functions applicable to all members of society: a so-called "utility-possibility function" and a so-called "utility-feasibility function," the latter function lying within the former in the region of the two situations being compared. Samuelson's findings, which explicitly recognize, *inter alia*, that income-distribution policies necessarily impose costs, a fact generally ignored by other analysts, are particularly discouraging.

...[W]e come to the paradoxical conclusion that a policy which seems to make possible greater production of all goods and a uniformly better utility-possibility function for society may result in so great (and ethically undesirable) a change in the imputation of different individuals' incomes, that we may have to judge such a policy 'bad'...A policy that shifts society's utility-possibility function uniformly outward *may not at the same time shift the utility-feasibility function uniformly outward, instead causing it to twist inward in some places.* (pp. 20-21, emphasis added)

Chipman and Moore

Also in the context of a purportedly comprehensive model, and building upon preceding analyses, Chipman and Moore (1971) present their own discouraging conclusion: the statement that *potential* total welfare (the only welfare that matters) has increased because real GDP is greater in Situation II than in Situation I depends crucially upon all individuals having *identical* tastes that are also homothetic. This is an even more stringent condition than the condition of constant tastes. Consequently:

...[T]he sort of identification of increases in potential welfare with increases in real [GDP] which has been traditional in the profession is on very shaky ground...[A]n increase in [GDP] is a *necessary* condition for an improvement in potential welfare, even though it is not, in general, a sufficient condition for inferring that such an improvement has taken place. (p. 415, emphasis in text)

Chipman and Moore further put matters in perspective by grouping into two categories the difficulties that arise from the attempt to infer changes in welfare from changes in GDP.

That [GDP] is a highly imperfect measure [of welfare] has never been denied...How best to evaluate nonmarket goods such as housewives' services, imputed rent, leisure, or externalities such as smoke, noise and other kinds of pollution, has never been satisfactorily resolved. Another big problem is posed by technological change, change in product quality, and changes in tastes. More difficult still is the valuation of public goods such as parks, police services, and national defense. However...it has generally been believed that while

these are difficult conceptual and practical problems, nevertheless they are capable of solution, and...then we would have an index which would provide a correct indication, if not of actual welfare, at least of potential welfare.

It is our contention that even if all the above problems...could be solved, there remain further difficulties of a fundamental nature in the use of [GDP] as a measure of potential welfare, let alone actual welfare...*In short, if an index of welfare is what we want, we cannot rely on [GDP] alone, and sometimes we cannot rely on [GDP] at all.* (P. 393, emphasis added.)

PART II

MODIFYING GDP WITH A VIEW TO CONVERTING IT INTO A MEASURE OF ECONOMIC WELFARE

Much attention is given in somewhat more recent literature to various problems included in Chipman and Moore's first category, in the belief that solving them will produce a satisfactory welfare measure. With few exceptions, the analysts in question tend, in effect, to proceed as if Chipman and Moore's "fundamental," second-category problems do not exist: they are not discussed, much less resolved. In spite of this regrettable situation it is highly instructive to suspend disbelief and consider their work on its own merits, largely, though not entirely, in isolation of the earlier work.

Unlike of the analysts discussed above, these analysts typically do not compare the GDPs of two successive periods and consider whether the change implies an analogous ordinal change in welfare. Instead, they typically begin with that major component of a given year's GDP namely, consumption, subtract some of GDP's components, wholly or partly, add or subtract other variables and, then, arrive at their respective welfare measure for that year. In doing so, these analysts in effect reject the proposition that individual and collective market choices are the *sole* determinants of welfare, and supplement these choices with various choices of their own, which vary greatly among analysts. In addition, they in effect deem each year's measure a cardinal measure and, therefore, deem the year-to-year changes in it as being cardinal as well. It is impossible here to consider all the additions and subtractions that can be found in this genre of welfare measures (three examples of such measures are presented in Appendix IV) but some of the most important and far-reaching ones can be discussed collectively under the general rubric of government services. Since, as a rule, their analyses do not approach the preceding ones in rigour, it is instructive briefly to consider some closely-reasoned, conceptual justifications for using a derivative of GDP as a welfare measure and, in particular, the assumptions upon which they rest.

Usher

Usher (1980), takes passing cognizance of the analyses summarized above and declares them peripheral to his own. His main focus is upon the measurement of economic growth. He holds, however, that a given increase in real income, deemed synonymous with GDP in an initial context of an artificial world in which consumers spend their entire income, reflects a corresponding *cardinal* increase in welfare. He specifies four alternative definitions of real income and assesses the realism of the assumptions upon which, under each definition, intertemporal and international welfare comparisons rest, both with respect to his so-called “representative consumer” and to the aggregation of all consumers that is the community. Under the first definition, the support he gives to two key assumptions, that the consumption of his representative consumer and that of the average consumer in the community are the same, and that the former’s rates of substitution in use among commodities are reflected in observed relative prices, seems rather lukewarm. Under the second definition, he acknowledges that the informational requirements of aggregating from individual consumers to all consumers are enormous, but contends that this difficulty can be surmounted by resorting to a Lespeyres index for the community. He also acknowledges that the coherence of this measure of real income is sensitive to changes in income distribution, but advises that the actual degree of sensitivity not be exaggerated.

Usher’s first two definitions of income differ only in choice of base year, but his third definition, cast in terms of certainty-equivalent income, is not only substantively different but considerably more esoteric, although he maintains, and supports with a hypothetical illustration, that changes in it can, in principle, measure changes in real income (and, hence, in welfare). Here, too, he acknowledges that the measure is sensitive to changes in income distribution and also that his crucial assumption namely, that the elasticity of utility with respect to income is the same for all values of income, is not based upon actual evidence and that calculating this elasticity in the real world would be an onerous task. In another relatively esoteric vein, Usher’s fourth definition conceives of real income in terms of how much it would cost, per person, in the base year to attain the value of the social welfare function attained in the current year. In order to “link” together individuals present in different years, he assumes that the welfare function is

“anonymous” in the sense that its value is unchanged if incomes are interchanged between individuals, and if demographic changes occur over the interval, so long as average income is invariant. And, as always, the specific assumption with respect to income distribution, now that it not only remains unchanged but that there exists complete equality of income within each decile class of earners, plays an important role in his analysis.

Usher reiterates his underlying premises.

...We...[maintain]...the hard and fast distinction between the size of income and the distribution of income. We shall not...impose a social welfare function onto the spectrum of incomes or...take account...of differences in taste among consumers or of special characteristics of the rich or the poor....On an empirical plane, it has to be recognized that adequate time series of the distribution of money income are not available over long periods of time, that...we cannot in practice account for differences in utility functions among consumers, *and that allowances for changes in the distribution of income would complicate matters greatly when we come to consider real saving, imputations, quality change and other modifications to the circumstances in which real income is defined....*(p. 50, emphasis added)

The contrast between the immediately preceding words and the caveats specified by Hicks and Kuznets, and essentially endorsed by Little (to say nothing of the far more prohibitive ones set forth by Samuelson and Chipman and Moore), is striking. Whereas their caveats are intended to caution against facile intertemporal GDP comparisons, whether for a given country or a group of countries, they ultimately validate the comparative exercise, properly done. Their attitude may be summed-up thus: do it if you must, but be very careful and don't claim too much, for our caveats are restrictive, and don't forget to complement GDP with income distribution and other data. Also, keep the comparisons ordinal. Usher's message is both more positive and more negative with respect to GDP's suitability as a welfare measure. He carefully notes the analytical importance of trends of taste, income-distribution and demography, but what are restrictive caveats for Hicks, Kuznets and Little are for him adequately-realistic assumptions, whose limitations must be acknowledged but not permitted to preclude cardinal welfare comparisons on the basis of GDP. This is Usher's positive message: his negative message is also important, for it casts a long shadow. He not only recognizes the analytical complexity of allowing consumers to save, invest and do other things that people do in the real world, he explicitly recognizes the need

to incorporate into welfare comparisons the imputed values of quite a few variables, ranging from home grown food, through depreciation (this appears to render the comparison in terms of NDP, not GDP) and environmental changes, all the way to travel to and from work and changes in mortality rates. This part of Usher's overall message points us in a very different direction from the one in which we are pointed by Hicks, Kuznets and Little namely, in the general direction chosen, *mutatis mutandis*, by the above-mentioned analysts that make cardinal welfare comparisons based upon derivatives of GDP. His imputations include an estimate of the value of the services provided by publicly-owned capital goods, and he explicitly refuses to do the same for those government services devoted to "defence and public administration." Thus, we now return to the subject of government services and, in due course, we will give special attention to these excluded services.

THE CATEGORIZATION OF GOVERNMENT SERVICES

The problem of how best to categorize government expenditures in measuring GDP has preoccupied students of national accounting from the very outset. Its complexity may be inferred from the fact that some leading analysts in the field have taken different positions at various times, in response to criticisms of their previous positions. Studenski (1958), who studies at length the debate surrounding the problem, goes so far as to declare it one of the most difficult in the entire field of national accounting.

THE OFFICIAL VIEW

GDP, viewed in terms of expenditures, includes final government consumption expenditures at purchasers' prices; and it is worth considering what the 1993 SNA says on the subject.

The collective services provided by government consist mostly of the provision of security and defence, the maintenance of law and order, legislation and regulation, the maintenance of public health, the protection of the environment, research and development, etc. All members of the community benefit from such services. As the individual usage of collective services cannot be recorded, the individuals cannot be charged according to their usage or

the benefits they derive.... (p. 214)

This reasoning is extended to certain non-collective (i.e., quasi public) goods, such as health, education and services "concerned with the formulation and administration of government policy, the setting and enforcement of public standards, the regulation, licensing or supervision of producers, etc." The value of specific government services is defined to be equal to the amount of the corresponding expenditures. Also:

Many government expenditures benefit enterprises as much as households; expenditures on the cleaning, maintenance and repair of public roads, bridges, tunnels, etc....These are individual services whose consumption can be monitored....*However, it would be difficult to separate the services provided free to households from those provided free to enterprises and, by convention, all these expenditures are treated as collective final expenditures.* (*ibid.*, emphasis added)

There are only three possible positions on the appropriate categorization of government services in GDP: all are intermediate products; some are intermediate and some are final products; and all are final products. In spite of a certain amount of overlap, both of rationale and critique, it is useful to consider each position in turn.

ALL GOVERNMENT SERVICES ARE INTERMEDIATE PRODUCTS

Studenski

To illustrate this view (but without endorsing it), Studenski cites the rationale offered by economists that estimated Hungary's national income, during the late thirties, for deeming all government services, with very few exceptions, as being intermediate products. This rationale is repeated, *mutatis mutandis*, by later analysts that share their outlook in varying degrees.

...[T]he machinery required for keeping order and securing safety...do not produce values in addition to the flow of consumers' goods, but ensure only the maintenance of the present economic and social order and the maintenance of the present level of production. (emphasis in text)....If the cost of public administration increases, the national income does not therefore become greater, just as it would not become smaller if the cost of public administration could be reduced, provided the prices of consumers' goods remain unchanged....We do not dispute the usefulness of the public service but....the results of its usefulness appear in the value of the goods and services produced, *and an inclusion of the*

cost of public services as such would mean double counting.... (p. 196, emphasis added)

The underlying concept is unequivocal: no activity undertaken during a given fiscal period contributes to social welfare unless its fruits are directly and immediately manifested in additional consumption or investment goods. Man lives by and for bread alone.

The basic argument presented by Studenski, in rejecting this reasoning, is couched in terms that are likewise echoed by other analysts sharing his perspective in varying degrees.

...It [the concept] cannot reasonably be said to apply to modern government, which in a thousand ways seeks to provide necessities and conveniences to its citizens complementary to those that business enterprise provides or that they provide for themselves. Can it be said that public health, hospital, and clinical services that combat disease, promote hygiene, and prolong human life "do not produce values in addition to the flow of consumers' goods," and that they do not contribute to a "general rise in the standard of living"? Or is it true of the services of public museums, parks, highways, street lighting, street cleaning? Is not the feeling of security in the enjoyment of one's life, provided by the various protective services of government, a good that is additional to that provided by the flow of consumers' goods? (ibid., emphasis added)

Studenski also points out a serious inconsistency in the methodology advocated by the Hungarian economists. Goods and services purchased by the government from business are treated as final products and, therefore, are included in GDP, a treatment that is hardly appropriate if the resulting government services are themselves deemed to be intermediate products. As will be seen in due course, this is not the only such inconsistency in the argument that all government services are intermediate products.

SOME GOVERNMENT SERVICES ARE INTERMEDIATE AND SOME ARE FINAL PRODUCTS

Mainly Kuznets

Hicks (J.R. and U.K.) (1939) argue in favour of including all government services in GDP, treating them in effect as final products, even though they consider many of them intermediate products. Their grounds are the purely pragmatic ones that the measurement problems that attend any attempt to separate the one type of product from the other, with respect to each of the many

services in question, are insurmountable. However, Hicks (1948) reconsiders the question, having in the interval further consulted his economist wife (U.K.) and become convinced that the measurement problems are not in fact insurmountable: so, intermediate government products should be identified, measured and excluded from GDP. Hicks is not the only analyst to reconsider his position. Colm (1954) records his own concurrent journey in the opposite direction, wherein he abandons his original position (namely, Hicks's revised one) and adopts Hicks's original (and now abandoned) position, on the very same grounds of intractability of measurement problems. It appears that tractability and intractability of measurement problems in this area are very much in the eye of the analyst (and his advisor, if any).

Unlike the shifting pragmatic grounds of these two writers, Kuznets's own shifting grounds are essentially conceptual. He frequently couches the issue in terms of intermediate and final products, but not always and not entirely. Consider Kuznets (1941):

It could hardly be denied that the services of the post office, judiciary, etc. represent productive activities and contribute to the satisfaction of the needs of society at large. Doubts, however, have often been expressed concerning the validity of including the services or armed forces in national income. One can easily see the reason for such treatment if an investigator adopts criteria of productivity in the light of which he can modify judgments expressed by an overt act of the body social. However, only the acceptance of criteria of productivity different from those applied to society at large would justify the treatment. Since the estimators or analysts who advocate it usually profess to accept the dictates of the market place, the exclusion of services of government agencies such as police or armed forces...seems inconsistent....

...[I]f the activities of private police used by many large corporations are productive, why not those of municipal police? And if of domestic police, why not of international police, i.e., the armed forces of the nation? *If capital invested in private plants is productive, why not capital sunk in the preservation of the country's economic system or in securing to it economic privileges that affect the welfare of all enterprises or inhabitants? Indeed, there is considerable parallelism between governments and private corporations in their expenditures on policing, economic warfare, their financial structure....* (p. 31n, emphasis added)

For Kuznets, on this occasion, both private and public expenditures reflect conscious and, above all, *complementary* social choices, the former collective, the latter individual, which are made in pursuit of utility in a manifestly imperfect world. Both kinds of outlay therefore warrant inclusion

in GDP.

However, a decade later, in Kuznets (1951), his reasoning is quite different. GDP is now described as "an approximation to social welfare," and it is explained that some social goals are both society-specific and time-specific. If, therefore, comparisons are to be made over time and across societies, they must be made in terms of goals that "transcend differences in economic and social organization across time and space." Kuznets now explicitly echoes Pigou's view that only with the "measuring-rod of money" (albeit "stretched to its utmost") can the transcendental goal of economic activity namely, the satisfaction of the wants of the individual consumers that make up the society, be made operational. Hence, with respect to government services, only those services directly provided to consumers, plus those that increase society's capital stock, should enter into GDP. Kuznets is now thoroughly at odds, not only with his earlier outlook, but also with the official view of GDP, which maintains that unlike purchases of inputs by firms that will later be resold at a price, most government purchases of inputs are made on behalf of the population as a whole, not for resale but to provide it with free services. Hence, they should be included in GDP. For Kuznets, now, the not-for-resale criterion is adequate to identify final expenditures but inadequate to identify final *products*. Some consumers' purchases are made because they directly produce individuals' happiness, and therefore are final products. Others, however, are made for resale, in that they enable individuals to sell their labour and, therefore, are intermediate products.

...[M]ost government activities are designed to preserve and maintain the basic social framework and are thus a species of repair and maintenance *which cannot in and of itself produce net economic returns*. (p. 184, emphasis added)

But, and this decisively sets him apart from other analysts making analogous assertions, Kuznets immediately proceeds greatly to restrict the generality of this position by specifying a major government activity to which it does not apply (and he later specifies others). That activity is the waging of "a crucial war," a war that is a "life and death struggle" in which individuals' current welfare is less important than the "survival of the social framework." For the duration of this "temporary" situation all defence expenditures are final products.

More generally, Kuznets sets forth three criteria for distinguishing intermediate from final

government products. The first criterion is that the individual recipient of the service pays no price for it, or only a token price (the service is financed by taxes or borrowing). Thus, not only do free education, health care, legal aid, etc. qualify as final products, but so do most other free government services. The second criterion is intended greatly to narrow the field: the service only becomes available to individuals after they have taken an overt initiative to obtain it. The three services just mentioned again qualify as final products, but the services of the legislature and the military (to mention only these) do not.

...The activities by government designed to preserve or expand the framework involve economic costs to society at large; but any net returns cannot be associated directly with any changes in the framework, certainly not in terms of services to individuals. (p. 193)

Kuznets, believes, however, that a criterion which excludes from the final-product category all government services not supplied at the overt behest of individual beneficiaries is insufficient to exclude all governmental intermediate products. He gives the example of the work of an appellate court, which although set in motion by overt individual initiative, belongs to the same category as other services designed to preserve the social order. Hence, a third criterion is needed, which requires, in addition to the other two criteria, that the particular service-to-individuals have an analogue in private markets.

...This permits the inclusion of such services by government as education, which obviously finds its analogue in purchases of private education; medical services, with similar analogues in private medical service; parks, theatres, public tourist centers, amusements, etc.... (p. 195)

Kuznets admits, however, that, if stretched too far, this criterion breaks down. For example, the fact that individuals hire bodyguards must not be allowed to justify declaring police services as final products. The analogue in private markets must be "widespread," although Kuznets undercuts this position by admitting that the presence of a widespread analogue may imply that the social framework "does not recognize an overriding need for internal peace." In such circumstances, police service to individuals qualify as final products. He also acknowledges another problem with his private-market-analogue criterion: government services that obviously are services to individuals may be so well delivered that pre-existing private suppliers vacate the

field. Examples include free medical care, free right to participate in elections, and free police protection to individuals.

It is important to note that Kuznets also believes that all government spending on capital goods, like all private investment spending, should be included in GDP; and he includes changes in the "net balance" of claims on foreign countries under that heading, although he acknowledges a difficulty with claims resulting from war. Even when the services provided by governmental capital goods consist in intermediate goods investment in them should be included in GDP.

...There is no inconsistency in including in the final product of government changes in the stock of armament, and yet excluding from final product such government activities as are carried on by the country's armed services; as there is no inconsistency in including additions to the stock of blast furnaces in net output, and yet excluding pig iron from the flow of finished goods to the country's ultimate consumers. (pp. 197-198)

In sum, expenditures to feed, pay and otherwise maintain the police and [peacetime] armed forces as well as the corresponding bureaucracies, as well as expenditures to hire and manage road maintenance crews, etc., are expenditures for intermediate products, but expenditures to equip them with the tools of their respective trades, in order to enable them to do their job are expenditures for final products.

Abandoning previous positions, Kuznets now implicitly agrees (subject, again, to the crucial reservation that his agreement only applies to peacetime conditions) that individuals live by and for bread alone. Being consumers and nothing more, they view all other material and institutional aspects of their existence as but means to that end, not as ends in themselves. If, under these conditions, they want liberty and protection of life and property at home, protection against foreign enemies, reasonably honest and efficient judicial institutions, and the host of institutions, rights and regulations that preserve individual security and liberty, as they obviously do, it is not because these things are valuable in themselves but merely because they serve present and future consumption appetites.

Like most other participants in the debate, Kuznets provides no factual evidence to substantiate his new (or his old, for that matter) outlook on human priorities, whether individual or collective. Nor does he provide practical criteria to facilitate making his crucial distinctions operational. Although he is at pains to exempt expenditures to wage a "major war" or maintain a

"chronic state of crucial struggles" from his restrictions on the final utility of national defence, he provides no criteria for distinguishing major from minor wars, chronic from nonchronic states of struggle, or crucial from noncrucial struggles. If specified, such criteria would surely qualify as final products the military expenditures made during (and at least shortly before) the two world wars and the Cold War of this century. Whether they would similarly qualify the expenditures made during the probably-less crucial Korean War and Vietnam wars is less certain. On balance, it is fair to say that Kuznets's "peacetime" allocation of defence expenditures to the category of intermediate products must await the advent of a future epoch, one that is very different from the contemporary one.

It must also be noted that Kuznets's list of government services that qualify for inclusion in GDP is significantly incomplete. It does not include services like street lighting and garbage removal or the services of roads, bridges, canals, etc., all of them services that meet his three criteria. Individuals must take overt action to use them, little or no price is charged, and the private sector that once provided them much more extensively than it does currently has withdrawn as a result of the successful entry of government into the field.

Nor, in an important omission, does Kuznets consider the possibility that there exists a private sector analogue to the security services that he designates as intermediate products on the grounds that do not directly produce consumer goods: they only create the environment in which consumer goods can be produced and consumed. The overhead and other fixed costs that firms necessarily incur in their everyday operations are incurred for reasons that are entirely analogous to the government's reasons for incurring security costs: to preserve the firms as institutional environments in which production can take place. Indispensable though these "environmental" costs are, they do not in themselves directly result in output. They do, however, enter into the market prices of the products that constitute that output and, thereby, into GDP, and, quite properly, no one finds this practice objectionable. This is an anomaly that will be returned to below. All things considered, Kuznets is a lone voice in this debate, a voice that belongs neither in the analytical camp of the above-mentioned Hungarian analysts nor in that of the analysts discussed next.

Nordhaus and Tobin

As, *mutatis mutandis*, do other derivatives of GDP (including the above-mentioned GPI), the well-known "measure of economic welfare" (MEW) developed by Nordhaus and Tobin (1972, henceforth N-T), excludes a variety of private and government expenditures (of which the latter are much more quantitatively important) on the grounds that they are "instrumental," or "regrettable" expenditures. The excluded private instrumental expenditures are the sum of the items in one consumption-expenditures category of the US national accounts, personal business, and one-fifth of the items in another, personal transportation expenses. The first excluded amount refers to a variety of personal services ranging from brokerage charges and investment counselling, through bank service charges, other services provided by financial intermediaries, life insurance handling and legal services, all the way to funeral expenses. The second is an estimate of the cost of commuting to work.

The quantitatively more important government instrumental expenditures not considered contributions to MEW include police services, sanitation services, road maintenance and national defence: N-T describe them as "among the necessary overhead costs of a complex industrial nation-state...[for]...activities that are not directly sources of utility themselves but are a regrettably necessity to activities that may yield utility."

N-T's discussion of instrumental expenditures is largely couched in terms of defence expenditures because, in their view, they most fully illuminate the issues raised by the genre. Their case for excluding them begins with two specific reasons.

...First, we see no direct effect of defense expenditures on household economic welfare. No reasonable country (or household) buys "national defense" for its own sake. *If there were no war or risk of war, there would be no need for defense expenditures and no one would be the worse without them.* Conceptually, then, defense expenditures are gross but not net output. (p.7, emphasis added)

Their second reason is that defense expenditures are input rather than output data. Further, measurable output is especially elusive in the case of national (or other) security.

...Has the value of the nation's [US] security risen from \$0.5 to \$50 billion over the period 1929 to 1965? Obviously not. It is patently more reasonable to assume that the rise in expenditure was due to deterioration in international relations and to changes in military

technology. *The cost of providing a given level of security has risen enormously. If there has been no corresponding gain in security since 1929, the defense cost series is a very misleading indicator of improvement in welfare.* (p. 8, emphasis added)

Implicitly rejecting Kuznets's distinctions, N-T acknowledge that when prompted by "unfavourable circumstances," defence expenditures can make consumers better off, but they do not merit inclusion in MEW because their benefits are only indirect.

...The diversion of productive capacity to [defence production] cannot be regarded simply as a shift of national preferences and the product mix. Just as we count technological progress, managerial innovation, and environmental change when they work in our favour (consider new business machines or mineral discoveries) so we must count a deterioration in the environment when it works against us (consider bad weather and war). From the point of view of economic welfare, an arms control agreement which would free resources and raise consumption by 10 per cent would be just as significant as new industrial processes yielding the same gains. (p. 8, emphasis added)

It is worth mentioning, in passing, that the slightly earlier Lekachman (1971) reflects, in his own terms, much the same reasoning with respect to regrettable expenditures. A self-proclaimed "deteriorationist at heart," he advocates the development of an "index of amenity," whose purpose would be to deflate GDP. By his own admission, this index is subject to "severe flaws in logical consistency," but it would still be better than nothing. The main issue is the extent to which purchases made by consumers can be regarded as "personal enjoyment," rather than as "costs of personal enjoyment," a distinction he regards as crucial (he eschews the term "instrumental" expenditures).

...[Much of what silent majoritarians purchase is perceived by them (not just by...snobbish elites) as a grudging response to personal danger (as in the acquisition of fierce dogs, burglar alarms, locks, and firearms), environmental hazard (as in the purchase of air conditioning and home insulation against intolerable noise), or a direct defense (sic) of one's personal health (emphasis in text)... Such expenditures are quite likely to strike the men and women who make them as coerced. They are among the costs of personal enjoyment rather than the enjoyment itself.

It is a deficiency of current national income calculation that the general rubric of market activity is made to cover both the pluses of personal gratification and its costs....
(p. 123, emphasis added)

Returning to N-T, although they largely disregard them, they paradoxically register some

important caveats to their own approach.

We must admit...that the line between final and instrumental outlays is very hard to draw. For example, the philosophical problems raised by the malleability of consumer wants are too deep to be resolved by economic accounting. Consumers are susceptible to influence by the examples and tastes of other consumers and by the sales efforts of producers. *Maybe all our wants are just regrettable necessities, maybe productive activity does no better than to satisfy the wants which it generates; maybe our net welfare product is tautologically zero. More seriously, we cannot measure welfare exclusively by the quantitative flows of goods and services. These, too, will be relative to the value systems which determine whether symptoms indicate health or disease.* (pp. 8-9, emphasis added)

There are two problems with N-T's first reason for excluding defence expenditures from MEW, the first of which can readily be seen by considering national defence from a historical perspective. It is the merest of truisms to assert, as they do, that without war and risk of war there is no rational justification for defence expenditures when, ever since the dawn of recorded history, the world has never been free of either. This sad but incontrovertible fact is all the more apparent if risk of war is defined as risk of armed conflict with another country that, if not imminent, is significant over, say, the medium term. In a word, N-T's first reason for excluding defence-related expenditures from their welfare measure depends upon a state of human affairs that has yet to exist. The second problem with this reason is as or more serious. National security not only provides the welfare inherent in the protection of the economic system, it also simultaneously provides the welfare inherent in additional social desiderata, some perhaps even more cherished than a preserved economy, such as peace and liberty. Wedded to undefined "economic welfare," N-T's do not reckon with this consideration. Since their approach is shared by other analysts, this very important issue will further be taken up towards the end of the paper.

N-T's second reason for excluding defence expenditures from MEW is also unpersuasive, as can be seen by generalizing it to other expenditure areas, as does Jaszi (1958) while also offering what is at once an example of sound national accounting and anomalous welfare measurement.

... [S]uppose defense production increases but the power of the potential enemy rises *pari passu*. Other things being equal, the population is no better off than before, but national product measured inclusive of defense expenditures would be larger. *This is the sort of ground on which it is argued that the inclusion of defense expenditures in national output constitutes duplication.* By analogy, in the private sphere there may occur a rise in medical

expenditures which merely offsets an increased danger of infectious disease. Other things remaining the same, the population is no better off than before, but again the national product as currently defined would rise. (p. 71, emphasis added)

Jaszi here touches on a matter the importance of which extends far beyond defence and health expenditures. Expenditures captured by national accounting only reflect the fact that they were considered necessary by the individuals that made them, a fact that tells us nothing of their circumstances or consequences. Since these can and do vary widely, without knowledge of them there is no way of distinguishing expenditures that enhance welfare from those that merely restore it by remedying a previous loss or, indeed, from those that reduce it because they are perverse.

Although they are by no means the only arguments that can be brought to bear, Kuznets's above-mentioned arguments suffice to show that N-T's general approach to national defence is unsatisfactory. Their discussion is also sometimes mistaken in purely factual terms, as for example when they in effect deny that American defence expenditures had a major impact on the welfare of the United States (to speak only of that country) during this century. To give but two of several possible examples to the contrary, the historical evidence is overwhelming that the insignificant American defence expenditures of the early-thirties strongly encouraged the aggressive designs of the governments of Germany, Japan and Italy that made World War II inevitable. Further, the year 1965 was on the morrow of the Cuban Missile Crisis, an occasion when overtly manifested American military strength prevented a very dangerous shift in the international balance of power that would greatly have increased the risk of all-out war between the Western democracies and the Soviet Bloc.

Finally, N-T behave inconsistently in failing to remove from MEW a variety of private-sector analogues of governmental defence expenditures, including expenditures by households and businesses for security, whether in the tangible form of locks and alarms systems, in the human form of security guards, and the like, or in the intangible form of insurance coverage against theft and vandalism. As does Kuznets, they also fail to consider whether there is an analogy between the public costs of protecting and preserving the environment in which production takes place and the private fixed costs routinely, and inevitably, incurred by firms: although they likewise do not directly result in output, they accomplish the same end of making output possible. Granted, the

private costs are (and will always be) technically obligatory and the public ones are not; but, the world being what it is, they are what may be termed “socially obligatory.” Until that devoutly-to-be-hoped-for dawn of a better world, the word “obligatory” will remain operative. The fact that the private costs enter into the prices of consumer and investment goods bought and sold in private markets, and that the public costs may or may not (depending upon how they are financed by the government), should not be the determining factor with respect to inclusion in a welfare measure.

The full relationship between defence expenditures and national security is exceedingly complex and far beyond our scope. The rules of thumb sketched by Kuznets certainly have their uses but the most important consideration was just implied: the welfare implications of a given level of defence expenditures depend crucially upon the attitudes and responses of other countries, especially of actual or potential enemies. Without information on these attitudes and responses, the implications are indeterminate: they can be positive, negative or nonexistent (the last is unlikely). The only thing that can be asserted with confidence is that it is inappropriate to exclude defence expenditures *a priori* from a welfare measure, whether welfare is defined broadly or narrowly. This, of course, also implies that the expenditure data must be accompanied by additional information, and that in turn raises additional issues. Several of these will be taken up in various places below, and particularly in Appendix III.

ALL GOVERNMENT EXPENDITURES ARE FINAL PRODUCTS

Jaszi

Proceeding from a very different perspective from that of analysts he describes as "welfare-oriented," Jaszi (1946) contends that semantic confusion is an important contributing factor to the controversy surrounding the proper place of government expenditures in GDP, a controversy that was already heated in his day. Citing the unenviable experience of various countries, he denies that a useful distinction can be drawn between intermediate and final products in the case of government services. He insists that even in the private sector, distinguishing intermediate from final products is far from being a straightforward exercise. Offering an example involving the

production of men's suits, he shows that the composition of national product is affected (rightly so under established national accounting conventions) by whether suits are made from cloth customers have bought and supplied to their tailors or whether the tailors buy their own cloth. Consequently:

...[I]t is not possible from the physical characteristics of yarn to determine whether it will be enumerated as a final product or not. *The criterion which is used to distinguish between final output and intermediate output is whether the item in question is bought by a consumer or bought by a business. A final product is output bought that is bought by consumers. An intermediate product is output that is bought by a business [and either charged to current cost or to fixed assets]. A definition of consumer goods, which runs in terms of physical characteristics that yield satisfaction to consumers, is not operative.* (p. 171, emphasis added)

However,

...government services are neither bought by consumers nor by business and hence the definitions of consumer good and intermediate product used in the measurement of national product in the private sphere are not directly applicable. (p 172)

Jaszi points out that economic theory postulates that consumers, at any given time, are faced with a specific variety of goods and their respective prices, from among which they make choices (subject to their budget constraints) to maximize their total utility; and he insists that the operative term here is "specific variety," a term that refers to a particular institutional setting. Staying with the example of cloth and mens' suits, there invariably exist several different, and alternative, institutional settings in which cloth could be bought.

...For instance, if the customary procedure is to buy uncut cloth and to have it tailored to measure, uncut cloth is a consumer good, *because the customer would take it into account in the course of his exchange transactions.* If, on the other hand, it is the practice to wear ready-made suits, uncut cloth will disappear from the list of consumer goods, *because it is no longer an item in the list of exchange transactions by which consumers maximize their transactions.* (p. 174, emphasis added)

Economic theory does not, and need not, differentiate between institutional settings in order to establish that consumers always seek to maximize utility. Consequently, "[economic] theory does not provide tools which would allow national product measurement to transcend the market

place."

All this is argued in support of Jaszi's main thesis that, more than anything else, GDP is an accounting concept far more suitable for measuring output than welfare. (It will be seen in due course, that this view is overdrawn.) Pointing out, in passing, that GDP ignores the contributions of family services, he offers the example of shelter, heat and light provided to workers in factories, and suggests that these commodities enhance workers' welfare at work in precisely the same way as they enhance it at home. "Yet the latter are, and the former are not, part of [GDP]." He also provides additional examples. Recognizing that inputs used by business enter into the prices of products, he insists that:

...It will not do to say that the heat and light consumed in places of work is [sic] indirectly included in [GDP] by being an element of the price of the products sold by the factory. This can be made clear as follows. If a simple shift should occur between heat and light consumption places of work and heat and light consumption in homes, *deflated* [GDP] would show a change (an increase if the shift were towards the home, and a decrease if the shift were away from it) *in spite of the fact that no change had occurred in the total physical consumption of heat, light, and factory products*. (pp. 176-177, emphasis added)

After reviewing some conundrums presented by certain imputations (ranging from food and board of farmworkers and members of the military, through owner-occupied premises, to self-administered shaves and haircuts) Jaszi insists that as long as analysts are under the "hypnosis" of a welfare-based definition of GDP, the problems of imputed income and occupational expense will be a constant source of irritation. Glaring omissions that cannot possibly be reconciled with a welfare definition will always be encountered.

...To give only one striking example, the services rendered to consumers by the resources engaged in the...broadcasting industry do not appear in any of the existing measures of [GDP] even though that industry is just as important in providing recreational enjoyment as are motion picture theatres, etc. (pp. 103-104)

Jaszi goes on to review some attempts to establish a satisfactory criterion for distinguishing intermediate from final products, and he finds them all wanting.

...The reason for this impasse is that the proposed criterion involves the asking of a basic philosophical question which never is raised in economic theory, viz. what things are wanted "for their own sake", "are valuable in themselves", and what things are desired merely

because they are instrumental in getting other things. *Economic theory merely assumes that individuals will buy the collection of goods which maximizes their satisfaction. But it does not analyze the internal production process, as it were, by which consumers maximize their satisfaction; it does not attempt to distinguish between...raw materials in that process and goods that are "valuable in themselves."* Introspection will show that this question often cannot be answered.... (pp. 187-188, emphasis added)

The insoluble difficulties in the private sphere also exist in the public sphere, Jaszi maintains, offering the illustration of public education. Some people think it valuable for its own sake; others think it valuable for increasing earning power; and still others think it valuable for both these reasons. So, in the event that the government ceases to provide free education, and assuming that the consumption of marketed consumer goods is initially unaffected, it may be inferred that some, but only some, proportion of total public education is an intermediate good at that point in time. This raises a serious problem because:

...different individuals will feel differently about this matter, that the same individuals will feel differently about it at different times, and that most individuals...will not have a clearly defined attitude at all. *No objective measure can be constructed from this evidence.* Other examples of a similar nature would arise in cases when government provided free transportation to individuals. (p. 191, emphasis added)

Jaszi agrees that, as a practical matter and unlike firms, the government often cannot distinguish individual users from business users of a given service. (Nor should it do so, in his view, even if it could.) He sees no analogy between the supplying of government services and the allocation of certain costs, such as electricity, in a firm with two or more production divisions, each division producing a different and unrelated product from specific inputs that are also independent of the inputs of the other products. For the firm with this kind of production to allocate its electricity costs among its products is rational, but it would not be rational, in his view, if, instead of being different and unrelated, the firm's products consisted of joint products or a primary product and various byproducts. Such products are a set of two or more related products that emerge from the same inputs, and the output of the entire set increases when any of these inputs is increased. There is no rational reason to allocate the cost of any single input among such products, nor should overhead costs be allocated among them. Whilst some government services can validly be likened to products to which input costs can be specifically allocated, most

government services are analogous to joint products or primary and byproducts.

Like other analysts, Jaszi offers the example of national defence but, unlike many of them, as an input that serves more than one important end. Two of these are the preservation of liberty and the provision of the peaceful conditions essential to a stable and efficient economy. How then are the costs of national defence to be allocated between individuals and business? To ask this question, Jaszi argues, is to demonstrate its vacuity.

...[It does] not seem more reasonable than the question whether sunshine is desired for its own sake or because it facilitates production; and, if it is desired for both purposes, what is the proper allocation between business and consumers? Yet, in many studies, assignments of basic government functions either to business or to consumers, or allocations between the two, have been advocated or actually made. (p. 194)

Jaszi's broaching of the subject of cost-accounting for joint products and primary and by products is interesting and will be considered more fully in the paper's concluding section.

Jaszi also tackles the claim that including all government services in GDP involves double counting (since many of these services are allegedly intermediate goods) first by pointing out that national accounting with respect to the private sphere is itself hardly devoid of double counting.

His most basic rebuttal of the double-counting charge, however, runs along different lines. Analysts that decry government services as being intermediate products tend to conceive of a welfare measure as an stand-alone aggregate, calculated at a certain date, say a fiscal year end. This, in his view, is inappropriate, for the very good reason, allegedly recognized in economic theory, that an *absolute* welfare measure is conceptually impossible: only a *relative* measure is possible. We cannot speak, in other words, of this year's absolute level of welfare; we can only compare this year's welfare measure, say GDP, with last year's, and then say whether total welfare has risen or fallen during the year (presumably ordinally). From this perspective, the answer to the question of whether the inclusion in GDP of both cloth and the suits made from it distorts welfare measurement depends upon whether a GDP that only includes suits is the best basis for measuring relative welfare. Put another way, a GDP that includes both cloth and suits is certainly a GDP that includes an intermediate product, but this does not in itself suffice, according to Jaszi, to render it a flawed basis for measuring *relative* welfare, the only welfare that can validly be measured.

To further illustrate the complexity of the problem of satisfactorily delineating government services that are intermediate products, the inclusion of which in GDP distorts it as a welfare measure, Jaszi conjures up eleven different production scenarios involving cloth and suits, with various forms of government participation financed by various tax regimes. These are summarized in Appendix I.

Gilbert, Jaszi, Denison and Schwartz

Some of Jaszi's arguments are further developed by Gilbert *et al* (1948), which is specifically intended to respond to Kuznets (1948). Denying that a precise line between intermediate and final goods can ever be drawn, these American experts in national accounting suggest that most consumers' expenditures are not for "Sunday clothes and holiday dinners," which are obvious examples of "the good life" and, therefore, of final products. These other expenditures could as legitimately be viewed as having been made to maintain consumers' earning power as having been made for final consumption. Since much the same is true, in their view, of many business expenditures, conventions are needed in order to get on with calculating GDP, any version of which:

...must overlook the fact that the expenditures of individuals in their business capacity are influenced by their standards as consumers, and that the expenditures of consumers are influenced by their activities as producers. It must overlook also the fact that the conditions under which work is performed have an important bearing on the welfare on individuals. *These conditions are affected by business expenditures on goods and services that are classified as intermediate just because there is no satisfactory way to take account of their benefits in a quantitative measure of final output.* (p. 184, emphasis added)

As does Jaszi, Gilbert *et al.* dispute Kuznets's (later abandoned) claim that the classification of intermediate and final products can readily be extended to the sphere of government services. They deny, for example, that his "all types of economic legislation, administration, and adjudication" really are services to business. They regard them as being, instead, services to individuals.

...Activities such as regulation of security dealings, administration of anti-trust laws, control of child labor, provision of minimum wages, and regulation of public utilities are certainly services to the individuals that make up the nation. *Economic legislation generally provides rules for the operation of the private enterprise system in order that it may function with greater protection to the individual against fraud and the hazards of industrial life....* (p. 185, emphasis added)

Gilbert *et al.* also conjure up hypothetical examples to make their point. In one, the government supplies free flour to bakers, and they ask whether it would be double counting to include the government's purchases of flour in GDP. Since the flour is not a cost element to

bakers it does not enter into the market values of their final products: hence, the question must be answered negatively. Nor would there be double counting if, instead, the flour were distributed free to consumers and the government's flour purchases were included in GDP. They point out that if these flour purchases are not included in GDP, as some analysts propose, comparing two consecutive years, in one of which the flour is purchased by bakers and in the other it is obtained free from the government, would result in distortion.

They also reject Kuznets's (later modified) argument that many government services (e.g., to provide internal and external security) are not direct contributions to welfare because their purpose is to preserve the state of society in the context of the existing civilization. They point out that the costs of these myriad services are highly variable, because the circumstances that render them essential in the eyes of the government acting on behalf of society, are themselves highly variable. Succinctly put, different social needs demand different policy responses.

...For example, to decide whether armaments should be included in a measure of economic welfare it is not enough to consider the comparison of a peacetime situation with a wartime situation. One must also consider two situations in which there is a comparable need for armaments but a different quantity of armament production. *Under this circumstance, there is no question but that a larger war output means a larger measure of economic welfare. Omitting armaments from [GDP] would yield entirely false results for this type of comparison.* (p. 189, emphasis added)

The reality that social needs tend to change over time is of great analytical significance, in their view (as well as in the respective views of Hicks, Kuznets and others, as noted above): among other consequences, it precludes the making of intertemporal welfare comparisons. Consequently, although the costs of government services belong in GDP, any notion of using the temporal trend of GDP to measure the corresponding trend of society's level of welfare must also be abandoned. To express this strong conclusion in the conceptual terms of Hicks, Kuznets and the others, the analytical requirement that tastes and wants remain constant over the interval (one of their *sines qua non* of inferring changes in welfare from changes in GDP) is effectively incapable of being satisfied over an interval of any length.

Granted, Jaszi and Gilbert *et al.* have a profound knowledge of the practical exigencies and tradeoffs that routinely confront practitioners of the art of national accounting in situations in

which no fully satisfactory alternative exists. Nonetheless, some questions arise when considering their resolute defence of the *status quo*. One of these concerns the *net* magnitude of the accumulated distortions, in any given fiscal year, that result from the reporting inconsistencies they attribute to varying institutional arrangements in the production and delivery of consumer goods. Like the analysts they criticize, neither Jaszi or Gilbert *et. al.* provide any empirical evidence to support their position. If the accumulated distortions prove significant, it could be argued that the solution lies in correcting the accounts, not in perpetuating inherently dubious practices with respect to government services. On balance, however, their arguments add verisimilitude and weight to the case that man does not live by and for bread alone. Hence, government services that to a substantial degree serve purposes that have their own utility, a utility separate from and independent of that of consumer and investment goods, warrant their own place in a welfare measure, whether it be a measure of economic or of general and comprehensive welfare. Their arguments also serve collectively to give pause to analysts that are too zealous in pursuing the otherwise laudable objective of eliminating double counting of intermediate and final products from their respective GDP-derived welfare measures.

PART III

FURTHER ARGUMENTS AGAINST CONVERTING GDP INTO A WELFARE MEASURE

Okun

The pragmatic arguments just considered avowedly do not conceive of GDP as a welfare measure. Instead, they conceive it as an aggregate economic statistic generated by a national accounting system that records multifarious private economic activities, the most important feature of which is that they occur within the institutional structure of markets, along with most government expenditures on goods and services. Somewhat paradoxically, the enormous reliance upon GDP by a wide variety of analysts in business, government and academia has not resulted in correspondingly wide acceptance of this conception. Instead, according to Okun (1971), it often attracts a "fundamental criticism."

...Put simply...the criticism is that, even after correction for price and population change, [GDP] does not yield an unambiguous measure of national welfare; a rise in real [GDP] per capita does not necessarily mean that the Nation has become better off, nor does a decline imply that it has become worse off. (p. 129)

This criticism strikes Okun as incomprehensible.

...Obviously, any number of things would make the nation better off without raising its real [GDP] as measured today: we might start the list with peace, equality of opportunity, the elimination of injustice and violence, greater brotherhood among Americans of different racial and ethnic backgrounds, better understanding between parents and children and between husbands and wives, and we could go on endlessly. *To suggest that [GDP] could become the indicator of social welfare is to imply that an appropriate price tag could be put on changes in all these social factors from one year to the next....* It is asking...the national income statistician to play the role of philosopher-king...and it is absurd to suggest that, if the national income statistician can't do that job, the figure he writes for [GDP] is not interesting. (pp. 129-130, emphasis added)

Okun tackles head on the issue of "regrettable necessities," noting, as was discussed above in some detail, that it has been argued that these are not really final products and should, therefore, be excluded from GDP.

...Don't start down that path. If you should do so, regrettable and unnecessary as it would be, you would find it winds along forever. Physicians' services and all other medical care costs are obvious regrettable necessities. So are the services of lawyers, policemen, firemen, sanitation workers, and economists (including national income statisticians). So are heating and air-conditioning outlays. Except for the few people who live to eat, rather than eat to live food is a regrettable necessity. *Indeed, it is hard to imagine any output which clearly serves the purpose of pure, unmitigated enjoyment....* (p. 132, emphasis added)

Echoing Denison (1971), Okun now advances a rather profound consideration, which was alluded to earlier in the context of national defence and war risks.

...But even if you could invent some arbitrary definition that kept final-product consumption from falling to zero, the exclusion of regrettables would make no sense. *It would deny the distinction between meeting one's necessities or failing to meet them.* (*ibid.*, emphasis added)

Using the example of air conditioning, he argues that if it is a regrettable necessity to those who have spent money to obtain it, it is also a regrettable necessity to those who do not have it. Furthermore:

...it must have been a regrettable necessity fifty years ago when nobody had it. Excluding the services of such items as might be deemed regrettable necessities is palpably unsatisfactory. (p. 132)

In other words, to exclude regrettable expenditures from a welfare measure is to erase the difference between meeting social needs and not meeting them.

On the subject of externalities (e.g, environmental degradation), Okun notes that GDP has been criticized for its failure to capture them when they occur. He wonders, however, how this could be done "if the market and the democratic process don't generate the necessary price tags."

...[GDP's present rules] reflect the costs and benefits that society recognizes and responds to. If a ban is placed on activity that is inherently dangerous, or fees and taxes are imposed, [national accountants] will follow the signals and properly reflect them in [their] valuation of output. If society changes its mind. [they] will make...changes in [their] definition and coverage of outputs. *But any puzzles that arise concern the volatility of the Nation's collective judgment, not of [their] practices....* (p. 132-133, emphasis added)

He substantiates this point by referring to the national-accounting practice of excluding the output of illegal activity from GDP.

...[This practice] abides by the social judgment that some activities have such important negative externalities that they subtract from society's output even though somebody is willing to pay for them as an ultimate consumer. *However sensible or foolish it was for the Nation to decide that the sale of alcoholic beverages was illegal and then it was legal again, it was completely sensible for the national income accountant to follow these verdicts....* (p. 133, emphasis added)

These words are pertinent, but they are not the whole story. The wisdom or lack thereof of declaring certain expenditures legal or illegal has a bearing on the level of social welfare, as does the wisdom or lack thereof of the expenditures themselves. These matters will further be considered below.

It is precisely because Okun is so firmly convinced that GDP, however modified, is inherently incapable of serving as a satisfactory welfare measure, rather than because he fears that a modified GDP will deprive analysts of very useful information (which would still be available), that he so strongly opposes the very attempt to modify it.

...[A]s I see it, the big danger is that, by taking a few steps in the direction of an allegedly more comprehensive measure of welfare, a reformulation of the accounts might mislead the Nation into supposing that [GDP] was at last measuring social welfare. *And that would impede the progress which we so urgently need toward better measurement and evaluation of various changes in our social and physical environment, our health, and the diffusion of well-being across the country....* (*ibid.*, emphasis added)

Far from being something to deplore, GDP's unsuitability as a welfare measure is actually a matter of gratification to Okun.

In short, [GDP] is not the whole story of our society or even of our economy, *and no conceivable redefinition can turn it into the whole story*. National accountants can help put together some of the other pieces required...But [they] would not assist by compromising on the proposition that [GDP] is *not* a measure of total social welfare. (Emphasis in text.) *The beauty of [the present] practice is that no sensible person could seriously mistake [GDP] for such a measure.* (*ibid.*, emphasis added)

Denison

Denison (1971) shares Okun's opposition to the undeniably attractive and convenient concept of a single, generally accepted welfare index. If such an index could be constructed:

...A glance at it would tell us how much better or worse off we had become each year, and

each decade. We could judge the desirability of any proposed action by asking whether it would raise or lower this index. (p. 13)

To demonstrate the impossibility of constructing such an index Denison lists some of the social changes it would have to capture and the problems its compilers would face. He agrees that relative prices are useful gauges of consumers' relative preferences, and that they provide a sound basis for aggregating innumerable and disparate goods and services. He also endorses the value of measuring GDP at constant prices in order to shed light on changes in productivity. He cautions, however, against overburdening these positive features of GDP in vain attempts at welfare measurement, and in so doing propounds a very important theme that will be taken up below.

...[H]ouseholds, governments, and nonprofit organizations are regarded as the final users of the economy's output, and [GDP] measures the goods and services they buy. *How effectively they use their purchases is outside the purview of [GDP].* Soap, vacuum cleaners, washing machines, and the time of domestic servants bought by the housewife are measured, not how clean her house and linen may be. Similarly, the teachers' services, books, school buildings, etc., purchased by school systems are measured, as are the planes ammunition, and soldiers' services bought by the Department of Defense; *[GDP] does not tell us how much education and national security are obtained per dollar...of expenditures for such items.* (pp. 13-14, emphasis added)

Denison identifies some of the intractable problems that inevitably arise in any attempt to convert GDP into a welfare measure. One is the futility of any attempt to value government services by regarding governments as being, in effect, as he puts it, in the business of "selling" their services to the public. There is no acceptable way, in his view, of measuring "prices" of services such as education and defence, to speak only of these services. He is equally pessimistic about the feasibility of soundly, and generally-acceptably, measuring unpaid household services. Accounting for quality change is a third problem area, largely, though not entirely, due to the absence of an acceptable way of ascribing value to the ever-increasing range of new products that the economy generates: at present, no value is ascribed to this important and never-ending phenomenon.

Such [problems], which in my view are not remediable, limit the accuracy of real product as a measure of changes over time in the ability of output to satisfy our wants. Nevertheless,

real product is a very useful measure. *But to evaluate welfare we would need additional measures which would be far more difficult to construct.* (p. 14, emphasis added)

Denison identifies some of the many such measures, beginning with an index of real costs of production, which is necessary "because we are better off if we get the same output at less cost." Constructing it for, say, labour would require the "unreasonable" assumption that all changes, say increases, in required working hours per week cause equal burdens on all workers, irrespective of the numbers of hours they are already working. "A usable measure of the real costs of working would consider that the welfare benefits from working fewer hours decline as hours are shortened and may even disappear." Another dimension that would need to be captured is what is generally described as "working conditions," (the importance of which was recognized in a different context by Little, as noted above). Denison not only believes that the necessary data are lacking, but also that such highly complex variables as "the disutility of involuntary service in the armed forces" would need to be counted, along with the deaths and injuries suffered in the armed forces during both war and peace. Data on saving exist, but there is no measure of the real costs of what was once called "abstinence." Nor, in his view, does an acceptable way exist to combine the real costs of labour with those of abstinence.

To meet Denison's version of the familiar criterion of Hicks, Kuznets and the others, welfare measurement requires, in effect, measuring changes in the wants that goods and services must satisfy. This, he makes clear, is another very tall order. Consider the impact of population change, "now handled crudely" in per capita terms.

...[The assumption is] that, other things being equal, twice as many people need twice as many goods and services to be equally well off. Beyond this, an index of needs would account for differences in the requirements for living as the population becomes more urbanized or suburbanized; for the effect of weather changes on requirements for heat, air conditioning, and clothing; for medical requirements occasioned by epidemics or new diseases; and, most of all, for changes in national defense requirements. *Such an index would have to tell us the difference between the cost of meeting our needs to the extent that we do, in a base year, and the cost of meeting them equally well under the circumstances prevailing in every other year.* (*ibid.*, emphasis added)

Repeating one of the most serious of the reservations summarized earlier, Denison, like Okun, gives short shrift to arguments in favour of excluding instrumental or regrettable variables

from GDP.

...This procedure fails utterly. It yields the false result that we are equally well off whether, in the same circumstances, we ride or walk to work, freeze or are comfortable, do or do not obtain medical care when we are sick, or provide or do not provide for national security. *Needs and provision to meet them must be separately evaluated.* (p. 15, emphasis added.)

Put another way, the question is: if the expenditures made to satisfy certain wants is deemed regrettable, how much more regrettable should be the refusal to make them, and thus leave the wants unsatisfied, be deemed? As implied above, this question goes to the heart of the question of the feasibility of *any single* welfare measure.

Denison recognizes that measures of needs necessarily:

...shade into measures of the human and physical environment in which we live; perhaps it is here that the concept of economic welfare broadens to encompass "social welfare." (*ibid.*)

However, he strongly discourages optimism about the feasibility of incorporating environmental data and data on social pathologies into single a welfare measure. The data problems are enormously difficult, but they are less serious than two other problems, the first of which is the fact that technical relations between environmental conditions and welfare are usually nonlinear. This makes the relations very hard to analyze and assess in welfare terms.

...A little air pollution is harmless, more an annoyance, a great deal lethal. Discrimination against Jews by a random 10 percent of employers, landlords and operators of public places might be merely an annoyance to those affected; by 40 percent, a real hardship; by 90 percent, an economic and social catastrophe. (*ibid.*)

The second intractable problem arises from the fact that weighting is usually required:

...To combine robberies and murders in a crime index; to combine pollution of the Potomac and pollution of Lake Erie in a water pollution index [etc.]. An expert in the field may be able to provide judgments...that would permit an interesting index to be calculated. *However, the necessity for numerous individual judgments that are difficult to assess or even to describe must impair general acceptability of measures based on them.* (*ibid.*, emphasis added)

Already very complicated, matters become still more complicated when the construction of an index of indexes is contemplated. Denison flatly rules out the possibility of accomplishing such a

construction a generally-acceptable way. This prompts him to make another statement of special importance:

...I can imagine only letting each individual compute his own index with his own personal weights, and then averaging them. But even this procedure is almost sure to be biased because we are all concerned with the aspects of the environment that *currently* are problems. Who would now think to consider the dangers of attack by hostile Indians?...Even the very recent elimination of refrigerator doors that cannot be opened from within that cost the lives of so many children is almost forgotten....(*ibid.*, emphasis added)

As has been seen, the relevance of income distribution has been recognized by analysts since national accounting's earliest days. Denison endorses the centrality of some notion of the "goodness" of income distribution to any welfare measure but, unlike other analysts, he only does so to cite the lack of agreement as to the "ideal distribution from which departures could be measured" as further evidence of the inherent futility of attempts to construct such a measure. To round out his list of obstacles, Denison repeats the familiar observation that "tastes differ among individuals and change over time" and, then, touches on another consideration:

...I have not yet recalled that welfare is affected by people's perception of reality as well as the objective facts; one's fear of crime on the streets need not be closely related to actual risks. The authors of "Towards a Social Report" [U.S. Dept. of Health Education, and Welfare, 1969] stressed the need for attitudinal data to develop welfare measures. (*ibid.*)

Denison reiterates that even if the foregoing indexes (on real costs, needs, etc.) could be constructed, the absence of an acceptable weighting system rules out a composite index. "Certainly statisticians and social scientists are in no position to assign weights." He then extends this dilemma to the classic dilemma faced by all decisionmakers.

...Most decisions that might be made have favorable and unfavorable effects on various aspects of life. Decisionmakers must try to determine the favorable and unfavorable effects of alternatives and then decide their course of action. Economists [etc.] can help determine what the effects are likely to be, but the responsible decisionmaker must decide how [these diverse effects] balance out *and different persons will decide differently*. This is another way of saying that a generally acceptable weighting system does not exist. (*ibid.*, emphasis added)

There is some overlap among the views reported in this section but they are in many respects compelling, and they will be drawn upon in formulating and answering the questions

addressed in the concluding Part.

PART IV

CONCLUDING QUESTIONS AND ANSWERS

IS GDP AN ADEQUATE MEASURE OF ECONOMIC WELFARE?

If the term "adequate measure" is meant to refer to a measure that is suitable both for intertemporal comparisons, with respect to a given country, and international comparisons involving two or more countries, the answer is clearly no, on both counts. Taking the second comparison first, it is evident that even between societies that have a great deal in common, such as the Canadian and American, there will always be enough differences in tastes, wants and product mix to render at least somewhat dubious rigorous comparisons for even a single year based on their respective GDPs, let alone comparisons over longer intervals. As to intertemporal comparisons with respect to a given country, so onerous are the conditions that must be met before it can confidently be inferred that a given change in GDP *unambiguously* implies an analogous change (in ordinal terms) in economic (and therefore in general) welfare, that, Usher's more optimistic view notwithstanding, prudence dictates a negative answer. The same prudence dictates a negative answer ever more strongly the longer the interval of comparison. Whether a given requirement (say, constant tastes) is more or less onerous than another (say, full substitutability of goods) is immaterial. All the requirements must be met if comparative GDP is to provide a rigorous basis of comparative welfare, and the probability of that occurring, even over a fairly short interval, seems low.

It is important to recognize, however, that serious though these caveats are, they do not entirely deprive annual changes in GDP of normative significance. As Little and Kuznets both point out, each in his own way, a *substantial* annual increase in GDP would probably prompt most people to agree that most, though by no means all, members of society are, in varying degree, better off as a result. The normative significance of this agreement, though limited, is real.

Of greater, though still limited, normative significance is the fact that a given year's GDP is

produced by a national-accounting system designed to report the interaction of the main components of a market economy. Thus, GDP is the sum of the monetary values of innumerable, freely-made choices of individuals pursuing their own self-interests as consumers and/or entrepreneurs. In a different sense and to a lesser degree, the same may be said of the government expenditures included in GDP. Without endorsing the almost frivolous suggestion of Hicks (1940) that the expenditures of even the least representative of governments can ultimately be attributed to the choices of individuals, it is reasonable (with due regard for Arrow's impossibility theorem) to suggest that in North American and Western European democracies, such attribution is defensible. And without denying that the connections are sometimes tenuous, it is also a reasonable assumption that these market economies are sufficiently competitive to ensure that prices bear enough of a relationship to the corresponding marginal utilities to justify the preceding majoritarian welfare comparison.

Although these considerations increase the normative significance of substantial changes in GDP, that aggregate remains an inadequate welfare measure. One reason is the existence of significant market imperfections, be they restrictions on competition in specific markets or market failures of one kind or another. Another, and more important, reason is the fact that individual decisions, freely-made in markets for private goods though they may be, can be wise or unwise, far-sighted or short-sighted, and responsible or irresponsible with respect to the best interests of both the individuals themselves and the society to which they belong. Likewise, the volume of expenditures for government services, ultimately endorsed though it may be by collective decisions, provides no information as to the efficacy of the services. More generally, it is in the nature of both private-market transactions and the provision of government services that although prompted by individual and collective wants, they are both inherently incapable of illuminating either the circumstances that induced them or their consequences. These dimensions can only be indicated, and then only incompletely, as will be seen, by additional information, which for the most part is not generated by the national accounts.

CAN SOME OTHER MEASURE, DERIVED FROM GDP, SERVE AS AN ADEQUATE MEASURE OF ECONOMIC WELFARE?

In addressing this question, a great deal depends upon how the term "welfare" is understood. If it is understood as a generalized level of satisfaction of human wants, the caveats concerning changes in GDP that collectively disqualify them as a measure of a country's comparative-welfare trend, over more than a short period, apply *a fortiori* to measures derived from GDP. This remains true even if a distinction is made between "welfare" and one of its components "economic welfare," but the question takes on a different character. This difference was alluded to when N-T's MEW was discussed and it was noted that they do not delineate economic welfare from generic welfare. It was also noted that analysts belonging to their school implicitly couch the issue, not in the ordinal terms that characterize analyses of the Hicks-Kuznets type, but in cardinal terms. The caveats carefully developed by Hicks, Kuznets and the others, which collectively are so damaging to the enterprise of inferring welfare changes from changes in GDP, tend to go unrecognized (Usher is a rare exception), much less satisfied. To this worrisome situation must be added the concerns arising from various problematic components of their respective measures. Among the most problematic is the widespread exclusion of expenditures on many government services included in GDP. Whether these expenditures are described as "instrumental expenditures" or "expenditures on necessary evils," it is their involuntary character that allegedly disqualifies them. They are further disqualified by their alleged inability directly to produce utility.

Although these two disqualifying grounds tend to be combined by analysts of this school, they are in fact distinct. The second of these grounds were considered above with respect to national defence, a prime example of such a government service, and it was shown that they depend heavily upon the assumption that man lives by, and for, bread alone. Ignoring the very different treatment of business expenditures on fixed costs, which are no less indispensable to output and whose contributions to it are no less indirect, they insist that this renders national defence an intermediate rather than a final product. If, however, this unidimensional view of the human condition is rejected, the argument that, in addition to preserving productive capacities, national defence provides desiderata of great and independent utility (such as peace and liberty) comes into its own and implies that defence expenditures warrant inclusion in a welfare measure, economic or general, as fully as any others.

The first grounds were also considered above, and the key question was seen to be: which consumption expenditure is not incurred in response to a "necessary evil" of one kind or another? This is another way of asking whether there actually exist consumer goods that are not only final products which directly produce utility, but are also so luxurious and unessential that they are only purchased at the whim of consumers that can painlessly forego them. To put the question thus is to demonstrate that quite apart from the separate and rather profound concern (separately expressed by both Denison and Okun) about the evil informational consequences of obscuring the distinction between providing for necessities and failing to do so, very few, if any, commodities fall into that happy category.

In sum, together with the onerous caveats previously identified, these difficulties fatally undermine the grounds upon which rest GDP-derived economic-welfare measures that exclude instrumental expenditures, and the like. This leaves GDP standing supreme in the field of single measures, warts and all.

CAN ANY SINGLE MEASURE OF ECONOMIC WELFARE BE ADEQUATE?

This question may be reformulated as follows: can all the necessary components of a single measure of economic welfare be specified and quantified in monetary terms and, if so, can it be done *objectively*? The answer is again negative, for several reasons, some of which can (yet again) be exemplified by defence expenditures. To begin with the first subquestion, it was just noted that expenditures by individuals, whether acting as consumers or entrepreneurs, may be wise or unwise, responsible or irresponsible, and so on. So long as they are incurred for a "productive" reason, the expenditures qualify for inclusion in GDP (properly so, given GDP's officially avowed purpose of measuring output), but whether they increase or decrease society's economic or general welfare is another question altogether. It is not only true, during any given era, that one man's meat can be another man's poison, and it can also at the same time be the *same man's* poison, it is equally true that one era's meat can be another era's poison. Alcohol consumption and gambling are two obvious examples of expenditures that currently enter into GDP and which have both current and subsequent deleterious social consequences, some of which

also enter into GDP, sometimes (interestingly) positively, and sometimes negatively. Many analogous examples could easily be provided. Presenting a more complete welfare picture than emerges, even under the best of circumstances, from GDP alone requires that additional variables reflecting associated physical- and mental-health effects, and the like, be reported alongside it. Some of these effects can be quantified monetarily; others cannot.

To illustrate the latter, recall that both Hicks and Kuznets emphasize the importance of data on changes in income distribution to any assessment of the welfare implications of changes in GDP, and both analysts (one implicitly, the other explicitly) call for the reporting of these data as complements to GDP. Recall also that Little makes an analogous point pertaining to data on changes in working conditions that accompany changes in GDP. It is a common feature of both types of data that they cannot adequately be rendered in monetary terms alone: this is especially true of the latter type. Finally, it is enough to refer, without recapitulation, to Denison's grounds for concluding that a single welfare measure which transcends the subjective values and biases of the analyst that constructs it is inherently unattainable. The fact that his grounds (or anyone else's, for that matter) are not, and cannot be, exhaustive makes the case all the stronger.

HOW SHOULD ECONOMIC WELFARE BE MEASURED?

Parts of the answer to this final question can be found in the answers to the preceding ones. They establish that only a set of complementary variables can qualify as an adequate measure of economic welfare, but it can only qualify as a contender, one of several, perhaps many, for this is a contest in which there can be no undisputed champion. As will be argued forthwith, any proffered set of variables is bound to be, at least in part, both problematic and subjective, not only with respect to the identification and specification of its members, but also with respect to their valuation in monetary terms.

Little's view, mentioned earlier, with respect to economic welfare now requires closer scrutiny. He says:

...[I am] interested in *economic* welfare. There is no part of well-being called 'economic well-being'. If I am interested only in someone's economic welfare, then I interest myself

only in the economic things that may affect his well-being. (p. 6, emphasis in text)

"Economic things that may affect well-being" are better described as contributions to economic welfare.

The distinction between economic welfare and welfare *tout court* is not a factor in the analyses of Hicks, Kuznets and those who share their approach. These analyses involve a comparison between two levels of total private and public expenditures for alternative (or successive) combinations of marketable commodities and government services, because their normative relationship is expressed ordinally, there is no need to consider, let alone measure, the absolute levels of welfare associated with the combinations of commodities and government services. Matters are very different indeed in the case of the genre of measures exemplified by NT's MEW.

If we accept Little's view that economic welfare is meaningfully conceived only in terms of economic contributions to welfare, we must reckon with the fact that, as Jaszi points out, government services often produces two or more products jointly, whose contributions to welfare often fall into more than one category. (National defence, which produces peace and liberty, while preserving the economic structure, is an obvious example.) Going beyond Jaszi's discussion, it should be recognized that when contemplating an input that produces joint products or byproducts (and there are many such) from a reporting standpoint, it is necessary to know in advance which category of contributions to welfare is the primary one. In the case of joint products, sound accounting practice requires that the costs of the inputs be prorated among the products. In the byproduct case, the entire cost of the input must be attributed to its primary product, whose total cost is then reduced by the combined market value of the other products. The question thus arises as to the criteria by which one of the perhaps several categories of contributions to welfare jointly served by a given government service should be given primacy.

It is very doubtful, however, that Little's view is operationally sound. If economic contributions to welfare exist as a distinct category, so do cultural contributions, physical and health contributions, and many other contributions exist. Is it meaningful to differentiate, for purposes of welfare measurement, between categories of contributions to welfare in the expectation that all human wants are such that their satisfactions are scientifically measurable?

Put another way, is it possible to develop not only a generally-acceptable taxonomy of categories of contributions to welfare but, also, a generally-acceptable list of their respective components? Little may usefully draw a conceptual distinction between categories of contributions to welfare and welfare itself but, because he adheres to the subjective-valuation-of-combinations-of-commodities school of thought, he has no need to establish that his distinction is operationally sound. Analysts not so happily situated must face the fact that it is highly unlikely that the development of a generally-acceptable taxonomy of categories of contributions to welfare is a realistic project.

Fortunately, there is no need to undertake it. The variety of rubrics under which contributions to welfare can be categorized is substantial, but most contributions have in common the fact that they can only materialize, in economies such as ours, through economic transactions that have been consummated in markets. When we purchase theatre or concert tickets we make cultural contributions to welfare, to utilize Little's distinction. When we purchase memberships in health clubs we make physical or health contributions to welfare, and so on. It may well be that as a result of these and other contributions to welfare, we become happier and healthier people, able to perform our jobs more efficiently than before, in spite of the fact that when we decided to make them we did not do so for that reason. If the fact that these contributions to welfare belong to different categories is subordinated to the fact that they are all manifested by economic exchanges, and (Little to the contrary notwithstanding) they are therefore classified as economic contributions to welfare, or simply, in N-T's terms, as economic welfare, the number of purely noneconomic contributions to welfare shrinks into relative insignificance. On the other hand, not only has the number of human wants whose degree of satisfaction warrants recognition in a measure of economic welfare greatly increased, so has the complexity and subjectivity of the measure. If, irrespective of its immediate purpose, every transaction is deemed to be a contribution to economic welfare simply because it is a transaction, then the sky is virtually the limit.

Laidler (1985) invokes Adam Smith's concept of *homo oeconomicus*:

...[He is] a simple creature. The self-interested acts of producing, trading, and consuming scarce goods are the sum total, not just of his economic life, but of his social life as well.

His general welfare is identical with his economic welfare.... (p. 7, emphasis added)

By contrast, *homo oeconomicus's* more realistic, and far more complex, counterpart, *homo sapiens*, must be contemplated in more comprehensive terms.

...In particular, his economic welfare, conceived of as the satisfaction he obtains from the consumption of goods and services (net of the effort put into obtaining them) is only one aspect of the welfare that should concern us when we discuss the design of social, political, and economic institutions and policies. Freedom has many dimensions that are important for individuals apart from the freedom to exchange goods and services in the market place; equality has many dimensions apart from the equality of income and wealth. (*ibid.*)

But, Laidler insists, the economic and noneconomic spheres are not mutually exclusive and independent of each other.

...[A]ny conclusions we may reach about...enhancing economic well-being by taking or not taking particular actions, must be subjected to questions about their continuing validity when the pursuit of non-economic ends is taken into account, before they are accepted as providing a firm basis for policy actions.... (*ibid.*)

By referring only to freedom and equality as ends that fall under the noneconomic rubric Laidler implies that the economic rubric subsumes most, if not all, other ends pursued by *homo sapiens*. And by insisting that the criteria for assessing the validity of economic behaviour must include these noneconomic criteria, he also legitimates "economic-welfare" measures (in this context, the terms "welfare" and "well-being" are synonymous), like that of Osberg (1985), about which more shortly. This is tantamount to endorsing the just-summarized notion that all human needs which can only be satisfied, in a market economy, by households engaging in consumption spending are, therefore, economic needs, and their satisfaction increases economic welfare. Such expenditures obviously go far beyond those made to obtain the wherewithal to earn a living; they include all goods and services purchased in the market place, be they cultural, recreational or anything else. However, whilst this approach endorses N-T's description of their welfare measure as a "measure of economic welfare," and the other analysts' analogous descriptions of their respective measures (although giving no support to the notion of instrumental or regrettable expenditures), it subjects all such measures to additional constraints, as will be seen forthwith.

It also exposes a serious limitation of this genre of welfare measures. The only market of

which they take serious cognizance is the market in which households spend money directly, to satisfy various perceived needs by means of *private* goods and services. But another market, which is just as real, tends to be ignored by the measures. This is the market in which the collectivity of households that comprise the nation simultaneously spends money indirectly, via the government, to satisfy other perceived needs by means of *public* goods and services. If spending is to be the crucial criterion, the spending that takes place in the latter market is as relevant to the measurement of economic welfare as the spending that occurs in the former market, although the commodities naturally differ. (It is in the nature of private goods that every unit consumed by a given consumer reduces the supply available to all other consumers; by contrast, it is in the nature of public goods that they are consumed simultaneously by every consumer, and the units consumed by any one of them leave undiminished the supply available to all the others.) The important consideration for our purposes is the fact that expenditures in both markets represent more-or-less deliberate choices by households, whether wearing their consumer hats or their citizen hats. As Kuznets (1933) argues, collectively-consumed commodity are as deserving of inclusion in an economic-welfare measure as any other commodity, whether privately or publicly produced. Interestingly, in spite of its importance to their approach, the expenditure criterion is not always adhered to by analysts of this school. As will shortly be illustrated with specific examples, alternative measures of economic welfare commonly include differing (and often negative) amounts not reflected in market transactions but nonetheless deemed pertinent.

The challenge of dealing with distributional equity is among the most important of the constraints upon the measures under consideration. Laidler links the development of economics as a discipline with utilitarian philosophy, a philosophy that:

...requires us, as a matter of moral principle, to regard all individuals as having equal capacity for enjoyment and suffering, and to regard social welfare as being synonymous with the sum of individual welfare...*At the very least, we are compelled to regard those changes which enhance the economic welfare of the poor at the expense of the rich as being superior to those which have the opposite effect, always provided that there is nothing to choose between them on other grounds.* (p. 9, emphasis added)

These words underscore, albeit for a different reason, the Hicks-Kuznets view that changes in income distribution must be reported as complements to changes in GDP, so as to permit an

assessment of the welfare implications of the latter changes. They also underscore Little's more general view that the very concept of welfare is at bottom an ethical one. As will be seen, however, these views do not constitute the last word on the subject.

Before considering Osberg's measure, another of Laidler's observations is worth noting.

The economic well-being of any society is multifaceted, and it would be surprising indeed if there were any simple formula for the organization of economic life that would ensure that it is always maximized. *Indeed, given the complex nature of economic well-being, it is a mistake to think in terms of having some easily measured achievable maximum value about which everyone can agree.*

Nevertheless, the fact that an unambiguous and universally acceptable standard of assessment is not always and everywhere available is no excuse for taking the nihilistic approach to the problem of judging the consequences of varying changes for economic well-being. (p. 11, emphasis added)

In quoting Adler (1982) as follows, Osberg explicitly recognizes the relevance of the first of these caveats.

...There is an almost unanimous agreement among social indicator workers that it is neither practical nor theoretically desirable nor analytically sensible to have one measure of economic welfare. (Osberg, pp. 72-73)

Osberg also draws attention to some of the pitfalls of expressing in average terms important components of economic welfare, like GDP, and suggests that public discourse on economic issues will benefit if people are enabled to look beyond the averages. Public discourse will also benefit if:

...we could consider separately each aspect of well-being *and assign the weight each of us considers appropriate...*

However, Osberg proceeds to discount this point by completing the preceding sentence with the following words:

...but public debate will not be assisted by an incomprehensible deluge of esoteric statistics. (p. 73, emphasis added)

Such is the choice, according to Osberg, that confronts the analyst seeking to convey the level of economic welfare at any given time, as well as changes therein over time: either present a

single measure reflecting both the analyst's personal conception of each aspect of economic welfare and the weight he assigns to it, or present a flood of statistics no nonspecialist can hope to comprehend. Osberg does not explain why he sees only this one stark choice, a dichotomy not necessarily seen by the large "nearly unanimous" group of analysts he mentions. More particularly, he does not explain why each analyst should not present his personal set (which need not be a flood, by any means) of unweighted statistics, such that each member of the set is fully comprehensible to the celebrated intelligent layman. This approach would encourage the latter to decide for himself whether the set and its members are satisfactorily specified and measured, and, no less importantly, also to assign his own weights to each member.

Before considering the question of which approach places the more onerous burden upon the intelligent layman, return to Osberg's measure, which he labels "index of economic well-being" (IEW). Four "main dimensions" of IEW are identified: the aggregate flow of effective consumption, net additions to the stock of productive resources, poverty/inequality of lifetime income, and economic insecurity in year-to-year income flows. Briefly, the first includes the (per capita) sum of consumption of marketed goods and consumption of household production, leisure and other unmarketed goods; the second includes the sum of business and personal capital formation, net accumulation of training and R&D investment, net changes in the value of natural resource stocks, environmental costs and net foreign debt; the third includes a poverty measure consisting in income shares, the fraction of the population with an average income below the median income, along with income needed to raise all poor households to a poverty-level income; and the fourth includes the level and rate of increase of unemployment, the percentage of the labour force that can expect over-twenty-percent variations in average real income, and the change in the rate of inflation.

There is only space here for a few brief comments on IEW, of which one of its several striking features is the fact that national-defence-type expenditures are excluded but, paradoxically, not personal spending on locks, burglar alarms, private security guards, and the like. Nor are private burglary and theft insurance excluded along with the business equivalents that enter into the prices of consumer and investment goods. Defence-type expenditures are declared to be made entirely made to acquire "bads...in the hope of avoiding something worse,"

but it is not explained why the avoidance of a worse "bad" is not itself a "good." Osberg goes so far as to declare categorically that people will not feel better off if increased spending on police protection reduces their holiday time in the Bahamas, although it is not obvious that, given the choice, a reduction in police protection that allows them more holiday time in the Bahamas, at the expense of more muggings and burglaries at home, will be preferred by these same people. More generally, Osberg does not deal with the reality that there are unavoidable tradeoffs between the desiderata of holidays and security (to mention only these), and that different combinations of them will be evaluated differently, both at a given time and over time, not only by individuals but by communities. Granted, all this renders the task of placing a value upon any actual combination very difficult indeed, but that is all the more reason to put the problems on the table, as it were, not in order to declare the situation hopeless, but to see what can be done in spite of them.

Like other analysts of his school, Osberg takes no cognizance of the highly varied, not to say anomalous, treatment, so laboriously set forth by Jaszi and Gilbert *et al.*, which national-accounting conventions afford economically-similar transactions completed at different points in time. At the same time, Osberg implicitly deems all private expenditures on consumption and investment goods irreproachable from an economic-welfare standpoint.

Osberg justifies his inclusion of an income-inequality measure, not in the technical terms of Hicks and Kuznets, but in ethical terms. He declares himself an adherent of the theory of justice of Rawls (1971), which places a premium on alleviating the poverty of the poorest members of society. However, as Laidler makes clear, other reputable theories of distributive justice also exist (e.g., those of Nozick (1971), Dworkin (1981) and Gilder (1981)), which have different implications for the measurement of economic welfare. An indication of the range of thoughtful opinion on the subject is given by following quote from the Encyclopedia of Philosophy (1967).

...Questions of [distributive justice], according to Hume, Mill and others, presuppose conflicts of interest; there would be no point in talking about [it] but for the limitations of human benevolence and the competition for scarce goods. *[Distributive justice] presupposes people pressing claims and justifying them by rules or standards....*

Whereas, the Encyclopedia continues:

It would be generally agreed that doing [distributive justice] means treating equals equally

and unequals according to their relevant inequalities. *Disagreements arise over the criteria of relevance -- that is, over the rule to be applied.* Distribution (for example, of income, taxation, social service, benefits, rations) may be organized on any of at least three principles of justice: arithmetical equality, merit (or desert) or need.... (p. 301, emphasis added)

The important point in the present context is that oceans of thoughtful ink can be, and have been, spilt, first in defining equality and degrees of inequality, merit and need, and, then, in developing distributional-equity arguments under these rubrics. It is no reflection upon Osberg's Rawlsian approach to say, first, that it is far from having the field to itself and, second, that the intelligent layman contemplating IEW is likely to be aware of this fact.

Taken as a whole, IEW is a mixture of approaches, all of them subjective but in different ways. On the one hand, the subjective choices of individual consumers and entrepreneurs are taken at face value. On the other hand, important government services are deemed unhelpful to economic welfare, a specific theory of justice is invoked, and economic insecurity is deemed inherently deleterious (presumably, whatever its level). Each of these positions is in its own way and in varying degree far from unanimously held. Then, each of Osberg's four "aspects of economic welfare" is assigned a weight, again according to his personal ranking, and aggregated to produce IEW.

To further demonstrate that singularity and subjectivity are the order of the day when it comes to measures of economic welfare, however labelled, consider two additional recent measures. Cobb and Cobb (1994) present their "index of sustainable economic welfare (ISEW), describing it as a "Green GDP" namely, a GDP adjusted to reflect environmental and other factors ignored by GDP. Its details can be found in Appendix IV. As usual, the measure's starting point is consumption expenditures, but these are weighted by the authors' own index of distributional inequality. The weighted consumption expenditures are then increased or decreased by a series of amounts deemed to be the values of factors ranging from household services, through public and "private defensive" expenditures on health and education, expenditures on advertising and the costs of auto accidents, to various environmental costs, including loss of wetlands and farmland. Apart from the weighting for distributional inequality, all other components of ISEW are unweighted monetary values.

ISEW's slightly later "successor index" namely, the "genuine progress indicator" developed

by Cobb, Halstead and Rowe (1995) omits some items included in ISEW and adds positive or negative amounts for the new value of volunteer work, as well as for the costs of crime, family breakdown, and underemployment. As before, only consumption expenditures are weighted.

It is enough to set the respective components of NT's MEW, Osberg's IEW and the Cobb's ISEW side by side to show that, specification and measurement problems apart, there can be little in the way of social phenomena that could not plausibly be deemed either a social pathology or its opposite and, therefore, suitable for inclusion in a measure of economic welfare. This problem is quite separate from the problem of the propensity of analysts to prefer radically-different ways of addressing similarly-described phenomena. To illustrate, MEW, on the one hand, and these two measures, on the other, purport to capture the dimension of "sustainability, but they go about it in ways that differ so profoundly that it is hard to imagine that their respective authors are contemplating the same thing. Analogous incompatibility and noncomparability attend the treatment of health and education expenditures. The enormous overall incompatibility and noncomparability of the measures under consideration can be seen in Appendix IV, which lists the variables that comprise them.

It cannot be too strongly emphasized that none of the foregoing caveats and criticisms is intended to imply that efforts to measure social welfare, and changes therein, are foredoomed to failure and should therefore be abandoned. Far from it. Just as people need an analogous sense with respect to the body politic, they need a sense (based upon more than the evidence of their personal experience and hearsay) as to whether, overall, things are getting better or worse in the body socioeconomic. They will satisfy that need in one way or another; and, just as the absence in the public domain of an authoritative single measure of political welfare is not, and should not be, cause for concern, neither should the prospect that an authoritative single socioeconomic measure is unattainable be alarming.

Every individual ultimately assesses the trend of the nation's political health, at a given time, by looking at those variables he or she considers both relevant and significant, weighted on the basis of his or her personal value system and, doubtless, the variations among individuals of these variables, and especially of their weights, are as great or greater than those of the socioeconomic variables and weights under consideration. The resulting assessment (presumably in ordinal

terms), represents the individual's judgment as to whether, on balance, things political are "better" or "worse" than they were "last year." So, analogously, must individuals assess, for themselves, economic welfare and its trend, not on the basis of a generally-acceptable single measure (no such measure exists, or is ever likely to exist) but on the basis of a self-chosen set of variables, subjectively weighted. The members of that set may or may not all exist in the public domain, but that consideration is secondary to the fact that it will be an individually-chosen set, subjectively weighted and not easily comparable in ordinal, still less in cardinal, terms with the sets chosen by other individuals.

To demonstrate the inevitability of such an outcome, return to our intelligent layman, still trying to form an informed opinion on how things are going socioeconomically, only now he is contemplating not only Osberg's IEW, but, also, the other two measures whose components are listed in Appendix IV. Assume that these three measures are the only ones available. What is he to make of them, since it is altogether likely that if he does not deem relevant all the listed variables, he deems many of them relevant, and he also deems relevant other variables that none of them lists? Since the "bottom line" values of the measures are fundamentally noncomparable, he is likely to disregard them. What he is bound to do is to collect together those listed variables that he deems relevant and, if he agrees with them, he will collect their assigned monetary values as well; otherwise he will supply his own estimates. He will also collect those variables not listed that he deems relevant, along with their respective values that he considers plausible. Finally, he will assign to every one of these values the weight he considers appropriate, whatever the listed weight. The end result will be the personal index that forms the basis of his judgment as to the trend of the country's socioeconomic health.

If this reasoning is correct, the most sensible approach to welfare measurement, whether welfare is defined broadly or narrowly, must be this: to a large extent, the assessment of welfare, like the assessment of beauty, is for the eye of the beholder. Therefore, let a hundred measures bloom, but let none claim that it, alone, is the truth, the whole truth and nothing but the truth.

APPENDIX I

INDEX NUMBERS AND THE MEASUREMENT OF CHANGES IN THE LEVEL OF ECONOMIC WELFARE

Hicks

Using Hicks's notation: let $E = (\sum p_2 q_2 / \sum p_1 q_1)$ represent the index number of money expenditures at the second date, using the expenditures of the first date as the base; let $L = (\sum p_2 q_1 / \sum p_1 q_1)$ represent the (Laspeyres's) index weighted by the quantities of the first date; and let $P = (\sum p_2 q_2 / \sum p_1 q_2)$ represent the (Paasche) index weighted by the quantities of the second date. The criterion for a higher welfare level at the second date thus is $\sum p_2 q_2 > \sum p_2 q_1$, which implies that, after dividing by $\sum p_1 q_1$, $E > L$. The criterion for a higher welfare level at the first date is $\sum p_1 q_1 > \sum p_1 q_2$ or $1/\sum p_1 q_1 < 1/\sum p_1 q_2$, which implies, after multiplying by $\sum p_2 q_2$, that $E < P$.

Hicks identifies four alternative situations. One, E may be greater than either L or P , which means that welfare has increased. Two, E may be less than either L or P , which means that welfare has decreased. Three, E may be less than L and greater than P , which means we cannot categorically say whether welfare has increased or decreased. Four, E may be greater than L and less than P , which means, absurdly, that welfare has both increased and decreased (Hicks suggests that the underlying problem here is that wants have changed).

Expanding upon the third situation, Hicks recognizes that although sufficient information is not available to enable us to identify them, there usually will exist some values of $E < L$ that indicate an increase in welfare and some values of $E > P$ that indicate a decrease. Thus, it is justifiable to suggest that welfare has probably increased when E is only slightly less than L , and that welfare has *probably* decreased when E is only slightly greater than P . "This is as far as we ought to go."

APPENDIX II

SUMMARIZED SCENARIOS INVOLVING INTERMEDIATE PRODUCTS, FINAL PRODUCTS AND GOVERNMENT SERVICES

The following alternative situations are conjured up in Jaszi (1946) to convey an important message. The problem of differentiating intermediate from final products when calculating GDP for purposes of welfare measurement, especially in an economy in which production processes change over time and in which the government participates by supplying (or not supplying) certain services, is considerably more complicated than is generally recognized.

I - There are two firms, one producing cloth, the other producing suits made from the cloth. Labour is the only other input and government is not a participant. Everything is straightforward and there is no double counting in GDP.

II - Hitherto unemployed workers are now employed to double the work force, and GDP therefore doubles. Government is still absent from the picture. Everything is still straightforward and there is no double counting.

III and IV - The government takes over the production of cloth and provides it free to the firm producing suits, which reduces its prices accordingly. If Scenario I and Scenario II are both replayed under this arrangement as Scenario III and Scenario IV respectively, Scenario IV's output in terms of the output of private business is double that of Scenario III. If an index of output is constructed for these scenarios, and the intermediate product provided by the government is included, it too shows an increase of 100 per cent, whether or not the government's production of cloth is included in GDP. (These results are independent of the particular form of taxation the government adopts to finance its cloth production.) Says Jaszi:

...The purpose of this example is to show that the counting of government intermediate output *per se* does not result in duplication, although this belief is...fostered by many current statements...." (p. 205)

But that is not the end of the story, because national accounting that included intermediate product in GDP would produce a distorted picture of relative welfare in these two scenarios .

Remember that suit prices fell in response to the provision of free cloth (although consumers' welfare in term of suits was unaffected thereby), and if the value of those suits in constant dollars were now augmented by the value of the governmental intermediate product, the sum would show an increase in consumers' welfare that is really spurious. This result puts in question the preceding statement that the inclusion of the intermediate product does not distort welfare measurement.

V - Jaszi now hypothesizes a situation in which, instead of the government producing cloth and providing it free to suit makers, consumers now buy their own cloth and hire suit makers to convert it into suits. As they did when the cloth was supplied free by the government, the suit makers reduce their prices accordingly. Standard national accounting does not treat such a decrease in suit prices as a genuine price decrease: real output of suits is deemed to have fallen commensurably, and the cloth purchases are included in real GDP. The government case should be handled in exactly the same manner.

There is no justification for adopting a technique of deflation which is not employed in the private sphere, and then correcting for the misleading result by adjusting the current dollar value totals. (p. 208, emphasis added)

VI - A production process different from the one implicitly assumed in the preceding scenarios is now hypothesized. Suit makers both produce suits and deliver them to customers, employing transportation as well as production workers. Suit prices rise to reflect delivery costs.

VII - An adverse change in transportation conditions is now hypothesized, which forces the suit maker to transfer some production workers to the delivery function. This in turn results in both reduced suit production and higher suit prices. Deflation of these current prices will show that total suit production has fallen.

VIII - Revert to the conditions in VI and assume that the government provides free transportation to suit makers. (As before, the outcome is independent of the form of taxation with which the government finances this service.) Suit makers reduce their prices accordingly and produce the same number of suits as in VI.

IX - Assume the adverse event described in VII, but this time it is the government that transfers workers from suit production to the provision of transportation services (increasing taxes to

finance the transfers). Suit production falls, although suit prices remain unchanged. Real GDP has fallen, a fact that would be obscured if the intermediate product supplied by the government were included in GDP. That, however, would be considered double counting.

X - Assume a regime under which transportation services are bought by consumers from a transportation firm. Real GDP now consists of both transportation services and suits.

XI - Now assume the adverse transportation event described in VII occurs under the regime in X, and it again causes workers to be transferred from suit production to the provision of transportation services. Suit production naturally falls, although suit prices remain unchanged. Jaszi points out that, logically, there is no more justification for including the transportation services bought by consumers in GDP than there was for including it in the circumstances described in IX, when it was acknowledged that doing so would result in double counting. Here, too, suit production is reduced, exactly as it is in IX, but standard national accounting includes the transportation services in GDP, which it refuses to do in IX. In Jaszi's words:

...Counting the service charges of [the transportation firm] obviously leads to duplication: the welfare of the consumer is exaggerated. But in fact this line of argument is not adopted. There is no suggestion to omit payments to [the transportation firm] from the current value figures in order to avoid duplication. *There does not seem to be any reason for adopting a different procedure if the threatened duplication is in the sphere of government.* (p. 813, emphasis added)

APPENDIX III

SOME FURTHER THOUGHTS ON DEFENCE EXPENDITURES

Varied and contentious though it is in many respects, the discussion in the literature of the proper place of defence expenditures in a welfare measure generally assumes that the expenditures serve to protect and preserve (i.e. leave unaltered) the “sum of things,” be it the economy’s productive capacity or that capacity plus various social values, such as peace, liberty, justice, and the like. As was foreshadowed above (in the suggestions that the impact of a given level of expenditures upon national security depends upon the reactions of other countries), this static view of the impact of defence expenditures seems inadequate: defence expenditures generally change the “sum,” either for the better or for the worse. Though not impossible, the mere-preservation impact (i.e. no change) is highly unlikely. Granted, as indicated above, all expenditures are capable of proving wise or unwise, responsible or irresponsible, constructive or destructive, and so on, but these contingencies are so much greater in the case of defence expenditures that they warrant special attention in a discussion of the measurement of welfare. This paper is hardly the place to attempt a proper discussion of the implications of this highly complex situation; but a few basic considerations, some of them prompted by N-T’s assertions, can tentatively, and somewhat speculatively (hence this appendix), be sketched.

At any given time, a country's national security depends upon the degree to which it faces two risks: the risk of becoming involved in a war and the risk of defeat in it. Both risks are sometimes inversely related to the country's defence expenditures, as when the truth of the old adage, if you want peace, prepare for war, is confirmed; and sometimes they are directly related, as when the very preparations for war increase the probability of its occurrence. The awkward fact is that a given change (in either direction) in a country’s defence expenditures will, in some circumstances, influence other countries in a way that increases its national security and, in other circumstances, influence them in a way that decreases it. There is no general case. Taking no cognizance of these considerations, N-T flatly deny that American national security increased substantially during their long interval of observation, 1929-1965, leaving the reader free to infer that it remained fairly stable over these years. Precise and objective assessment of either risk is

impossible, so there is no way of determining the overall relationship, during that interval, between American defence expenditures and American national security. Still, the questionable soundness of their categorical judgement becomes apparent when the interval is divided into subintervals during which events of tremendous and world-historical import first loomed and later occurred, events like the Second World War.

N-T's more general reasons for excluding defence expenditures from MEW refer only to the event, war, not to the risks of war that are the true concomitants of their so-called "deterioration in the environment;" and their analysis suffers as a result. As they suggest, national accounting automatically captures the fruits of technological progress, managerial innovation, a new mineral discovery, improved weather, and the like, but a change, say an increase, in the risks of war is not analogously reflected, even though welfare is as reduced by this change as it is increased by the others. Since risks of war are contingencies and not actualities that are sooner-or-later manifested in transactions, welfare, as measured by MEW or any comparable measure (including GDP), reflects neither the true economic cost namely, the present value of the expected economic costs of war, borne by a country exposed to them nor, more pertinently, changes in it. Nor, by the same token, does any such welfare measure capture the true economic gains that accrue when defence expenditures reduce this cost. These unreflected gains are fully as real as the corresponding, and reflected, gains attributable to the other, positive "environmental" changes identified by N-T.

This rudimentary sketch of the effects of defence expenditures upon national security and upon actual (as opposed to "measured") welfare also allows parenthetical clarification of another case mentioned by N-T. In it, in contrast with the preceding case, increases in both measured and actual welfare are associated with reduced defence expenditures. N-T contend that an arms control agreement or a disarmament agreement that frees economic resources (which presumably would otherwise be devoted to national defence) and raises consumption by 10 per cent, increases welfare just as much as do new industrial processes. It should first be noted that an arms control agreement and a disarmament agreement generally do not affect defence expenditures in the same way. The former generally freezes defence expenditures at existing levels, the latter generally reduces them; this makes it the only kind of agreement with the potentiality of increasing

resources available for consumption. What is more important, however, is the fact that the increase in welfare is really due to the prior reduction in the risks of war, rather than to the disarmament agreement that reflects and formalizes that reduction, a fact that N-T do not recognize. National accounting has no way of capturing this fact, nor has any welfare measure that ignores contingencies.

To repeat, a given level of defence expenditures is as capable of reducing national security and, therefore, welfare as it is of increasing it. The intangibility of the relevant factors greatly complicates matters from a welfare-measurement perspective, for, as indicated, it is virtually impossible to measure objectively the war risks facing a country. They are functions not only of the relative military capacities of that country and its potential enemies, but also of the enemies' intentions. Estimating the former is usually a fairly manageable task, estimating the latter usually is not. It is also impossible to estimate objectively the present value of the expected costs of war. All this makes it impossible to assign a generally-acceptable monetary value to the impact of a given level of defence expenditures on that year's welfare, a conclusion that applies equally to all the definitions of economic welfare discussed above.

Referring to the increase in American defence expenditures over their 36-year period of observation, N-T also say that:

...It is patently...reasonable to assume that the rise in expenditure was due to deterioration in international relations and changes in military technology. The cost of providing a given level of security has risen enormously. If there has been no corresponding gain in security since 1929, the defense cost series is a very misleading indicator of improvements in welfare. (p. 8)

One can agree with these words and still insist that they do not add up to an argument for excluding defence expenditures from the measurement of welfare. It is undeniable that military technology developed spectacularly during these years, as did its cost, but what matters is that the technology's destructive capacity, expressed in terms of economic damage, also increased, if anything, even more spectacularly. Hence, even if war risks were the same in 1965 as in 1929 (they were not), the present value of the expected economic cost of war was far higher in 1965 than in 1929. Nuclear weapons existed in 1965. This conclusion would probably hold even if it were argued that the balance of terror that existed in 1965 between the democratic and communist worlds implied the existence of lesser war risks than before, so great was the increase

in the destructive capabilities of weaponry. To put it in more general terms, even when war risks hold constant the economic stakes of war grow as the destructive power of weaponry grows, which means that national security decreases. The only way to maintain a constant level of national security is somehow to accomplish a reduction in war risks that is proportionate to the increase in the destructive power of the weaponry available to potential combatants. Although it is trivially true that a defence-cost series is, in itself, a very misleading indicator of improvements in welfare, as N-T maintain, their supporting arguments fail to illuminate many factors that must be reckoned with. Among these highly-complex factors are two related ones: first, the development of military technology has proven, at least for the major powers, to be a rich source of technological innovation in nonmilitary fields (e.g. health care); second, that many military facilities (e.g. airfields, shipyards, tank factories, etc.) are dual purpose. They can as readily be used for civilian as for military purposes, and often are.

How, then, in the face of these formidable problems, should defence expenditures be reported in a welfare measure, whether welfare is conceived broadly, in terms of general welfare, or narrowly, in terms of economic welfare (however the latter is defined), given that they are not to be excluded? Since the soundest approach conceptually (to proceed as recommended by Hicks, Kuznets and Little with respect to GDP and income distribution, and complement defence expenditure data with data on the associated change in national security) is not feasible, the question really is one of choosing the least unsatisfactory alternative. To adopt the approach recommended by Jaszi and (with minor reservations) Kuznets is in effect to assume that whatever the actual level of defence expenditures, it has been well calculated to maintain the existing level of national security. The trouble with this approach is that, all too often in this century alone, it became apparent to everyone retrospectively (and was apparent to some at the time) that the expenditures were badly calculated for that purpose. Consideration might therefore be given to complementing the expenditure data with the best available data on the defence expenditures of potential enemies and allies. This would be better than nothing, although there should be no illusion about the fact that without (unavailable) data on the associated change in national security, the picture is incomplete and, in some situations, misleading. But perhaps it is now more complete and less misleading than it would otherwise be.

APPENDIX 1V

<u>OSBERG: IEW</u>		<u>COBB AND COBB: ISEW</u>		<u>NORDHAUS AND TOBIN: MEW</u>	
Level of effective per capita consumption.	(+)	Personal consumption		Personal consumption	(+)
(a)effective per capita consumption of marketed goods and services; and		Distributional inequality		Private instrumental expenditures	(-)
Wt. :a1 (b)effective per capita consumption of Household production, leisure and other unmarketed goods and services.		Weighted personal consumption (1/2)	(+)	Durable goods purchases	(-)
		Services of household labour	(+)	Other household investment	(-)
Net societal accumulation of productive resources over policy period	(±)	Services of consumer durables	(+)	Services of consumer capital imputation	(+)
(a)net accumulation of tangible capital, housing stocks and consumer durables;		Services of streets and highways	(+)	Imputation for leisure	(+)
Wt. :a2 (b)net accumulation of training and R&D investment;		Public expenditures on health and education	(+)	Imputation for nonmarket activities	(+)
(c)net changes in the value of natural resource stocks;		Expenditures on consumer durables	(+)	Disamenity correction	(-)
(d)environmental costs; and		Defensive private expenditures health and Education	(-)	Government consumption	(+)
(e)net foreign debt.		Expenditures on national advertising	(-)	Services of government capital imputation	(+)
Poverty and economic inequality	.(±)	Costs of commuting	(-)	MEW net investment	(±)
(a)the shares of the poorest 20 percent, richest 20 percent and middle income quintiles in the lifetime incomes of their cohorts;		Costs of urbanization	(-)		
Wt. :a3 (b)the fraction of the population having an average annual income below a poverty line of one-half the median income; and		Costs of auto accidents	(-)		
(c)the average amount of income it would take to raise all poor households to a poverty-line income.		Costs of water pollution	(-)		
		Costs of noise pollution	(-)		
Security of individual year-to-year income flows.	(±)	Loss of wetlands	(-)		
(a)the level and rate of increase of unemployment;		Loss of farm land	(-)		
Wt. :a4 (b)the percentage of the labour force that can expect large (20 percent plus) variations in annual real earnings; and		Depletion of nonrenewable resources	(-)		
(c)the change in annual inflation rates.		Long term environmental damage	(-)		
		Net capital growth	(±)		
		Change in net international position	(±)		

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CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
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niveaux de vie*

Competing Paradigms in the Development of Social and Economic Indicators

Clifford Cobb

Redefining Progress

Craig Rixford

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Session 2: "Indicators of Well-being"

October 30 10:30 AM - 11:30 AM

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Prepared for the Centre for the Study of Living Standards conference:
"The State of Living Standards and the Quality of Life in Canada"
Ottawa, Ontario, October 30-31, 1998

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October 1998

* The views represented in this paper are those of the authors and not necessarily those of Redefining Progress.

I. INTRODUCTION

A movement to develop better social and economic indicators has developed in the last few years among social analysts and local communities.¹ It is based on the belief that a detailed, statistical description of social problems will make possible intelligent reforms. According to this view, the value of improved and widely disseminated indicators is self-evident: more public awareness of social and economic conditions will produce better policies.

This relationship is seldom questioned. Since the efficacy of indicators cannot be tested, they are presumed to have value. Their very existence is taken to be a measure of their worth.

The connection between indicators and reform is, however, far subtler and less direct than the advocates of better indicators may realize. It is our contention that better indicators per se provide no guidance about how to reduce poverty, homelessness, crime, and other social problems. Indicators can improve social conditions only when they are used to test a priori theories or models.² This view runs directly counter to those who regard indicators as instruments for social change. Based on historical evidence, we believe a misplaced faith in indicators will lead not only to wasted intellectual resources but also to the social tragedy of basing programs on unworkable premises.

In this paper, we examine two distinct frameworks or paradigms for understanding social phenomena. We have assigned the label "historicism" to the descriptive approach and "positivism" to the analytic approach.³ These two approaches constitute different worldviews. They are based

¹. We use the term "indicator" rather broadly in this paper to include statistics that are deemed worthy of collection and reporting as measures of social and economic conditions. Technically speaking, an indicator is a single variable that represents the status of a complex system or a measurable proxy for an unmeasurable phenomenon. However, for reasons that will become clearer in this paper, an indicator has come to mean almost any measurement of social phenomena. We use the term in that broader sense.

². There are two exceptions to that principle. One is when an indicator makes the public aware of conditions that would otherwise be invisible, such as a warning sign of chemical or biological contamination of what appears to be pure water. In the second case, the mere publication of an indicator automatically causes behavior to change. Judith Innes (1990) points to human rights and civil rights indicators as examples in that latter category: the mere threat of publication shames people into less abhorrent behavior. However, those cases are relatively rare. In general, public knowledge about the existence of a problem does not lead to a solution unless someone has a theory about what causes it.

³. Historicism is generally understood as belief in universal principles or laws that govern history, particularly ones that determine a general pattern of social development. We are abstracting from that belief system and focusing on the inductive method of the German historical school. In their efforts to discover historical laws, the adherents of that philosophy sought to construct a detailed record of events from which patterns might be discerned. They eschewed the use of a priori models to guide research. Their aim was to be inductive instead of deductive: gather facts first, then generalize (develop theories) from them.

We also use positivism in a specialized sense. The term was coined by Auguste Comte in the nineteenth century, based on certain ideas of Francis Bacon in the seventeenth century. As Bryant (1985) shows, the French, German, English, and American uses of the terms have varied considerably. We do not wish to associate ourselves with that whole range of ideas. Specifically, we do not endorse the narrow forms of empiricism, the reductionist bias, or the assumptions about ordinary language as a tool of philosophical inquiry associated with logical positivism. We use the term to mean an approach to indicators based on the priority of theory over data, analysis over description, and problem solving over consciousness-raising.

on different epistemologies: direct observation in the case of historicism and statistical inference in the case of positivism. They serve different purposes. The historicist describes; the positivist prescribes.

The historicist methodology yields information that explains the meaning of a situation.⁴ Historicist indicators are useful for raising consciousness and understanding the significance of events. They are intended to answer the question, "What are the present circumstances or conditions?"

Positivism provides knowledge that can be used to predict and manage conditions.⁵ Indicators developed using this method are useful for analyzing policies and solving problems; they respond to the question, "What are the key elements in the social system that can be adjusted to restore its balance?"

When indicators are developed using historicist principles, attempting to use them as problem-solving tools can lead to confusion and frustration. That is precisely what has happened again and again, not only in the development of indicators, but in social research more generally. Researchers, journalists, and citizen groups who use the historicist method are content to describe problems in great detail, without offering any theoretical analysis of how or why a specific set of conditions arose. They are then frustrated when their purely inductive or descriptive methodology does not lead to the development of a theory that advances social reforms.⁶ For example, a leading figure in

In contrast to historicism, it derives theories deductively rather than inductively. Both the historicist and the positivist rely on facts, but the latter emphasizes the importance of deductive reasoning and experimental evidence. Indicators are relevant in the positivist framework as part of a process of testing hypotheses to determine valid relationships. Those relationships can then be used to predict the effects of policies put in place to remedy problems.

We do not share the utopian hopes that some positivists have displayed historically. Nevertheless, we regard this analytic, problem-solving approach as more fruitful than the purely descriptive approach of the historicists. The historicist approach to social science research in the United States began at the turn of the century as a reaction to the armchair theorists who were searching for universal laws (e.g., Herbert Spencer). Their insistence on grounding theory in empirical evidence was a very important step in moving social science theory forward. When we refer to positivism, we are not referring to grand theory or "theory without measurement" but theory grounded in and evaluated by empirical evidence.

4. Historicism is guided less by a search for causal relationships than by an interest in how people perceive events.

5. The confusion over the definition of indicators described in footnote 1 is symptomatic of the issues we address in this paper. A historicist regards an indicator as useful if it meaningfully and accurately describes a condition. A positivist, by contrast, is interested in whether an indicator can assist in making accurate predictions or diagnosing and solving a problem. Since historicism dominates social thought, it is not surprising that the historicist definition of indicators is regarded as the norm.

6. It appears that C. Wright Mills used the term "abstracted empiricism" to mean something closely related to the descriptive use of statistics that we are calling historicism. (His term for what we are calling positivism is "classic social science.") His analysis of abstracted empiricism is similar to our view of historicism: "The policy for progress of abstracted empiricists is very specific and quite hopeful: Let us accumulate many microscopic studies; slowly and minutely, like ants dragging many small crumbs into a great pile, we shall 'build up the science'" (Mills 1959, 127). Mills devotes an entire chapter (chapter 3) to explaining why the "building block" methods of social inquiry employed by Paul F. Lazarsfeld, the most sophisticated spokesperson for abstracted empiricism, cannot form a coherent theoretical framework. Mills proposes that the underlying

the social indicators movement of the 1960s and 1970s revealed a bit of that frustration in 1983 at the time of the closing of the Center for Coordination of Research on Social Indicators:

We have not evolved a conceptual statement, an overarching framework [of social change]. We have moved only a short distance in achieving the grand concept. . . *I had hoped that in time data collection would be less ad hoc and that measures would take on interconnected meanings. But this requires a middle-range theory that has yet to be developed.* In its absence, it is less possible to provide cumulative knowledge of social change, let alone monitor it. [emphasis added] (Sheldon et al. 1983 , 81)

The failure to develop a theory that would guide future work was no accident. This quandary inevitably arises from an anti-theoretical approach to the gathering of facts, when researchers repudiate the formulation of deductive hypotheses. The historicist approach can not generate a theory from the accumulation of facts. The tragedy is that many indicators groups and other social theorists are continuing to follow that path.

We predict that those who try to solve social problems through the use of the descriptive or historicist method will fail in their endeavors.⁷ The historicist approach is simply not designed for that purpose. By the same token, positivism fails when it is used to understand the meaning of events. One would not ask a positivist researcher to assist in collecting information to write a novel. In our view, confusion arises not because one method is "right" and the other "wrong" but because each method is useful for different purposes.

Ideally, social indicators research would draw on both the historicist and positivist methods. That does not mean, however, that they should play equal roles. In our view, the positivist or problem-solving approach should take precedence, and the historicist or descriptive approach should play a subordinate role. That would reverse the way in which indicators have been approached throughout this century.

Despite what the names may suggest, we wish to make clear from the outset that historicism is not more historically oriented than positivism. At least in the case of indicators, the reverse is true.⁸ The positivist practice of hypothesis testing requires an examination of historical events. Since it is generally impossible to perform experiments on whole societies, one must look to the past for examples of "natural experiments" with which to test hypotheses.

principle of abstracted empiricism is psychologism: "an explicit metaphysical denial of social structure" that treats individuals, not social systems, as the key to understanding social phenomena (Mills 1959, 67). Mills summarizes his key idea succinctly: "Social research of any kind is advanced by ideas; it is only disciplined by fact" (Mills 1959, 71). That could stand as the slogan of the approach we are calling positivism.

⁷⁷. Based on Leon Festinger's analysis of cognitive dissonance, we would also expect that the failure of the historicist approach would lead them to redouble their efforts to gather information rather than admit failure.

⁸. This is not to say that historicists generally ignore the past. In economics, for example, Institutionalists have often paid more attention to history than the more positivist Neoclassicists have. In anthropology at the turn of the century, historical particularists concentrated on understanding the unique cultural history of a given people, whereas unilinear evolutionists only drew on the history of Western Civilization. Mills, however, makes a much stronger generalization that conforms with our experience of the historicist approach to indicators: "Abstracted empiricists are systematically a-historical and non-comparative" (1959, 68).

II. CATEGORICAL DIFFERENCES BETWEEN THE TWO APPROACHES

In section III of this paper we examine historically how positivism and historicism arose and influenced the development of social and economic indicators. Before turning to that developmental process, we first wish to explain conceptually how the two paradigms differ.

Table 1. Categorical differences between positivism and historicism

	POSITIVIST	HISTORICIST
Theory formation	Deductive or a priori (prior to experience)	Inductive: based on collected data
Theory testing	Is there evidence that it works? (Practicality)	Does the theory make intuitive sense? (Plausibility)
Evidence cited	Indirect, inference from statistics about causes	Reliance on direct observation, focus on symptoms
Role of theory	Explicit theories about social causes guide data collection	Implicit reductionism, individual causes
Purpose of data gathering	To determine which policies will actually work, problem solving	To determine the extent of a problem, create support for action
Role of values	Concerned with means, not ends; Value judgments contingent on facts	Regards facts as value-neutral, values are fixed
Bias in data collection	Conscious, purpose avowed, upsets status quo	Unconscious, pretense of neutrality, supports status quo
Origins	England, classical liberalism; France, public health	Germany, institutional economics, human sciences
View of social system	Holistic, exhibiting mathematical regularity, self-regulating	Complicated, diverse causes, demanding detailed analysis
Desirable role of government	Minimal involvement to manage key system variables (macromanagement)	Welfare state, detailed management, comprehensive plan (micromanagement)
Obstacle to good policy	Knowledge about causal relationships, resistance to counterintuitive solutions	Political will to do what is already known to be right
Indicators: significance for politics	Not useful; technical tools	Symbolic value, displacement of goals, promotes participation

Table 1 gives an overview of the differences between historicism and positivism. Since not all of the cells in the table are self-explanatory, we describe each of them below:

1) Theory formation: The issue here is how theories are developed initially. The distinction between deductive and inductive analysis is a bit too crude. Positivists rely on feedback from data to modify intuitive hunches into theories. Historicists believe that theory derives from generalization or abstraction, not from raw data. Nevertheless, the difference between the two

approaches is based on competing conceptions of the source of ideas. The positivists are, practically speaking, Platonists: they believe that ideas or theories are independent of sense experience.⁹ The historicists, by contrast, are closer to Aristotle's view that ideas are simply generalizations from experience. The positivist cannot imagine the possibility of collecting useful data in the absence of a theory, if only an implicit one. The historicist cannot imagine how one could possibly have a meaningful theory without having immersed oneself in the data.

2) Theory testing: The positivist must test hypotheses drawn from theory using historical or experimental evidence. The hypothesis is either validated or falsified according to a very practical test: does it work? The historicist does not think in terms of hypothesis testing. The purpose of generalization (which is what the historicist means by theory building) is simply to deepen understanding. The test of a good theory in the historicist paradigm is whether the theory makes sense and is intuitively plausible.¹⁰ The idea of eliminating faulty intellectual constructs by means of careful testing does not enter into the historicist framework.

3) Evidence cited: When judging the validity of a theory, the positivist and the historicist use different sorts of evidence. The positivist (like Plato) is wary of appearances and (unlike Plato) prefers the evidence derived from statistical inference. The results of models developed by positivists may at times defy common sense. The historicist relies on evidence that is directly available—immediate sense impressions. The indicators developed by historicists almost always sound like common sense because they simply generalize from what is obvious.

4) Role of theory: To the positivist, theory explicitly guides research. There is no point in collecting data until a theory has been formulated. To the historicist, the role of theory is the Holy Grail. It is something to be sought endlessly, but which may never be found. Yet the historicist is guided by an implicit theory. In this case (drawing on C. Wright Mills), it seems that historicists have a theoretical predisposition toward reductionism: the belief that wholes can be explained by parts. Thus, historicism implicitly gives precedence to individual behavior over social or structural factors.

5) Purpose of data gathering and indicators: Positivists collect information to test whether a theory has practical significance: will a particular program actually do what it professes to do? In order to increase the problem-solving capacity of managers, the positivist seeks to find indicators that reveal causal relationships and predict the outcome of interventions. The positivist seeks answers to the question, "What works?" Positivists believe they understand a system only when they have found the most significant variables, most of which are hidden.

Awareness of social or economic conditions are the goals of historicist indicators projects. Historicists gather data to demonstrate the symptomatic features of a problem, i.e., to answer the question, "Where are we?" They believe that widespread knowledge of the existence of a housing crisis, the number of homeless people, or the frequency of farm foreclosures will help to alleviate

⁹. This view, of course, is directly opposite that of the logical positivists who had (or have) a purely nominalist view of ideas or universals.

¹⁰. This plausibility criterion is equivalent to taking a vote. If a majority of people believe the earth is the center of the universe (as was true for many centuries), then the geocentric theory would have been plausible and thus "true" by the standards of the historicist.

the problems they depict. Thus, there tends to be an assumption among the historicists that descriptive information is inherently valuable: If more data are available, society will be better off. Historicists believe they understand a system when they have the equivalent of a detailed photograph of it.

6) Role of values: Positivism treats broad social norms or values as given and the means of achieving them as the contentious issue. (For example, most people in our society believe in the value of education, but they dispute the best methods of providing it.) Conflicts arise not over general values, but over the trade-offs that arise in judging alternative policy instruments. Values are conditional, not absolute: They are contingent upon the context created by new facts that come to light through hypothesis testing.

Historicists study the complex texture of events in order to reveal their meaning. Values, like theories, are expected to emerge as generalizations from the details. That, at least, is the logic of historicism. In practice, historicists tend to treat values as trans-historical, relatively fixed, attitudes to be discovered "inside" people. (They talk of people "having" values, as if they were objects that could be possessed.) Contexts may change, but values endure. Thus, indicators projects seek to determine the "values" of a community, as if such values existed independent of the context surrounding particular issues.¹¹

7) Bias in data collection: Positivists assume that all data-gathering is done with a purpose and thus reflects some bias. The bias need not be ideological. The point is simply that data are collected to answer a particular question. It is helpful if researchers avow their theoretical purpose and make it explicit. Nevertheless, the issue is never whether data collection is unbiased, but whether the theory behind it is conscious or not. Historicists, by contrast, tend to assume that it is possible to collect information in a pure and unbiased manner. They see data as neutral "facts" that become biased only by the way in which they are used. This pretense of neutrality by historicists causes their work to serve the status quo, because the data they collect can only describe conditions; it cannot point toward alternative policies. By contrast, positivist analysis tends to challenge the status quo by showing explicitly how change is possible.

8) Origins: The two schools of thought can be traced back three hundred years to competing concepts of knowledge that arose in England and Germany. We speculate that the roots of positivism might lie in the revival of Neoplatonism in the seventeenth century in England, since Sir Isaac Newton was secretly an adherent of that view. The more evident sources of positivism can be found in an English scientific tradition (later developed in Belgium and France) that expected to find mathematical order underlying social phenomena as well as physical events. This approach was also more oriented toward problem solving. It collected information that could test hypotheses about causal relationships. The historicist approach began in Germany with an effort to provide an encyclopedic description of events, with the hope that meaningful generalizations would emerge

¹¹. Renowned pollster Daniel Yankelovich (1991) has discussed the vapidness of the idea that people's values are unrelated to a knowledge of facts. In *Coming to Public Judgment*, he argues that there is little stability to opinions or value judgments on issues about which the facts are still in question. Values are only formed in relation to facts over a prolonged period of deliberation about specific policy options, not in relation to broad, generic values.

from the details. It arose from a distinction between natural science and "human sciences." It has been carried forward in this century by Institutional economics.

9) View of social (and other) systems: Whereas historicism conceives of systems as excruciatingly complicated phenomena, the English positivist tradition looks for an underlying simplicity.¹² The historicist is burdened by trying to understand the myriad interacting causal factors in the social system. "Everything affects everything else," might be the slogan of the historicist.¹³ Detailed analysis of the functioning of the components or sub-systems (the historicist task) can narrow the range of relevant variables to a few hundred. Those can then be mapped onto a schematic diagram which could be used to make decisions. One can claim to understand the social system only after hundreds of detailed studies have been synthesized.

A positivist, by contrast, might agree with the historicist that the social system is comprised of a blooming, buzzing confusion of events (to paraphrase William James). Paying attention to those details is, however, distracting rather than enlightening.¹⁴ In order to understand how the system functions, one should not dissect it to explain all of the intricate interrelationships between sub-parts. One should instead seek mathematical regularities that underlie the confusing details. Thus, a positivist is interested only in complex biological or social systems that exhibit emergent properties. Those properties express themselves in rather simple patterns, and it is the job of the positivist researcher to uncover those patterns.

10) Desirable role of government: To a positivist, government intervention is not inherently wrong. However, since it is impossible to understand the myriad linkages in a society, micromanagement to achieve symptomatic relief is likely to cause more problems than it solves. The logic of positivism is to modify a small number of key elements in any system in order to manage the effects on society as a whole or on large sub-groups, but not to control the effects on individuals. Thus, for example, a positivist might support public health measures (sanitation measures or large-scale vaccination) that improve the health of entire populations on a statistical basis, but the same person might question the validity of state involvement in clinical interventions to assist individuals.

Historicists believe that social pathology results from a multiplicity of specific causes. When government tries to improve a situation, proponents of this approach believe that it should try to

¹². A biological or social system may be thought of as either "complicated" or "complex." Those who see it as complicated seek to map out the millions of interacting variables, one by one, in order to build a model containing all of them. Those who see it as complex, by contrast, assume that knowledge of only a few variables will enable the observer to make accurate predictions about the behavior of the system. Thus, complexity is actually simplicity. The simplifying concept of equilibrium in microeconomic theory is based on an understanding of market behavior as a complex system. The English (positivist) advocates of free trade in the nineteenth century were arguing, on that basis, that the economy is a complex (i.e., simple) system that is self-regulating. The German (historicist) opponents of free trade were arguing that the economy is a complicated system and must be managed.

¹³. In statistical terms, the historicist wants to take into consideration all of the points within a distribution, not just the mean or central tendency. Since truth lies in the details (*all* of the connections), statistical analysis is not particularly important to the historicist.

¹⁴. In statistical terms, the positivist focuses on the central tendency and the variance, not the entire distribution.

collect as much data as possible, develop a comprehensive plan, get feedback about how particular individuals will be affected, and to take as much of that information into account. Consequently, many programs, each targeted to a particular set of symptoms, are required to respond to the diversity of problems. This is the essence of the interventionist welfare state.

11) Chief obstacles to good policy: The positivist believes that there are many problems without any known solution and that, if there is a solution, it may be counterintuitive. Therefore, the main obstacles to solving social problems lie in a) ignorance about which remedies will actually work and b) unwillingness to accept the counterintuitive solutions discovered through the positivist methodology. In contrast, the historicist believes, above all, that experts know what to do to solve problems: break down larger problems into their components and solve each of them. To the historicist, that is the easy part. The difficulty lies in gathering the political will to act. Accordingly, widespread dissemination of social indicators will lead to greater public understanding of problems, which will strengthen political will to apply known remedies.

12) Significance of indicators for politics: The positivist is at a severe disadvantage in the political realm. Effective indicators, from this perspective, are technical tools that guide action. They are not easily understood by the public. Statistical inferences about causality have little symbolic significance. They cannot be used in political debate, unless the relationships that are uncovered happen to fit people's emotional predispositions. For the positivist, indicators are relevant in guiding substantive policies that affect the distribution of resources, not merely gestures of that sort.

For historicism, indicators fulfill the need to identify symptoms of social pathology. Since historicists regard appropriate policies to be self-evident, the challenge lies in building political coalitions in support of them. Under those conditions, the symbolic uses of politics (spending on visible, but ineffective, programs) dominate the substantive aspects (the actual distribution of resources and power). That is, indicators can promote the displacement of goals from substance to symbolism. In some cases, the mere publication of indicators can be taken as a symbolic gesture of concern for an issue. If a large number of people are involved in the development of indicators, the participatory process can also become an end in itself.

III. TWO STRANDS OF INDICATOR DEVELOPMENT

Having summarized the differences in concepts and methods between historicism and positivism, we now turn to a survey of the development of each approach.

A. Historicist Approach

The German historical school of thought can be traced back to the concept of *Staatenkunde* in the seventeenth and eighteenth centuries (Lecuyer and Oberschall 1968, pp. 40-41). That term, which is the origin of the modern term "statistics," referred to the comparative description of states: the gathering of facts that would "illustrate the condition and prospects of society" (Eyler 1979, 18).¹⁵ From our point of view, it is ironic that the first people to label themselves statisticians were not

¹⁵ The foremost representative of this discipline in the eighteenth century was Gottfried Achenwall, Göttingen professor of law and politics (Eyler 1979, 18).

interested in numbers at all. In nineteenth century Germany, a split took place between Tabellenstatistik (the use of tables) and Staatswissenschaft (the study of the state). The former became political economy and the latter became political science and public administration. Both, however, remained highly descriptive in orientation.

In the latter part of the nineteenth century, the Verein für Sozialpolitik (Social Politics Union) emerged as a reaction in Germany against the philosophy of laissez faire liberalism (Bryant 1985, chapter 3). The Verein hoped to assemble vast quantities of empirical data from which it would be able to draw conclusions about the management of the economy. This was precisely the approach favored by Bismarck, who established the first model of a paternalistic welfare state. The assumption of Bismarck and his bureaucracy was that the state needed to intervene constantly in the economy to promote the well-being of citizens. Since they aimed to micromanage the economy and various institutions, they required a detailed knowledge of how they function.

This connection between the welfare state and the historicist approach to social indicators is of great significance. Most conservative economists have been unsympathetic to any political movement that favors the compilation of social indicators. The official reason for their opposition is usually methodological. Without theory, they point out, numbers are useless. But methodology is tied to ideology. The opponents have discerned intuitively that the historicist approach to social indicators amounts to a defense of the welfare state.

1. Objectivity, reform, and the development of labor statistics

None of that was obvious one hundred years ago, when the historical approach to indicators was just getting under way in the United States. Although one might find earlier traces of this approach in the United States, a good place to begin is with Carroll Wright and the origins of labor statistics (Leiby 1960). Actually, Wright, as the son of a Universalist minister in Massachusetts, drew upon the moral statistics tradition that we will discuss later.¹⁶ He believed in the goodness of all people as long as they had good information. That liberal theology taught him to consider only the outward appearance of things and not to question too deeply. Later in life, Wright distrusted any effort to use statistics to theorize about the causes of social conditions (Leiby 1960, 21). His faith was in the numbers themselves, not in some subtle meaning that might be derived from them. This rationalistic belief that the knowledge of social statistics would solve problems was a specific example of a more generalized faith in education as the panacea for society's ills. That was the basis of the common school ideal, another New England invention that was Protestant in spirit, yet imposed in the name of universalistic principles of tolerance and rationalism.

Carroll Wright's focus on numbers as the commissioner of labor statistics, first for Massachusetts and later for the federal government, allowed him to avoid taking sides in ideological disputes. When Wright took over as commissioner in Massachusetts in 1873, he replaced a labor advocate who had used the office to gather statistics to prove theories about the exploitation of labor. Wright rejected that approach. He was determined, like his mentor, Francis A. Walker, the director of the U.S. Census in 1870, to stick to the facts and leave interpretation to others.

¹⁶ It is significant that theological disputes had as much bearing on the development of indicators in the United States as philosophical and political issues had in Europe.

The underlying political philosophy of Carroll Wright and of those who followed in his footsteps in the indicators movement is captured by his view of the condition of working people in his own day. As James Leiby says, referring to Wright's theory of social problems: "While there was no fundamental problem, there were inevitably many specific and occasional difficulties. . . . The bureau's function, therefore, was not to solve one big problem, but to furnish a factual basis for the discussion of a lot of incidental ones" (Leiby 1960, 67-68). Wright self-consciously eschewed any theoretical explanation of social conditions. He was content to record them and to leave theorizing to others, as if the two activities could be clearly separated.

In the midst of the labor turmoil of the time, Wright's moderate view was an essentially conservative one. Wright won support for the continuation of his bureau and later appointment as federal commissioner of labor by convincing business groups that the publication of facts had quelled agitation (Leiby 1960, 68).¹⁷ In effect, Wright recapitulated in the U.S. what the German historicists did through their alliance with Bismarck: He promoted incremental micro-level reforms that would obviate deeper structural changes.

In contrast to Wright, whose ideas merely converged with the German historicists, the new American school of economics called Institutionalism was directly shaped by them. Richard Ely, for example, studied with Knies at Heidelberg and became one of the most prolific and influential American economists of his day (Gaffney 1994, 84-87). He touted an inductive approach to economics. Thorstein Veblen and John R. Commons, two students of Ely's, focused attention on the historically conditioned details of institutions rather than formal theory. Although historicism underwent some changes as it crossed the Atlantic and influenced the formation of Institutional economics, it retained its bias against deductive formulation of theory and in favor of a micromanageial style of governance.

2. Inductive description and the development of business cycle indicators

The influence of historicism became especially evident in the work of Wesley Mitchell, one of Veblen's best students. Mitchell made his reputation with the publication of *Business Cycles* in 1913. He founded the National Bureau of Economic Research (NBER) in 1920 and directed it for 25 years (Oser and Blanchfield 1975, 391). The focus of NBER was the compilation of mountains of data. It produced business cycle indicators that are still used today (such as leading and lagging measures). However, to the extent that the work of NBER was not guided by theory, it did not produce any useful policy recommendations.

¹⁷. The conservative nature of statistical work that describes problems rather than analyzing their causes can best be seen in comparative perspective (Lecuyer and Oberschall 1968, 48). In France, in the early 1840s, the moderates rejected a national survey of social problems. But in 1848, when the socialists demanded a Ministry of Labor, the moderates proposed the same survey. The socialists, however, opposed the gathering of statistics as a bourgeois exercise. A study of textile workers had been conducted earlier that had been used to show that the conditions of workers had improved. Although liberals had also attacked the study because it revealed workers' miserable conditions, it had had little impact on law. In principle, a statistical study that merely describes events may show a horrible state of affairs, but it does not suggest a course of action. Because it encourages the treatment of symptoms, not causes, it is conservative.

Reacting to armchair theories of the business cycle that existed around the turn of the century, Mitchell sought to ground analysis of business cycle in empirical evidence.¹⁸ He wanted theories to be tested by the empirical record, not by logic. Rather than developing an a priori theory and testing it, however, Mitchell set out to collect and assess thousands of economic time-series, and to slowly build an understanding of the interrelationships. Eventually, he hoped that general guiding principles would emerge from the data. However, faced with the intricate interwoven nature of the business indicators, he noted that although the business cycle repeats itself there are always differences which preclude an accurate generalized theory (Seligman 1990, 185).

Mitchell never explicitly articulated his theory of the business cycle. In the culminating work of his career, Mitchell (along with Arthur Burns) published *Measuring Business Cycles* in 1946. It summarized in great detail their empirical analysis of historical U.S. business cycle data. Although replete with detailed descriptions of method and intricate analysis of the indicators movements in relation to the general cycle, it offered no hypotheses that explained the business cycle.

Their approach came under attack from econometricians such as T.C. Koopmans because of its lack of emphasis on theory. Although Koopmans thought it was important to describe regularities and irregularities of the system under evaluation, he felt it was equally important to search for the laws or principles governing them. In his famous critique, "Measurement without Theory," he suggested that with the Burns and Mitchell volume "everything had been tossed into the statistical hopper, so that the possibility of identifying the really significant relationships had been obscured" (Seligman 1990, 199). Were leading indicators the cause and lagging indicators the effect? Were the coincident indicators affected by the same forces that create the general cycle? Burns and Mitchell offered no explanation of these cause and effect relationships.

At the time, econometrics based on Neoclassical theory was an emerging force in economics. Keynesian theory, which offered a "simple" causal explanation of the business cycle, was being used to organize the national income accounts and to help formulate general economic policy. Koopmans and other critics felt that work on business cycles needed to have some sort of analytical underpinnings to generate and test hypotheses that could be useful in understanding the business cycles.

Institutionalists responded that it is all well and good to test hypotheses, but one must first have a hypothesis to test. Mitchell and Burns, according to their defenders, were searching out patterns that could generate reasonable hypotheses. Their work was not atheoretical in nature, but was a necessary precursor to testing hypotheses. It was simply premature to generate theories since the empirical basis of the business cycle was too skimpy (Klein 1997, 41).¹⁹

Phillip Klein, an institutional economist, describes Mitchell's approach: "... business cycles are inherently complex and there is, a priori, no reason why any reasonably accurate—and therefore

¹⁸. Critiques of abstract theories are appropriate if the theories are not put to the test. Those who create models with ungrounded and untested economic axioms should be called to task. This should not lead to an abandonment of theory but to an insistence on testing theories and assumptions.

¹⁹. They also argued that Neoclassical economists would attack any quantitative analysis not based on the principles of that doctrine.

useful—theory attempting to explain them would not be similarly complicated" (Klein 1997, 44). Klein then goes on to give the example of a simple causal explanation given at the turn of the century by Henry Moore, that "attributed the modern business cycle to periodic meteorological changes that produce sunspots" (44). This, for Klein, is an example (albeit exaggerated) of a "simple theory." Historicists had initially set out to combat that type of armchair theorizing. But the argument against armchair theorizing had no bearing on the debate with positivists who favored the use of empirical observation and who noted that a simple theory need not be simple-minded.

Institutionalists continued to identify and classify leading, coincident, and lagging indicators, work that eventually culminated in the well-known Index of Leading Economic Indicators. Klein notes that the timing relationships between the "short list" of currently used indicators can be understood in terms of a number of business theories (46-48). Although true, it is noteworthy that the theories themselves were not derived from the study of the indicators. And even though leading indicator series have been shown to lead turning points in economic activity, they do not speak to the amplitudes of the swings nor the duration. They also tend only to be useful for prediction in the short term (six months out) and are therefore less useful for policy.

The work of Kuznets (a student of Mitchell's and a coworker at NBER) in setting up the national income accounts was similarly driven by a desire to present facts without theory. However, in this case, the national income accounts came to have special significance in policy formation because they were relevant in testing the hypotheses of John Maynard Keynes.

3. Recent social trends

The 1920s was not only the decade in which economic indicators gained popularity, it was also the period when the idea of social indicators emerged. Herbert Hoover, first as secretary of commerce and later as president, was the chief proponent of the collection of data that could be used for social measurement (Anderson 1988, 161). Immediately upon taking office in the Commerce Department in 1921, he created the Conference on Unemployment. Hoover's own thinking on this subject appears to have been shaped by the historical school, particularly by the work of Mitchell. He commissioned detailed descriptions (but not the development of theories) of unemployment.²⁰ He believed that they showed the cause of cyclical unemployment to be the waste and extravagance that arose during boom years. Hoover imagined that this was a problem that could be solved by employers, since he assumed their inefficient management practices were to blame.

Another initiative at this time was the President's Research Committee on Social Trends, which was appointed by President Hoover. In 1933, in the last days of his presidency, the committee published its report entitled *Recent Social Trends*. This work, supervised by William F. Ogburn, a sociologist at the University of Chicago, marked a milestone in the social indicators movement in the United

²⁰. As commerce secretary, he commissioned a study in 1921-22 that relied on a methodology that was similar in concept to the German "statisticians" of the seventeenth and eighteenth centuries. That is, the study consisted of detailed descriptions coming from hundreds of cities around the country. The reports described who was unemployed, for how long, how businesses were responding, and whether any labor unrest had resulted. This amounted to "thick" historical research and extremely "thin" abstract theory. The intent here is not to single out Hoover for criticism. He was following the best advice of his day. The key point is that historicism so dominated statistical thought in the 1920s that no alternative seemed imaginable.

States. It was the first official document devoted to social measurement. Over 1,500 pages in length, it covered numerous social conditions such as demographics, health, and education. Yet, according to Adolph Berle, a law professor and adviser to President Roosevelt in 1933 when the report was released, *Recent Social Trends* was characterized by "barrenness of quantitative theory and statistical measurement." It was pure description. None of the sections contained any theory about why those conditions existed. Although it was completed during the early days of the Great Depression, there was barely a hint of the extent of the crisis (Smith 1991, 71).²¹

Ogburn, like Wright, believed that social reports should present facts, not opinions, and should present the data and trends but refrain from interpretation and certainly from policy recommendations (Bulmer 1983, 114). He envisioned an annual social report and, in fact, edited an annual issue of the *American Journal of Sociology* from 1928 to 1934 which presented a statistical account of social change in the previous year (Bulmer 1983, p.111). His approach (descriptive, inductive, pseudo-objective) became the dominant approach of academics who worked with social indicators. A number of his students, including Albert D. Biderman, Otis Dudley Duncan, Albert J. Reiss Jr., and Eleanor Bernert Sheldon, were later active in the social indicators movement.

4. Change through enlightenment: the early antecedent of the community indicators movement

The use of the historical method in social analysis was not limited to economists and national surveys. It was also the method of choice by social scientists who were hired by private foundations as well. The Russell Sage Foundation could be said to have initiated the development of what are now called "community indicators" using processes that are remarkably like the ones that have been re-established in the 1990s.

Around 1910, this foundation provided a grant to the Charity Organization Society (of New York) to survey industrial conditions in Pittsburgh. Paul Kellogg, a writer and editor, was hired to carry out the study. "The project lasted eighteen months and produced a six-volume study of Pittsburgh's housing, sanitation, and working conditions. Kellogg and his associates wanted a 'human measure' of social conditions that would prod the government of Pittsburgh to solve the city's problems" (Smith 1991, 40-41). After the study was released in 1914, the Russell Sage Foundation was besieged with requests to fund similar studies in other cities. Since it did not have the funds to do that, the foundation provided technical advice instead. Partly as a result of this initiative, over two thousand local surveys were taken on education, recreation, public health, crime, or general social conditions.

Just as community indicator projects today are often associated with some existing organization, the surveys of this period were "conducted under the supervision of citizens' committees, church

²¹. New Deal "brain trusters" like Berle may have been critical of the report, but they were also locked into a descriptive, rather than analytic, framework. The New Deal programs did not end the Depression, precisely because they were designed to micromanage the economy in the same way that Bismarck's social welfare state had done. Even after Keynes published his theoretical work on the causes of the Depression, the policies of the Roosevelt Administration did not change much. When the economy began expanding in 1936, Roosevelt clamped the lid on it and sent the country into another depression in 1937 and 1938, a fact generally ignored by historians.

federations, chambers of commerce, or civic improvement associations" (Smith 1991, 41). The process by which this information was expected to affect decisionmaking was not much different from today either: "These groups then relayed the findings of the technical experts to the public who, enlightened by the facts, were expected to mobilize public opinion and press for appropriate reforms" (Smith 1991, 41).

The Russell Sage Foundation supported this precursor to community indicators work because it believed the surveys would yield results. Like many others of the day, the officers of the foundation were guided by the metaphors of public health: They wanted to treat root causes, not merely alleviate symptoms. They did not just want to observe society; they wanted to improve it.

Yet the methodology employed was guaranteed to fail: The collection of factual information could *only* yield observations about symptoms. In the absence of theories, the accumulation of facts cannot offer any explanation of causes. Referring to the data gathered by the surveys of living conditions, James Allen Smith notes:

In these and countless other measurements, the professionals presumed that there were causal relationships and, thus, implicit remedies for social problems. But the surveys usually explained much less than met the eye. In reality, they were less an instrument for testing hypotheses and designing reforms than for arousing a community's conscience and "quicken[ing] community forces" for reform, as one staff member of the foundation put it (Smith 1991,42).

That is why "the actual political results [of the surveys] seldom lived up to the organizers' expectations" (41).

This explanation of the failure of the social surveys at the beginning of the century to lead to social change applies with equal force to current social indicators efforts that have their roots in the social indicators movement of the 1960s. Unless the methodology used to develop indicators goes beyond "arousing a community's conscience," it is unlikely ever to lead to reforms.

5. Social Indicators Movement

By the early 1960s, as a result of the increasingly successful management of economic policy, the deductive or analytic approach to policymaking had effectively triumphed over the inductive or descriptive method favored by the students of Ogburn. The success of the Kennedy tax cut of 1964 and the apparent accuracy of econometric predictions of its effect on the economy made positivistic economists quite influential forces in guiding public policy.

Professional economists in government (such as the Council of Economic Advisors) and in policy institutes (such as Brookings) became a model for applying social science to government policy. Critics charged that economic considerations were given undue priority in policy decisions. If social theory and planning were given equivalent institutional support, they surmised that social policy could be rationalized in the way economic policy had been. Thus, the success of economic indicators was one spur to the birth of the social indicators movement in the 1960s and early 1970s. As social crises mounted during the 1960s, some politicians and social scientists began to champion the development of systems of social statistics comparable to the existing economic ones.

The event that signified the launching of the social indicators movement in the United States was the publication in 1966 of *Social Indicators*, a project sponsored by NASA (Bauer 1966).²² Raymond Bauer, Albert Biderman, and Bertram Gross, the primary authors and influential forces in the budding social indicators movement, argued for increased collection of statistics that would be published as a social report. They also advocated the development of a system of social accounts which could help guide policy decisions.

A second influential publication, *Toward a Social Report*, was issued by the Department of Health and Welfare (HEW) in early 1969, on the last day of the Johnson Administration. It called for the establishment of an annual social report of the type advocated earlier by Bertram Gross in *Social Indicators*. This report was representative of the view that by definition social indicators should tell us if we are moving in the right direction, be relevant to setting policy, and help evaluate the effectiveness of social programs.

In the meantime, Senator Walter Mondale and others put forth legislation from 1967 to 1973 calling for the creation of a Council of Social Advisors, comparable to the Council of Economic Advisors (CEA) (Booth 1992, 380-85). The CSA was to issue an annual social report like the *Economic Report of the President*. Underlying this effort was the belief that the creation of the CEA had institutionalized the use of economic information and the power of economists. Creating a comparable institution to address social problems seemed like a logical next step.

Many of these early indicator reports reflected an interest in promoting or evaluating President Johnson's social policy. The Great Society was to provide an economic floor for all and was in many ways a replay of the social welfare programs that were first devised in Bismarck's Germany. For every need, a new program was developed. This way of approaching policy is based on the historicist model: create detailed solutions based on a detailed knowledge of events.

Although the authors of *Social Indicators* and *Toward a Social Report* were historicist in approach, they envisioned indicators as tools of policy analysis. The most profoundly historicist approach was the work sponsored by the Russell Sage Foundation and the Social Science Research Council. The Russell Sage Foundation (which had funded the early "community indicators movement" described above) was also instrumental in keeping alive the historicist tradition in social indicators. In 1968 it published *Indicators of Social Change*, a volume edited by Wilbert Moore and Eleanor Bernert Sheldon (who was a program officer at the foundation). This volume was a successor to the *Recent Social Trends* volume of the 1930s in both content and spirit.

Sheldon and others at the Social Science Research Council (SSRC) opposed the creation of the Modale's council of social advisors or any other premature application of social indicators to social policy. Instead, they argued, the pressing needs were basic research and better data series (Sheldon et al. 1983, 79). Since she was affiliated with the prestigious SSRC (she was president from 1972 to 1979), her views had an impact. Although the Center for the Coordination on Social Indicators was

²². NASA was interested in determining the second-order consequences of the space program for American society.

established at the SSRC, it promoted basic research and advocated against the establishment of even an annual social report.

Following the academic approach she had inherited from Ogburn, Sheldon believed that the development of a theoretical framework for indicators was premature. Social indicators could not follow in the footsteps of economic modeling since: 1) social goals were more ambiguous than economic ones, 2) social problems were less clearly understood than economic ones, and 3) the theoretical foundations of economics were much clearer than those underlying the analysis of social problems (Sheldon and Freeman 1970). Sheldon argued that an inductive approach was needed: First gather descriptive data, then develop the categories that would allow meaningful generalization and eventually work towards analysis of social change (103-5).

Although Sheldon correctly pointed out some of the differences between economic and social indicators (e.g., the lack of a body of social theory comparable to that of economic theory, and the substantially smaller amount of existing social data), she was incorrect in her portrayal of how economic theory came into being. It was not the result of laws emerging after the careful collection and interpretation of data; it was the result of a theory based on prior insights.

The social indicators movement thus entered the 1970s generally united in its historicist approach, but conflicted over the immediate goals of the movement.²³ Work on social indicators flourished in the United States in 1970s with thousands of relevant articles and books being published. In the United States, *Social Indicators, Volumes I, II, and III* were published (Office of Management and Budget 1973; Census Bureau, 1976, 1980). The original intent of the reports was to include critical analysis and judgments about causal relationships. Political forces within the Nixon Administration turned them into "neutral" chartbooks, full of isolated facts, with little to no interpretation (Innes 1990, 99-100). There was accompanying interpretation of the 1976 and 1980 reports, but it was done in the *Annals of the American Academy of Political and Social Science*, an academic journal. Even then, the analysis was highly technical, evoking no political controversy.

The social indicators movement in the United States was effectively over by the early 1980s, although it continued in the form of annual statistical reports issued by government agencies. Some data series that were started in part because of the movement (for example, the National Criminal Victimization Survey) also continued to be collected. Numerous explanations have been offered that account for the early demise of the movement (e.g., Johnston 1987; Andrews 1989; Bulmer 1989 and Noll and Zapf 1994). The most compelling of these reasons is the limited use of the indicators to policymakers and the paucity of instances where indicators brought about some reform. It was not simply the lack of political will (which the indicators were supposed to help create) or the inadequate theories of social change (that the inductive study of trends would help elucidate) that caused the demise of social indicators. It was the inability of the advocates of social indicators to offer causal explanations of social trends that would help formulate social policy.

²³. As Sheldon says, comparing the work funded by Russell Sage with the Bauer volume: "The Foundation's program was somewhat different in that its primary motivation was to establish a theoretical base, data, and measurement techniques for understanding social change. It was not that we eschewed the importance of 'policy analysis' but rather that we considered our effort as parallel—or even a precursor—to it" (Sheldon et al. 1983, p. 79).

While the U.S. government worked on social indicators sporadically during the 1970s, several European nations, notably Great Britain, France, Germany, and the Netherlands, went further than the U.S. and institutionalized social reporting. Examples of European reports include *Données Sociales* in France, the *Social and Cultural Report* in the Netherlands, and *Social Trends* in the U.K. Among the preconditions that enabled this were "an articulated welfare-state program of social policy, an interventionist orientation of government, innovative statistical agencies and geographical centrality" (Noll and Zapf 1994, 5).

The excitement generated by the social indicators movement also had effects on international agencies who began developing indicators as a part of their mission (Rothenbacher 1993). In the early 1970s, the Organization of Economic Co-operation and Development (OECD) established a program in social indicators which continued work until the publication of *Living Conditions in OECD Countries* in 1986. At the United Nations, the relationship between economic development and human development was explored via the Human Development Index. The World Health Organization (WHO) emphasis on human health led to the healthy cities movement which developed indicators to assess improvements in public health broadly construed (Waddell 1995, 213-5).

In a similar way, the development of environmental indicators was inspired by the social indicators movement. In the United States, the Council on Environmental Quality and the Environmental Protection Agency both began to develop indicators to monitor and publicize environmental trends. Similar work was begun at OECD in the 1980s. In addition, policy institutes such as WorldWatch and World Resources Institute began producing annual books describing and analyzing environmental trends. With the notion of sustainable development as highlighted by the Brundtland report and later by the Rio conference, a new framework for indicators was developed in the early 1990s. Sustainability indicators attempt to describe the interrelations of economic, environmental, and social concerns. These frameworks or sets of sustainability indicators offer conceptual models that illustrate those interrelationships, but they don't necessarily offer an analytical understanding of them.

Attempts to create indexes of social welfare that can be used as alternatives to the GDP are also characteristic of the last decade. Examples of indicators of this variety include the Index of Social Health, developed by Marc Miringoff of the Fordham Institute, and the Genuine Progress Indicator (GPI) developed by Redefining Progress. Although the GPI is useful as a rhetorical tool to point out the limitations of the GDP as a measure of well-being (and demonstrates the difficulty and arbitrariness of developing any such general measure), it does not lead to any specific policies. This is the crucial distinction between descriptive and analytical work.

The social indicators movement has experienced a revival in the 1990s. The sources of that renewed energy are perhaps somewhat different than in previous decades. There is far less impetus from federal agencies or major national institutions like the SSRC. Instead, the focus in the 1990s has been on community indicators, similar to the work catalyzed by the Russell Sage Foundation around 1910. It is also characterized by consideration of economic, social, and environmental conditions. However, it is similar in a critical way—it is dominated by the historicist approach.

Those who have worked for years to develop better indicators have been frustrated by the lack of success at achieving social change or even institutionalizing social reporting. Much emphasis has

been placed on the agenda-setting role of indicators and how descriptive indicators can be used effectively in the public debate. Our concern is that advocates, especially at the community level, then wonder what comes next: How can they actually effect change in what they are describing? There may be an important rhetorical or persuasive role to be played by descriptive indicators in raising awareness but one can not expect those same indicators to effect change in the conditions. It is our belief that if indicators are to be a tool in bringing about change in conditions, one must approach the indicators work with a positivist perspective.

B. The Positivist Approach

Positivism, by which we mean here simply a theoretical and analytical approach to the use of indicators in problem solving, has a tradition as long as the historicist or descriptive approach.²⁴ Whereas historicists have assumed that change will automatically result from publicizing facts about social conditions, positivists have been concerned with *how* effective policies can be formulated. (From the positivist perspective, many of the policies formulated by historicists are merely symbolic expressions that are directed toward symptoms rather than causes.) Positivists are interested in developing theories or models that specify causal relationships. Those models, if correctly specified, can provide relatively accurate predictions about the consequences of policies. They can, thus, be used to solve problems.

The ultimate test of whether a model is positivist or not is the extent to which it is used to make predictions. The use of numbers or algebraic analysis does not necessarily qualify work as positivist. Statistical analysis is positivist if it is based on the testing of deductive hypotheses about relationships that are not directly observable. The key difference is this: Historicist methodology seeks to understand by examining relationships that can be seen; positivist methodology seeks to predict by drawing inferences from relationships that are unseen.

1. Petty's deductive, problem-solving approach

In social analysis, one of the first applications of the positivist methodology was made in England by William Petty in the late 1600s (Studenski 1958, 26-30). Petty's innovation was to bring theory and data together in understanding social and economic conditions. Before him, writers had believed that economic health depended on increasing exports of goods and imports of gold because that increased the national treasury. (They assumed that what helped the government also improved the nation.) Petty developed a theory that reversed that relationship. He argued that wealth derived from production, not from hoarding gold, and that trade should therefore be taxed and regulated lightly. To help the crown, one must first improve the economic conditions of society.

This first example reveals an important feature of positivism: analysis often starts with startling or even paradoxical hunches that are a reversal of expected relationships. The positivist intuitively (or posits) a relationship that can only be discovered through inference and experimentation. By contrast, historicism appeals to observable relationships and thus conforms to common sense.

²⁴. See footnote 3 for a discussion of our use of the term "positivism."

Petty also theorized that England had the capacity to fight a war with France, but that Holland was rapidly growing in its capacity to wage war (due its liberal trade policies). In order to test his hypotheses, he made calculations of the populations of France, England, and Holland and of England's national income. (Gregory King estimated the national incomes of all three countries after Petty's death, using generally similar methods.) Petty estimated that France had a larger population than England, but that England's higher productivity made the two countries equally matched in wealth (and war potential). He determined that an income tax could be levied in England that would meet the needs of the state in peace and in war. Finally, Petty used vital statistics, which he also originated along with John Graunt, to disprove the theory circulating in his day, that England's population was declining.

2. The search for natural laws of society

Petty is generally remembered for his initiation of national income accounting and for his testing of hypotheses about society with statistics rather than pure reason.²⁵ It is especially important to understand that, unlike the German statisticians of the seventeenth century, Petty saw statistics as a scientific enterprise involving a search for hidden causes. Petty was guided by the prevailing expectation at the Royal Society (England's preeminent institution, of which Petty was a founding member) that society, like the stars and planets, would operate in harmony with natural law.²⁶ Thus, all of Petty's work was shaped by deductive hypotheses rather than being an inductive attempt to generate theories. He made predictions based on general principles, then sought the evidence to confirm or deny his hypotheses.

Although efforts to apply "political arithmetick" to economic issues lay dormant throughout the eighteenth century, efforts to look for underlying patterns in social phenomena continued as a search for "divine order" or natural law in human affairs (Westergaard 1932, chapters 2 and 3). Astronomers (Halley and Wargentin) and other European scientists (Huygens, Neumann, and Süssmilch) were drawn into the investigation of demographic questions such as population size and distribution by the search for mathematical order.²⁷ One question they particularly wanted to

25. "Petty was in fact the most significant theorist of social statistics in Britain, at least until the heroic decade of the 1830s, and even then no single figure stood out with his overall vision" (Cullen 1975, 5).

26. German intellectual traditions, in contrast to English ones, have been shaped by a strong belief in the dichotomy between the study of physical phenomena (Naturwissenschaften) and the study of human society (Geisteswissenschaften).

27. It is interesting to compare the work of Petty and statistically oriented scientists with the later work of Adam Smith, Thomas Malthus, Jean Baptiste Say and other classical economists. The economists were rationalists, who promulgated a theory of social equilibrium, which they were not especially interested in testing. The political arithmeticians (to use Petty's phrase to describe his work) were interested in how well theory conformed to facts. Thus, whereas Malthus (an early classical economist) asserted that life expectancies had been relatively constant throughout history, the political arithmeticians considered that a testable hypothesis. The conclusion about the merits of this idea were of great practical significance at the end of the eighteenth century. The economists of the day (or at least Malthus and Say) were content to ignore public health issues. Say also opposed efforts to improve social conditions in early nineteenth century France on the same grounds. They believed that whatever health or social improvements took place would be counterbalanced elsewhere, preserving the general condition of misery. The statisticians, on the other hand, thought that the smallpox vaccine and other public health measures could save lives on balance and that they should be introduced.

answer was the degree of imbalance in population of men and women. Another idea circulating at the time was that the human body was in danger every seven years and that human infants were in peril during weeks that were multiples of seven and nine. Thus, some of the hypothesis testing of early statisticians was to quell superstitious folk beliefs. They did so by contrasting population statistics with false inferences drawn from anecdotes. (The fact that legislatures still draw more on anecdotes than statistics shows that the early scientists were not entirely successful.)

By offering tantalizing conclusions based on the limited evidence available through parish records, these scientists convinced the leaders of a number of nations to initiate a national census. Sweden undertook the first modern census in 1748. In its reports, the Tabular Commission of that country not only reported the data on population size, it also offered an explanation for the low fertility rate that was causing what they regarded as underpopulation. When the United States began the first regular (decennial) census, it also did so to answer questions of practical importance: How were representation and taxes to be apportioned among the states.

Another eighteenth century development that permitted the later creation of social statistics was the refinement of life tables for the insurance business. The great regularity of mortality in large groups of people demonstrated to the mathematically-skilled scholars of the time (of which there were few) that social phenomena operated within the bounds of fixed laws that were not evident in the behavior of individuals. A life table made it possible to make predictions about the number of men and women who would die in a given year, even though it was not possible to predict the fate of particular individuals. This observation gave rise, in turn, to the belief among some statisticians that analysis of unseen regularities in society would permit leaders to shape the broad outline of the future, but not the details.

3. Public health and statistical inference in the 1830s

The positivist approach to social indicators became much more focused in the period from 1830 to 1850 in France, Belgium, England, and the United States. The interest in using statistics to reform society during this period arose in response to the strains and disruptions caused first by the Napoleonic wars and the consequent reductions in trade and later by industrialization and large-scale urbanization. In addition, the concept of public health emerged during this period, both as a product of statistical thought and as a catalyst for it. Much of the technical work on social indicators was carried out by physicians and then used by social reform groups. Applications of the theory of probability to large populations were refined during this period, so that it became possible to make more precise inferences about social phenomena. That is to say, analytical tools advanced considerably, without which useful inferences would not have been possible. In the 1830s, statistics came to be thought of in its modern sense as the science of society rather than as compilations of numbers.

Adolphe Quetelet, a Belgian mathematician, was perhaps the most important pioneer in the application of probability and statistics to social issues.²⁸ He was not only instrumental in

²⁸. The intellectual ancestry of Quetelet can be traced to Poisson, Laplace, and Fourier, the French mathematicians who had already been working on the application of probabilistic concepts to social events (Landau and Lazarsfeld 1968, p. 248). Quetelet was sent by his government's minister of education to Paris in the 1820s to meet with scientists and mathematicians in order to learn from them how to establish an

developing a new way of understanding society in statistical terms, he also set up the first International Statistical Congresses starting in 1853 that brought together researchers in this field from various countries.

One of the reasons Quetelet and others were attracted to statistics in the early nineteenth century was that it seemed to offer a way of understanding society that was beyond ideology. Statistics revealed an underlying order in society that persisted through periods of political instability and revolution. In addition, the nineteenth century marked an era of increased availability of data, although much of the growth in data collection was in response to the demands of social reformers.

Quetelet hoped to understand society and its subgroupings (especially as defined by social class) by the use of statistical means, "the average person," and variance around those means.²⁹ The statistical understanding of behavior gave birth to a new mode of thought that Quetelet called "moral statistics" or "social physics."³⁰ The former term simply referred to statistics dealing with socially significant behavior, while the latter referred to the similarity between the order in society and the order found in the natural world.

Quetelet began this course of social investigation after examining the first French judicial statistics in 1827. He was surprised by the regularity of age-specific crime rates. He was later struck by the relative constancy of marriage and suicide rates from year to year. These regularities in behavior convinced Quetelet that human behavior is governed by laws that transcend individual choice, despite appearances to the contrary. In effect, he was arguing that crime (or suicide or alcoholism) is "a property of the community, not of the malevolence of certain individuals" (Gigerenzer et al. 1989, 47). Quetelet understood that the attribution of the causes of pathology to social forces reduced personal responsibility. He did not deny the existence of free will, but he believed it operated within a much narrower framework than a more purely individualist philosophy allowed. Although everyone's freedom is constrained to some extent, social reformers and political leaders were not so limited by the statistical regularities. They were relatively free to determine the conditions that would either raise or lower the frequency of social pathology.

According to Quetelet, statistical laws showed that order was universal, that irrationality had its reasons, that even crime was subject to law. The findings of statistics implied that antisocial acts

astronomical observatory in Brussels. As in the eighteenth century, those interested in celestial harmonies were again the leaders in thinking about social harmonies that could be discovered mathematically.

²⁹. The concept of the average person represented a sharp break from the traditional concept of "the rational person," which had previously been understood as the norm for thinking about society. Whereas one might ask what the rational person would do in a given situation, one could ask what the average person actually does.

³⁰. Auguste Comte, often credited as the originator of positivism, "was annoyed because that 'mere' statistician Quetelet had appropriated his 'social physics' and obliged him to coin a new term, sociology . . ." (Gigerenzer et al. 1989, 46). In addition, Comte opposed quantification of social phenomena, although most later positivists did not share that prejudice. Comte believed in natural laws of historical development, which presumably were hidden from "mere" statistics. "Quetelet's statistical approach was the purest form of positivism, . . . too positivistic . . . for the founder of positivism himself, Auguste Comte" (Gigerenzer et al. 1989, 42).

were products of the social condition, and that these social maladies could be cured, or at least alleviated, by the scientific reformer (Gigerenzer et al. 1989, 41).

The analysis of statistical regularities would enable a benign government to intervene successfully in solving social problems—but only if the government focused on the condition of society, not the behavior or background of particular individuals. The state could not change which choices individuals would make, but it could (in principle) change social conditions and thereby influence outcomes on a statistical level.

Louis-René Villermé independently came to many of the same conclusions as Quetelet, perhaps because they were also derived from the mathematical ideas of Laplace and Fourier. Villermé, a physician, sought the cause of differential mortality in Paris in the 1820s (Coleman 1982, 149-180). Like Quetelet, he discovered that social conditions were to blame.³¹ By combining data from a survey of vital statistics with information on the distribution of wealth, he showed that there was a statistical correlation between poverty and high death rates. He showed the poor had higher birth rates, higher infant mortality rates, and lower average age of death. He also discovered that the rich abandoned unwanted infants more often than the poor did. In other words, he found not only differential mortality, but differential morality as well.³²

In England at the same time, a reform movement arose that was based on the idea that statistics could guide the development of policy. William Farr, one of the leading figures of this movement, developed a statistical approach to social problems that was similar to the models used by Quetelet and Villermé (Eyler 1979, chapter 1). That is due, in part, to his study of medicine in Paris starting in 1829.³³ In Paris, Farr acquired the image of public hygiene as the model of social improvement. Farr became aware from military records that clinical interventions with individual patients had virtually no effect on their death rates, but that public hygiene measures did reduce mortality substantially. This background in public health had a life-long influence on his work in statistics and social reform. Many of the other men who were active in social reform through statistical analysis in Victorian England were also physicians, in part because medical conditions and mortality were easier to quantify than many other social conditions.

³¹. In the case of medicine, the alternative explanation was not so much individual behavior as physical causes in the surrounding environment. Villermé was first able to disprove the long-standing assumption (based on Hippocratic theories) that illness was caused by environmental factors such as dampness and bad air (Latin: *mal aria*). He also found no statistical correlation between death rates in different sectors of Paris and the density of population, contrary to another popular theory at the time. Thus, he proved, by the standards of his time, that nature is not the cause of differential mortality. In doing so, he was as much responsible for the development of public health as William Farr and Edwin Chadwick in England. It is important to recognize, however, that physicians interested in public health were in a minority at this time. The statistical approach to medicine was considered an affront to the ethics of caring for each individual as a separate case.

³². Villermé also later pioneered the statistical study of working conditions through his analysis of textile workers.

³³. Farr was also influenced by "the British empirical medical tradition, a tradition represented by Thomas Sydenham and the latter's eighteenth century descendants" (Eyler 1979, 10). The British physicians, including Farr, were not as far advanced in statistics as the French.

Farr belonged to the first generation of career statisticians in England.³⁴ Although he maintained a very practical view of statistical work, he was, nevertheless, concerned with theory (Eyler 1979, 28-29).

He rejected the mindless garnering of numbers and had nothing but scorn for the "empiric who throws heaps of tables in our faces. . . ." In a medical editorial in 1837 he wrote: "Facts, however numerous, do not constitute a science. Like innumerable grains of sand on the sea shore, single facts appear isolated, useless, shapeless; it is only when compared, when arranged in their natural relations, when crystallized by the intellect, that they constitute the eternal truths of science" (Eyler 1979, 29).

Thus, like other positivists, he eschewed mere numerical description in favor of testing hypotheses and theories. Without theories, it is not possible to solve problems. This became the standard view of the statistical societies of the time. "Statistics . . . was to serve as a link between the other sciences and practical affairs. . . . The statistician, or 'statist,' as he was called, was to be the scientific expert in matters of policy, the one who spoke from a knowledge of facts, not from mere conviction" (Eyler 1979, 16). The key point is that statistical inference played a special role that was relevant for public policy. There was an implicit recognition that conclusions drawn from direct experience (with individual criminals or patients in a hospital) might be contradicted by statistical inferences. The latter were held to be more reliable as a basis for public health and other policy measures.

It would be wrong to infer that the positivist-historicist distinction was clear to anyone at the time or that it corresponded in a simple way with the differences between England and Germany. Influenced by German studies, English statistical societies conducted social surveys of English cities to measure social welfare. They were trying to answer the "condition of England question" with descriptive statistics (Eyler 1979, 17). Nevertheless, some English thinkers saw that it was possible to go beyond description. Farr and others with a background in public health used the data in the surveys not simply to write a detailed report, decry existing conditions, or create programs aimed at symptomatic relief (the response of academicians, social reformers, and bureaucrats, respectively). Instead, they laid the groundwork for a new kind of scientific understanding, reform, and government policy by analyzing causes and pointing to systemic remedies. They were particularly interested in determining the causes of epidemics and other threats to social well-being.³⁵

³⁴. Farr himself was both the chief statistician of the General Register Office from 1837 to the 1870s and an active member of the Statistical Society of London (later the Royal Statistical Society), as well as the statistical section (Section F) of the British Association for the Advancement of Science. Some of the other professional statisticians were Poor Law Commissioners.

³⁵. The prevalence of the statistical philosophy in solving social problems in the 1830s does not mean that all of the supporters of the statistical movement were competent in the use of statistics. Nassau Senior, a member of the House of Lords and the head of the Poor Law Commission, prevented an alteration of the Poor Law Amendment Bill in 1834 in the following manner: "Lord Ellenborough wished to make it possible for the authorities to grant relief at their discretion to those over 60. This would, in Nassau Senior's opinion, turn the aged into paupers, so he looked up John Rickman's life-tables for Essex in the period 1813-30. They showed that out of those who survived to age 20, nearly half survived to age 60. Hence, concluded Senior, nearly half of the adult population were over 60" (Cullen 1975, 84). On the basis of that confusion, he convinced Ellenborough to withdraw his proposal.

Statistical work has never been neutral. The biases of the statistician inevitably play a role in formulating hypotheses and in choosing which facts to gather. In early Victorian England, the reformers who used statistical techniques to analyze cause and effect were shaped by the interests of their social class.³⁶ The Manchester Statistical Society and other provincial societies argued that the suffering of the working class was due more to urbanization than to working conditions in factories (Cullen 1975, 106-108, 128).³⁷ The statisticians sought to deflect industrial reform measures and other potential attacks on property by channeling reform efforts into education and sanitation. Farr's conclusion (contradicted by Quetelet and especially by Villermé) that disease is caused by environmental factors (miasma) more than by social factors (such as income differentials) was almost certainly affected by his laissez-faire ideology and middle class background.

4. Hygiene and temperance: moral statistics in the U.S.

There were no individual figures in the United States at this time comparable to Quetelet, Villermé, or Farr who offered intellectual contributions to the development of the positivist approach to indicators. Nevertheless, there were physicians in the U.S. who were also intrigued by the new ideas about public health. From the 1830s onward, reform groups in the U.S. adopted both the metaphors and the statistical orientation of the public health movement and applied them to various social ills.

Reformers in the United States were primarily intent on purifying the morality of the nation. This was a concern of reformers in Victorian England as well, but it was a more pronounced theme in the United States than hygienic reform, which dominated the Old World. As a result, the statistical movement in America concentrated on studies of alcohol consumption, crime, and prostitution. (The pro- and anti-slavery forces also used statistics in their arguments.) In some cases, these studies involved gathering statistics that were intended to shock; in other words, they were descriptive indicators.³⁸ Still, many of the studies went beyond description and formulated a hypothesis.

³⁶. Francis Galton, independently wealthy cousin of Charles Darwin and the person who coined the term "eugenics" in 1883, took over the chair of the Anthropometric Committee of the British Association for the Advancement of Science from Farr in 1880 (Eyler 1979, 28; Gould 1981, 75). Galton represented the conservative school of thought that all characteristics were inherited. Farr and the other liberals believed that most observed characteristics were caused by environmental factors. Social reform ultimately lost out because of the dominance of the hereditarians who believed that social reforms would not help those they were intended to improve.

³⁷. It may in fact be true that urbanization was a worse culprit than the factory system since those working at home (in "cottages") also had high mortality rates. In retrospect, it would appear that the Enclosure Movements, which had forced millions off their land, was the underlying cause of the misery of many members of the working class.

³⁸. For example, the movement to eliminate prostitution used statistics in an attempt to alarm the public. A publication of the New York Moral Reform Society claimed that there were 12,000 brothels in the U.S., 75,000 to 120,000 prostitutes, and 500,000 licentious men. They also said that 20,000 women died each year from prostitution (Cohen 1982, 207-08). These statistics were not aimed at increasing understanding of the causes of prostitution. They were merely intended to shock the sensibilities of small-town readers.

The most common theory in mid-nineteenth century America was that alcohol was the source of social evil. Almost every vice in American society was traced to "demon rum" and affiliated liquids. In particular Samuel Chipman concluded in 1836 from his surveys of poorhouses and prisons that heavy consumption of alcohol was a major factor in both poverty and crime (Davis 1972, 172; Cohen 1982, 211-12).³⁹ The desire to analyze statistically the consequences of intemperance was not isolated to a few individuals. In 1833, a national temperance convention passed a resolution calling for the collection of accurate statistics on alcohol consumption and on "the number of deaths, paupers, and crimes attributable to drink" (Cohen 1982, 171).

5. Race: the enduring shadow in American society

The temperance debate was overshadowed from 1840 to 1860 by the national debate over slavery. After the census of 1840 the debate shifted from the intrinsic morality or immorality of the "peculiar institution" to its statistically verifiable consequences. That census marked one of the world's first efforts to gather national social statistics, including data on insanity and "idiocy" (Anderson 1988, 28; Cohen 1982, 176-78).⁴⁰ When the data became available in 1842, Edward Jarvis, a Massachusetts doctor specializing in the study of insanity, discovered major anomalies: "the returns showed that the black population in the North suffered from insanity at a rate more than ten times greater than blacks in the South" (Cohen 1982, 192). They showed that the rate of "idiocy" and insanity among free African-Americans in the North was higher (1 in 162) than among the slaves in the South (1 in 1,558). The rates ranged from a high of 1 in 14 in Maine to a low of one in 5,650 in Louisiana. The farther north one went, the higher the rate of insanity among African-Americans. (The rate for whites was fairly constant: 1 in 970 in the North, 1 in 945 in the South.) John C. Calhoun and other proponents of slavery cited this as evidence that slavery was indeed a beneficial institution for those who were enslaved. (The figures also suggest that whites in the South would have benefited from being enslaved as well, but no one seems to have drawn that inference.)

The only way to refute the conclusions was to engage in esoteric debates about methodology. Jarvis found some errors in the raw census results that helped explain what had gone wrong.⁴¹ Yet, neither he nor anyone else at the time was able to discover the true cause of the error, in particular the simple fact that the larger number of African-Americans in the South (the denominator of the proportions) diluted the effects of enumeration errors more than in the North.⁴² No official investigation was made because Southern senators had no desire to determine the truth.

³⁹. The same (incorrect) inference has been drawn in the 1980s and 1990s that "drugs" are a primary cause of poverty and crime.

⁴⁰. Cohen (1982, 178) explains that statistics on insanity were collected in 1840 at the behest of "physicians who had been making assiduous private efforts to find correlations that would explain the rising insanity rate . . ."

⁴¹. Jarvis was able to determine that there were large populations of whites in the asylums of Massachusetts who had been recorded on the census as black. He also discovered counties in Maine that contained not a single African-American, yet which were listed in the census as having several insane blacks.

⁴². The error was caused by several factors (Cohen 1982, 202-204): the confusing manner of printing the census forms; the likelihood of classifying older, white, senile people as lunatic blacks; and the much larger population of African-Americans in the South, which raised the denominator when calculating the rates of insanity among blacks in those states. Ultimately, the problem stemmed from a badly designed census form, not a conspiracy. As Cohen explains, "Each schedule contained seventy-four columns, with headings in

The truth, we are told, is the first casualty of war. It does not survive political conflict very well either. The misuse of statistical evidence by all sides has been a mainstay of politics ever since the census of 1840. Descriptive statistics are commonplace in politics because they are more malleable and evocative. But when a positivist model of causality fits the ideology of one side or another in political debate, it is an even more powerful tool.

The conflict over race since the Civil War has been heavily influenced by positivist statistics and indicators. In the nineteenth century and much of the twentieth century, the racist use of statistical models was the norm. Stephen Jay Gould has traced that sad history. In the 1840s, Samuel George Morton provided "evidence" of the intellectual inferiority of various people of color by demonstrating that their cranial capacity was smaller than that of Indo-Europeans. The errors that Morton made that biased his estimates were not conscious. As Stephen Jay Gould says about Morton, "All I can discern is an a priori conviction about racial ranking so powerful that it directed his tabulations along preestablished lines" (Gould 1981, 69). Robert Bennett Bean published similar brain-size measurements in 1906. His mentor at Johns Hopkins, Franklin P. Mall, demonstrated the error in Bean's procedures, "but not before a leading journal had recommended that blacks be barred from voting as a consequence of their innate stupidity" (82). This pattern begun by Morton and Bean continued for decades in the work of respected scientists. As recently as 1951, the Hall of Man at the American Museum of Natural History still displayed the characters of human races by linear arrays running from apes to whites. Standard anatomical illustrations, until this generation, depicted a chimp, a Negro, and a white, part by part in that order—even though variation among whites and blacks is always large enough to generate a different order with other individuals: chimp, white, black (88).

Gould (1981, 192-233) also shows how a confused hereditary theory, combined with misuse of test scores as true measures of general, innate intelligence, led to continued pseudo-scientific validation of racist and nativist theories. In 1923, C. C. Brigham published *A Study of American Intelligence*, drawing on a report by Robert M. Yerkes on the results of testing thousands of army recruits.⁴³ Brigham used the flawed data and incorrect inference to conclude that Jews and other recent immigrants were of subnormal intelligence and that immigration of certain nationalities or ethnicities should be restricted on eugenic grounds. Cornelia James Cannon argued in the *Atlantic Monthly* in 1922 that the test results also demonstrated the wisdom of "separate but equal" schools in the South. Thus, the indicators of intelligence that were devised by a few scientists destroyed the lives of millions of people, including many who died in the Holocaust—because Jews were denied entry into the U.S. As Gould concludes: "The paths to destruction are often indirect, but ideas can be agents as sure as guns and bombs" (233).

By the 1930s, however, the tide began to turn. Anthropologists provided statistical evidence countering the earlier assessments of differences in intelligence by race. As a result of that work,

microscopic type printed across the tops of two pages" (1982, 186). Under those circumstances, mistakes were inevitable.

⁴³ In 1930, Brigham publicly modified his views, pointing out the biases in the tests from which he had drawn his conclusions, but by then it was too late. The country was in the throes of a nativist spasm, and his recantation was little noted.

the Supreme Court declared in 1954 in *Brown v. Board of Education* that laws imposing "separate but equal" schools were unconstitutional. The court explicitly cited the work of Kenneth Clark (1950) and others, which showed the deleterious effects of segregation on school performance among African-American children. More than a century after the first statistical justifications of racism had appeared, a universalistic approach had been given legal status.⁴⁴

Racist uses of statistical analysis continue to plague us. The serious treatment of *The Bell Curve* (Herrnstein and Murray 1994), which treats group differences in intelligence test scores as evidence of innate differences in ability, demonstrates that the issue will not go away. It might seem, therefore, that positivist statistical analysis has little value if it enables pernicious ideas to maintain credibility. Yet, consider that in the early nineteenth century, many abolitionists were convinced that Africans were innately inferior to Europeans, whereas a minority of people in America believe that today. Analytic, not descriptive, uses of statistics were largely responsible for that paradigmatic change in an entire culture. Because the debate was over the status of groups, not of individuals, the defeat of pseudo-scientific racism depended upon statistical arguments.

6. The negative income tax and the welfare reform debate of the 1970s

The demonstration research projects conducted in the United States in the 1970s are an interesting application of the positivist approach to analyzing social problems. In the 1960s and 1970s, concern about the rising costs of the welfare system led to a number of proposals to reform welfare. One proposal, the negative income tax, was favored by some within the Nixon Administration.⁴⁵ A negative income tax essentially allows those on welfare to work and retain a certain percentage of their welfare benefits based on their earned income.

Rather than focus only on overall trends of inputs (such as welfare costs) and outputs (such as changes in household income or poverty levels) to assess the overall effects of the welfare system, the demonstration research project used indicators to measure the effectiveness of a particular policy proposal. While it is true that a descriptive approach might analyze the overall effects on subgroups in order to make more accurate generalizations, the positivist approach employed in the research project used indicators to test a specific hypothesis about welfare reform.

The research project designed to test the idea of the negative income tax was formulated during the Johnson Administration and carried out during Nixon's. The first demonstration project took place in New Jersey. Subsequent studies took place in Denver and Seattle. Advocates of the negative income tax believed that the policy would increase the incentive to work for those on welfare and

⁴⁴. It might seem that the "Coleman Report" (Coleman et al., 1966) and later follow-up statistical analyses perpetuated the justification of segregation by finding that school integration, by itself, made no significant difference in the educational outcomes of African-American children. These studies also found that changes in school spending had little effect on school performance, contrary to conventional wisdom (Jencks 1972, 194). But those studies did not confirm racial inferiority. Instead, they demonstrated that schools cannot carry the entire burden of equalizing opportunity and that segregated job and housing markets are greater obstacles to equality of opportunity than segregated schools. Over 30 years later, Americans are still resisting the clear implications of the statistical results.

⁴⁵. Meanwhile, in California, Governor Ronald Reagan was developing the "conservative" vision of welfare reform (simply eliminate benefits) that culminated in the recent welfare reform in the United States.

decrease the overall cost of welfare. By allowing people to retain a percentage of their welfare benefits while they worked to earn additional income, they would increase their total income and decrease their welfare receipts. The catch was that it was possible for someone maintain their current income level by working less and obtaining an additional part of their income from welfare payments. The question, therefore, was whether there would be a net increase or decrease of aggregate welfare payments. Although there is some controversy over the interpretation of results, the general consensus is that the negative income tax does not work to reduce the total cost of welfare (Nathan 1988, 49-60). This surprised many advocates of this approach who had expected the results to be positive.

The "supported-work" demonstration project conducted by the Manpower Demonstration Research Corporation (MRDC) is another example of the positivist approach. Supported-work represents a different hypothesis about how to reform welfare. This approach advocates the use of services (such as counseling, job placement services, vocational training, and education) as a way of helping those dependent on welfare increase their opportunities to work. This "service approach" to reforming welfare, as opposed to the "income maintenance" strategy described above, was not just of interest to those who wanted to reform welfare. Social workers who were trying to increase employment among youth or help ex-addicts reenter the workforce thought the same approach might make their efforts more effective (Nathan 1988, 102-3).

The results from the supported work demonstration project showed some interesting results. The supported work approach was most helpful for single-mother AFDC recipients, as it both increased their income and reduced the total cost of welfare. It did not make as much difference for the other groups in the project (Nathan 1988, 106-10). This implied that the most effective supported-work program would target single mother AFDC recipients and that other ideas were needed to address the problems faced by the other groups in the study. Another interesting finding was that the AFDC "participants with serious problems tended to register relatively larger gains than more experienced and better-qualified workers" (119). This finding is counter to the commonplace notion that such programs tend to be more useful to those who are already at a relative advantage.

Based on his involvement as a user and producer of public policy research, Nathan advocates the use of large-scale demonstration research projects that are interdisciplinary in design, use both quantitative and qualitative methods, and address *how* to do something rather than *what* is to be done.⁴⁶ In his view, applied social science research should move away from the description of conditions and trends (with its implied goal setting) and onto testing whether a policy (based on some causal hypothesis) works to ameliorate the problem (Nathan 1988, 16-17).

A positivist approach to understanding social problems relies on testing hypotheses about what causes problems and what we can do to change social conditions. If the purpose of indicators is to help us improve social conditions and quality of life, we will likely have more success if we employ a positivist approach to the work. Although indicators do not play a pivotal role in demonstration

⁴⁶ Demonstration research amounts to a social experiment to test a hypothesis about whether or not a policy will work. Ideally the projects use random assignment to create a control group to allow comparisons with the test group. The many technical, administrative and ethical difficulties in conducting large scale experiments are discussed at length in Nathan's account of his experience with the Manpower Demonstration Research Corporation.

research projects described above, the studies illustrate the potential benefits of trying to test alternative ideas about what will change conditions and trends, instead of trying to more accurately describe them.

IV. CONCLUSION

Although our brief history might suggest that historicism and positivism have run along parallel tracks, they have intersected frequently and contentiously. In the nineteenth century, a key dispute was over the relative weight to assign social and individual factors in illness. Another debate was about whether to adopt a liberal (*laissez-faire*) approach to economic life or a managerial (welfare state) approach. In the twentieth century, there was a conflict between those who favored the use of Keynesian macroeconomic tools and those who hoped to discover the mysteries of the business cycle by examining it in intricate detail.

The influence of Keynesian models and of the positivist paradigm grew until the mid-1960s, when faith in them began to evaporate. Since that time, policy has been driven by multi-sector models that rely on masses of data rather than relatively simple models based on theoretical principles. Thus, even within the field of national economic policy, positivism has been largely eclipsed by historicism. (Microeconomic policies are still positivist in orientation, but even there, the historicist framework has crept in through case studies, anecdotal evidence, and the like.)

Much of what passes for analysis today in the social sciences is still only a matter of complex description. A great deal of systems theory now ignores the original positivist, cybernetic models (with a few control variables) and substitutes detailed descriptions of a multitude of interactions.

The reliance on historicist methods is especially true of social indicators. Since descriptive indicators fit more closely with common sense, they have always dominated social indicators research. There would be no harm in that if planners and practitioners expected nothing more from those indicators than impressionistic results. However, many who favor the historicist approach also hope that it will lead to real social change if they try hard enough. They are unlikely to succeed.

A reasonable response to this condition is a displacement of goals. Since descriptive indicators cannot be used as predictive variables, they can become the framework for consciousness-raising and consensus-building processes. Nevertheless, this is not likely to be fully satisfying. Few people want the results of their work on indicators to be purely symbolic or affective.

Yet, if the indicators movement does not transcend the historicist approach to social phenomena, there is a danger that it will flourish once again for a few years and then die. That happened in the 1870s, 1920s, and 1970s when national indicators gained prominence. It also happened in the 1910s when the precursors of community indicators blossomed under the leadership of the Russell Sage Foundation.

Recognition of the contribution offered by positivism could deepen, transform, and sustain the social indicators movement. The analytic and predictive orientation of the positivist approach would improve all aspects of indicators development.

First, it would point toward more fruitful data collection. Data are relevant to social reform only when they help prove or disprove a hypothesis. Historicists begin with data and hope to find a pattern in it. Positivists begin with a hypothesis about what the pattern ought to look like and gather data to test it.

Second, positivism offers causal models for testing. This approach begins with a relevant question about some social relationship that is perceived as problematic. By contrast, the descriptive or historicist approach begins with facts and tries to discover a framework that will make them meaningful. For positivism, meaning is built in, not an add-on. As a result, if an indicators group followed a positivist model in developing social indicators, there is no danger that it would end up by asking, "What should we do with what we have?" or "How can we convince the public that our indicators are significant?" If a group could offer defensible explanations about what causes changes in their indicators and thereby show what sort of program would be effective, the value of the results would be self-evident. What is less self-evident is the value of simply collecting statistics that show how terrible conditions are.

Third, a positivist approach clarifies the relationship between factual disputes and value formation. Whereas historicists think of values as fixed formations that can be applied to changing circumstances, positivists regard values as arenas of conflict that emerge from the discovery of new factual premises. Positivists are interested less in general issues (e.g., "quality health care" as a value) on which there is consensus than in specific issues which are disputed (e.g., single payer vs. managed care vs. health-care vouchers). Indicators are of use to the positivist primarily when they make clear the nature of particular value conflicts.

While descriptive indicators enable a consensus to emerge about the existence of problems, they offer no guidance about how to solve them. Social indicators promote the mistaken notion that to know a problem and have the will to solve it is enough. If those engaged the social indicators are to be part of the solution and not part of the problem, they will need to examine how they might learn from the positivist tradition about the use of indicators as predictive variables.

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CSLS Conference on the State of Living Standards and the Quality of Life in Canada

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niveaux de vie*

Trends in Canada's Natural Capital

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Session 3: Sustainability I "Intergenerational Bequests of Natural and Human Capital"
October 30 11:30 AM - 12:30 PM

Trends in Canada's Natural Capital

1. Introduction

Historically, the well-being of a country has been measured in terms of the value of goods and services produced within its borders - largely ignoring environmental factors and natural resource wealth. To improve this situation, governments - and ours is no exception - have been actively engaged in trying to establish a system of “green” accounts which take stock of a country’s natural wealth and how it changes over time. Norway was the first to introduce physical measures of the stock of natural resources in the national accounts and Canada has followed suit since 1986. Satellite accounts of the natural capital may also include valuations of resources and the environment as well as trace changes in the stocks of forests, minerals and agricultural land. Alternative measures of economic activity can also be derived which incorporate changes in natural capital by deducting expenditures made to reduce welfare effects of resource depletion and environmental degradation.

On the path towards a comprehensive evaluation of wealth, Canada identified and developed environmental “indicators” that assess how we are progressing (or regressing) over time. Since this process began a decade ago, statistics on some 17 key indicators in four key areas are currently available.¹ This list will grow over time. Because of the increased awareness of the importance of environment and resources to well being, a staggering quantity of data is now available on a large number of indicators.

¹ The four areas (and indicators therein) are: Ecological Life Support Systems (stratospheric ozone depletion, climate change, toxic contaminants in the environment, acid rain, biodiversity change and marine ecosystems); Human Health and Well-Being (urban air quality, urban water, freshwater quality, urban green space); Natural Resources Sustainability (forests, marine resources and agricultural resources); and Pervasive Influencing Factors (passenger transportation, energy consumption, population growth and lifestyle patterns, and solid and hazardous waste generation).

However, while the current situation represents a vast improvement over previous years in terms of the availability of information, it remains difficult to sift through the deluge of figures to try to paint a portrait of the Canadian situation.

One of the main focuses of this paper is to try to present a clearer picture of the state and evolution of Canada's natural capital. Natural capital here is defined broadly in terms of environmental amenities and natural resources. The paper will thus add to the small body of literature that attempts to do just this, including a recent *Fraser Institute* (1997) document that examines various indicators in Canada and the U.S., and a *World Bank* (1997) document that takes account of the stock of natural resources in countries world wide.

The data used in this study come primarily from Statistics Canada's *Econnections* data base, CANSIM, and Environment Canada's *National Environmental Indicator Series*. The paper provides an overview of the available data articulated around three main themes: Natural resources; environmental degradation of air, water and land; and policy responses over time.

2. Natural Resources

Canada is one of the wealthiest in the world. And, once account is taken of our natural resources, the wealth of Canada becomes increasingly apparent. Indeed, in a recent World Bank study, Canada ranked **third** of 93 countries in terms of an estimated per capita value of "natural capital" (World Bank, 1997, p.34). To obtain these figures, this document employs a necessarily crude measure of what constitutes "nature capital" and how it is valued.² The problems associated with valuing a country's stock

² Natural capital, according to World Bank (1997, p.34) is measured as a sum of cropland, pastureland, timber resources, non-timber forest resources, protected areas and subsoil assets.

of natural resources are well documented. Heroic assumptions must necessarily be made in order to come up with figures that may be compared across countries. Rather than focusing on the validity of these assumptions - which is the subject of much debate and research - here we simply note that, in cross country comparisons, Canada is one of the wealthiest nations on earth.

Is our natural wealth growing or diminishing over time? One way to answer this question is to look at how the stocks of the various components of our natural resources have evolved. As straightforward as this may sound, it is actually rather complicated to determine what is the stock of natural resources. Aside from the obvious problems associated with determining how much of various minerals are under the ground (and here we speak only of those finds we know), it is extremely difficult to measure even those resources that are physically visible - like forests.

2.1 Forests

Looking at graph 1 we see that the total quantity of timber assets by province, measured in thousand cubic meters, has been slowly declining over time. For instance, in 1961 BC had 6195 million cubic meters of timber whereas this figure falls by 12% to 5432 by 1990. The story for Canada as a whole is very similar, as seen in graph 2. The value of timber stocks has fluctuated rather significantly since the late 1970s, as shown in graph 3. To put these numbers in context, note that in 1992 about 930,000 hectares were harvested, which represented about 0.8% of the managed forest area and about 0.4% of

Canada, not surprisingly, is particularly rich in subsoil assets. Notice that this definition falls short of the definition to which we subscribe insofar as we include environmental amenities as part of a nation's natural capital.

Canada's total timber forest.³ Of this figure about 90% of the area harvested each year represents forests that had not previously been commercially cut.

The quantity of timber harvested is affected by several factors - the amount of wood harvested, the age of the forest, the rate of forest regeneration, forest fires and disease. Different forests are affected differently by each of these factors. Typically, harvesting has replaced fire as the major cause of the decline in timber stocks, partly because of better fire management techniques.⁴ Despite the upward trend in the annual volume of wood harvested from 1950 to 1992 - as shown in graph 4 - the total volume is also likely to decline in the next 10 years due to the falldown effect. This effect, more severe in British Columbia than other provinces, refers to the decline in timber supply associated with the transition from harvesting a mature and previously uncut forest to the sustainable harvesting of a rotational forest. In British Columbia, the falldown effect is expected to result in at least a 20 percent decline in the volume of timber harvested over the next few decades from its current level of 71.6 million to around 50-60 million cubic metres.⁵

2.2 Fisheries

Canada's fisheries encompass a vast area of water and include a range of species often grouped into four main categories. Groundfish species (such as cod and halibut) are caught near the ocean floor and have traditionally provided the greatest quantity of fish by weight, pelagic species (such as herring and capelin) are caught near the surface often at times when the fish congregate to spawn, invertebrates

³ See Environment Canada (http://199.212.18.79/~ind/English/Forest/Bulletin/foind1_e.htm).

⁴ See Environment Canada (http://199.212.18.79/~ind/English/Forest/Bulletin/foind1_e.htm).

⁵ See British Columbia Ministry of Forests (<http://www.for.gov.bc.ca>).

(including crustaceans such as shrimp, crab, and lobster and shellfish) are caught in a variety of ways and often provide the highest value per weight of fish, and anadromous species (such as salmon) are caught both at sea and in rivers and are very important in terms of aboriginal and recreational fishing.

Given the immense variation in the habitats and life-cycles of the many different fish species, generalizations about the overall state of Canada's fish stocks are not possible. Nevertheless, within the different categories of species some noticeable trends are discernible over time. The most important change in the status of fish stocks in the past 25 years has been the collapse of the groundfish fisheries of Atlantic Canada. Many groundfish stocks have been affected and the most important stock has been the northern cod fishery located in the Northwest Atlantic Fishery Organization (NAFO) areas 2J3KL. The exploitable biomass, defined as the total weight of all fish which potentially may be caught, was at its highest level in 1962 at almost 3 million tons - graph 5. Due mainly to foreign exploitation the stocks fell to an estimated 526,000 tons by 1977. Following extended Canadian fisheries jurisdiction which began in 1977, the stock slowly recovered to over 1 million tons by 1984. However, despite a fishing moratorium which has been in place since July 1992, the exploitable biomass has collapsed and was estimated to be as little as 21,000 tons in 1997 (Department of Fisheries and Oceans, 1998). The overall downward trend is repeated for other groundfish species in Atlantic Canada, although for most species the collapse has not been as dramatic as in the northern cod fishery. The net effect has been an almost 80 percent reduction in the total Atlantic catch of all groundfish from over 520,000 tons in 1972 to just over 110,000 tons in 1996⁶ - graph

6

⁶ See Department of Fisheries and Oceans catch statistics at www.dfo-mpo.gc.ca/communic/statistics/landings.

A considerable fluctuation in abundance and catches is characteristic of pelagic species. In the Pacific, the Strait of Georgia herring fishery experienced a collapse in 1967 which led to a four year harvesting moratorium. Despite very significant fluctuations in the stock, the pre-fishery biomass which was estimated at 82,000 tons in 1998, is at one of its highest levels in three decades. By contrast, Canada's largest pelagic fishery - the Scotia-Fundy herring fishery - has experienced a decline in abundance in the 1990s. Landings of herring in Scotia-Fundy have fallen to 100,000 tons in 1997 from an average yearly harvest of 188,000 and 156,000 in the 1970s and 1980s. As a result, the total Canadian catch of pelagic species has fallen from around 460,000 tons in 1972 to some 320,000 tons in 1996.

Catches of invertebrates, in contrast to groundfish and pelagic species, have increased almost four fold in the past 25 years. The biggest increases have been in terms of crustaceans such as shrimp, crab and lobster. Despite the increases, evidence exists that some stocks may be in decline, including the important Atlantic lobster fishery.⁷

Anadromous species, such as salmon, are subject to very large fluctuations in catch from season to season. Thus overall trends in abundance are difficult to separate from annual fluctuations. Nevertheless, the stock of Atlantic salmon appears to have oscillated around a declining trend since the 1970s and some abundance measures have reached their lowest levels ever in the 1990s.⁸ On the Pacific coast, five species of salmon (not including steelhead and cutthroat trout) are caught. In recent years, a dramatic decline in abundance of coho has been observed which has led to special conservation strategies to protect the species. The most important stock, in terms of catches, is the Fraser River sockeye which experienced

⁷ Department of Fisheries and Oceans Stock Status Report C3-58 (1998).

⁸ Department of Fisheries and Oceans Atlantic Salmon Abundance Overview for 1997.

large drops in catches in 1995 and 1996, and again in 1999.

Overall, several important fish stocks have declined over the past 25 years despite extended fisheries jurisdiction since 1977. Some of the declines are due to environmental factors but, at least in the case of many of Atlantic Canada's groundfish species, overharvesting has contributed to the decline in stocks.

2.3 Minerals

Canada is rich in several minerals, metals and ores - including coal, iron, potash, silver, uranium, crude oil and natural gas. For the sake of brevity, we concentrate on crude oil and natural gas and graph 7 shows the evolution in the stock of crude oil from 1961 to 1995. During the decade of the sixties, the known reserves steadily increased, whereas since 1970 they have been more or less on the decline. Further information can be obtained from looking at the *value* of crude oil reserves in Canada which takes account of the price of oil on the world market. From graph 8, we see that the value of oil reserves increased steadily and quite dramatically throughout the 1970s and early part of the 1980s - a period of rising or relatively high world oil prices. Since then, until 1995, the value of these reserves has fallen considerably; indeed, the value of reserves in 1995 is lower than it was in 1971 in real dollars.

The magnitude of natural gas reserves in Canada grew steadily from 1961 to 1982, at which point they began to fall and have gradually declined until the end of our data in 1995, as shown in graph 9. Nevertheless, in 1995, the known reserves of natural gas were 67% higher than they were in 1961. By contrast, the value of the natural gas stock displays quite a different pattern over time, as seen in graph 10. Over the first half of the time period, from 1971 to 1983, its value was increasing; since then, it has generally declined. Once again, the importance of price in determining the value of natural resource stocks

is underscored.

2.4 Wildlife and Biodiversity

One measure of the wealth of a country is the richness and diversity of its plant and animal life. Trying to determine biodiversity is an extremely complicated process - which certainly cannot be dealt with adequately in this current review. Nevertheless, because of its importance as a component of natural capital, we would be remiss to ignore this topic altogether.

We examine a couple of problem areas associated with determining the “stock” of wildlife and extent of biodiversity in Canada. To begin, it is useful to note that Canada is comprised of five distinct marine ecozones - Pacific, Arctic archipelago, Arctic basin, Northwest Atlantic, and Atlantic - and some 15 terrestrial ecozones.⁹ Each ecozone has its own particular characteristics and its own ability to cope with environmental challenges. Table 1 presents a summary of the biophysical characteristics of these zones. Clearly, each area differs quite substantially in its plant and animal life. In some zones, like those in the arctic, seemingly small changes in environmental conditions may have a catastrophic impact on life within their borders. Other zones, especially in the south, can withstand much greater environmental changes.

Most of the Canadian population - 51% - lives in the Great-Lakes-St. Lawrence region which is the mixed wood plains ecozone. This zone comprises, however, only 2% of the total area of Canada. Table 2 provides a useful summary of the environmental and socioeconomic characteristics of our fifteen terrestrial

⁹ Arctic Cordillera, Northern Arctic, Southern Arctic, Taiga Plains, Taiga Shield, Taiga Cordillera, Hudson Plains, Boreal Plains, Boreal Shield, Boreal Cordillera, Pacific Maritime, Montane Cordillera, Prairies, Atlantic Maritime, and Mixedwood Plains.

ecozones.

Very little information is available over time concerning wildlife and biodiversity. Most of the available information is of a qualitative nature rather than quantitative. One exception is with respect to birds. Table 3 shows the percentage change in the population of breeding birds over the period 1966 to 1994. Overall, a small decrease in the number of such birds is observed - however, this result depends upon the terrestrial ecozone in question.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has compiled several lists of endangered species. In 1995, about 200 species were either endangered or threatened in Canada. Unfortunately, it is extremely difficult to get a consistent time series of consistent data reflecting endangered species in Canada. According to an official at COSEWIC, the lists of species that are endangered reflect largely the time and resources available to the team constructing the lists rather than the actual situation, *per se*. Budget and time pressures mean that accurate accounting is simply not available for our wild and plant life in Canada.

2.5 Remarks on our stock of Natural Resources

Canada is rich in natural resources. However, some resource sectors have experienced more difficulty than others. Part of this difficulty may be linked to property rights, the absence of which often leads to an overuse of the resource. For those resources where property rights have been well-established - like minerals, potash and ores - their extraction is relatively well-managed.¹⁰ In others, like fisheries and forestry, serious problems have arisen with overuse.

¹⁰Although problems still exist in these resources, see Anderson (1991) especially chapter 8.

Canada's renewable resources have not been as well managed as its nonrenewable stocks. In particular, fishery resources have suffered from policies which have encouraged and even subsidized fishing leading, in some cases, to significant declines in important fish stocks. In the past three decades, hundreds of millions of dollars have been spent on federal deficiency payments and various subsidies to fishers (Crowley *et al.* 1993). Moreover, unemployment insurance benefits for self-employed fishers in Atlantic Canada in 1990 were on average over 80 per cent of the income they received from fishing - a level of support which has encouraged people to enter and remain in the industry. Policies which limit reduction in the total harvest, following a decline in the stock, have also been applied so as to avoid dislocations for people involved in the fishery.¹¹ Such approaches have contributed to the over exploitation of some groundfish stocks in Atlantic Canada. In fisheries where managers and fishers have set up systems to co-manage the resources, often with individual output controls, fisheries management has been much more successful.

In forest management, crown ownership of the lands means that appropriate prices have to be established for those who use the forests. Unfortunately, much conflict exists between those who harvest the trees for commercial use and those who would like to preserve them for future generations. Such conflicts have been most noticeable in British Columbia and have led to a major shift in forest policy and timber practices over the past decade. In addition, changes have occurred in the stumpage system---the amount charged harvesters for cutting trees on Crown Land. Until 1987, stumpage was calculated as a residual equal to the market value of timber (accounting for costs of delivery) less operating costs and an

¹¹ A useful discussion of policy instruments in the fisheries is contained in Anderson (1991, Ch.7).

allowance for risk. Such a system led to “highgrading” whereby firms harvest only those trees that provide a net return equal to or in excess of the stumpage, leaving (often damaged) trees behind. The new BC stumpage system avoids this problem but, in recent years, may have collected more rent than actually exists in the industry (Grafton *et al.* 1998).

In recent years, provincial governments (which own about 88 percent of commercial forest land in Canada) have begun to improve their tenure arrangements with timber companies. For example, Ontario’s *Crown Forest Sustainability Act* of 1995 has led to the use of sustainable forest licences which have a duration of 20 years. Increased security and length of tenure should, in turn, improve forest and management practices of licence holders. Similar tenure arrangements have also been introduced into British Columbia although harvesters are obliged to follow a sustained harvest level, called the annual allowable cut (AAC).

Because of marked differences in the stock of different natural resources, it is difficult to summarize our current situation relative to earlier decades. Even our known non-renewable resources are not necessarily depleting as we become aware of new finds. Overall, the biggest problems seem to have arisen in our renewable resources, notably the fisheries and forestry sector.

3. Environmental Degradation

The topic of environmental degradation - pollution in short - is so multi-faceted as to render very difficult its treatment in a concise manner. We simply cannot do justice to every component of the problem in the space we have available. To frame our discussion, it may be useful to refer to the categorization used

by Environment Canada in its National Environmental Indicator Series namely: stratospheric ozone depletion; toxic contaminants; acid rain; climate change; and urban air quality.

3.1 Stratospheric ozone depletion

The stratospheric ozone layer protects the earth from the sun's harmful ultraviolet (UV) radiation. UV-B intensities have been increasing on the earth's surface - growing some 10% over the decade 1986 to 1996.¹² Exposure to this radiation is linked to skin cancer, cataracts in humans, depression of the immunization system and is potentially linked to disruptions in crop yields and marine life. Several human-produced ozone-depleting substances have been identified as having an impact on the thickness of the ozone layer, namely: chlorofluorocarbons (CFCs), bromofluorocarbons (halons), methyl chloroform, carbon tetrachloride, methyl bromide and hydrochlorofluorocarbons (HCFCs).

As a result of increased awareness of the importance of the ozone layer, the Vienna Convention in March 1985 set up a group to develop a protocol for the use of ozone-harming substances. The Montreal Protocol arose from this initiative and was adopted in September 1987. So far, some 162 countries - including Canada - have ratified the protocol and have begun to introduce measures to phase out the production and use of these substances.

Several problems are associated with pollutants like CFCs that result in a global externality. Clearly, international cooperation is essential in order to improve the situation. As long as some countries still permit the production of these products, international markets will flourish. For instance, a thriving

¹² See Environment Canada (http://199.212.18.79/~ind/English/Ozone/Bulletin/st_iss_e.htm).

black market in CFCs is now in operation into the United States for precisely this reason¹³. In Canada, criminal suits are now being successfully prosecuted for illegal trade in ozone-depleting substances.¹⁴

As a direct result of policy initiatives, new production of ozone-depleting substances has dropped substantially in Canada since 1987, as shown in graph 11. Note, too, that the fall in production of these substances is not the result of a fall in economic activity over the same period - as reflected in real Gross Domestic Product (GDP). Globally, the trend in the production of CFCs displays a similar drop since the late 1980s, as shown in graph 12. While global production is falling for certain substances, however, the stock of ozone-depleting chemicals continues to rise. As a consequence, global concentrations of the most abundant ozone-harming substances - CFC-11 and CFC-12 - have been increasing since measurements began in 1977 - although they appear to have leveled off somewhat in the early 1990s. By 1997, the stratospheric ozone level above Canada had improved since its worst measurement in 1993 but remains about 10% thinner than it was in 1980. Graph 13 shows the ozone levels above the City of Toronto from 1960 to 1995.

3.2 Toxic Contaminants

¹³ According to officials in Miami “CFCs are the port’s second most profitable contraband after drugs” (*The Economist*, 9 December 1995, p.63).

¹⁴ For instance, in a well-publicized case, a Fredericton automobile dealership was charged in May 1997 of ten counts of exporting CFCs without valid permits. The owner was also charged in the United States of illegally importing this substance. (CFCs are used in automobile air-conditioning units.) Several prosecutions have resulted in fines: for instance, in Ontario, Amcast Industrial Limited was fined \$25,000 for selling a cleaning product that contained CFC 113 an ozone depleting substance, another company (Hi-line Manufacturing) was fined \$100,000 for importing and selling CFCs. For further details see: www2.ec.gc.ca/enforce/prosec/english/city_p_e.htm.

According to Environment Canada¹⁵ more than 35,000 commercial chemicals are reported in use in Canada today. One group of substances that is associated with harmful effects on animals and humans are known as *persistent organochlorines* (POs). Organochlorines include the insecticide DDT, polychlorinated biphenyls (PCBs), and polychlorinated dioxins and furans. These substances are called “persistent” because they take a long time - sometimes centuries - to break down naturally. They thus tend to accumulate in the tissues of some animals - which may result in very high concentrations of POs in the top predators of the food chain. Two other groups of substances of concern to wildlife are heavy metals (lead, mercury and cadmium) and organophosphate and some pesticides.

One way to measure the extent of contamination - and the extent to which human health may be affected - is through wildlife. For instance, because of its broad distribution across southern Canada, where the Canadian population is most dense, and because it eats live fish, the double-crested cormorant is used to measure organochlorine levels (from DDT, PCBs, and some dioxins and furans).

An examination of double-crested cormorant eggs in four key regions in Canada¹⁶ show that concentrations of DDE (the main breakdown product from DDT) have dropped significantly since DDT was banned in the early 1970s. Concentrations of PCBs have also fallen over the same period. However, some year to year variation in the measurement of both of these substances has occurred during the 1990s which suggests that Canada is still adversely affected by DDT and PCBs, possibly because of their use elsewhere or from the slow release of stored contaminants over time. Measurements of dioxins and furans

¹⁵ See Environment Canada (http://199.212.18.79/~ind/English/Toxic/Bulletin/tx_iss_e.htm).

¹⁶ These regions are the Strait of Georgia (British Columbia), Great Lakes (Ontario), St. Lawrence Estuary (Québec), and the Bay of Fundy (New Brunswick).

in these birds display a similar pattern.

Further evidence of the pervasiveness of POs in our environment can be obtained from human breast-milk samples. Periodic sampling has been reported from 1975 to 1992 with some relatively encouraging results. Graph 14 shows the parts per mililitre of PCBs in human breast milk for Canada, Ontario and Quebec. A significant drop was experienced over the decade 1975 to 1985 - not surprisingly given the controls that were put into effect over this period. Somewhat troubling, however, is the small increase in this measurement from 1985 to 1992. Like in the cormorant eggs case, this may be due to the use of POs in other countries and which may be contaminating our food chain or because of seepages from stored contaminants.

From graph 15 we can see that the level of DDT in human breast milk has fallen dramatically since the data became available in 1967. The ban on DDT in Canada is, no doubt, responsible for this massive decline. It is interesting to note, nevertheless, that small amounts of DDT were still discernible in human breast milk in 1992 - some twenty years since the substance was banned.¹⁷ As a telling aside, the US Food and Drug Administration conducted tests on typical bundles of foods in 1995 and found that 25% of them contained DDT!

3.3 Acid Rain

¹⁷ In spite of the international ban of DDT, several countries still use this pesticide - largely because it is effective and easy to make. India, for instance, as recently as 1997, still had not banned this substance. Furthermore, without enforcing the ban, many countries continue to have problems with DDT. In 1995 in Bangladesh, where the substance is banned, large quantities of DDT were found in dried fish (some 100 times the allowed level when it was permitted). It was apparently put in the dried fish on purpose to help preserve them. In poor countries where food is scarce for large portions of the population, future well-being is often highly discounted in favour of present subsistence.

Acid rain refers to precipitation that is acidified by atmospheric pollutants. The principal culprits are sulphur dioxide (SO₂) and nitrogen oxides (NO_x) which convert to sulphuric acid and nitric acid in the atmosphere. Although these substances occur naturally, over 90% of emissions are from human activity.¹⁸ Acid rain was first considered a problem in Canada when fish populations were first discovered to be missing in acidified lakes in Northern Ontario.

The largest sources of SO₂ are in the smelting and refining of certain ores and in the burning of fossil fuels. NO_x occur during the combustion of fossil fuels in vehicles, industrial processing, power generation and other activities. For geological reasons, much of Canada is unable to neutralize acid deposits adequately, which renders acid rain a particularly serious problem. Some of the consequences of acid rain and SO₂ and NO_x emissions include the destruction of trees and aquatic life, the deterioration of buildings, and respiratory problems in humans. Several policy responses have emerged to deal with the problem, including participating in numerous international accords designed to reduce the amount of SO₂ and NO_x emissions.¹⁹

Data from 1985 to 1993 reveal that SO₂ emissions in Canada have remained fairly constant; over the same period, the US experienced a small decline in emissions - see graph 16. In Eastern Canada,

¹⁸ See Environment Canada (http://199.212.18.79/~ind/English/AcidRain/Bulletin/ar_iss_e.htm).

¹⁹ For instance, in 1979 Canada signed the United Nations Economic Commission for Europe Convention (UN ECE) on Long-Range Transboundary Air Pollution; in 1985 Canada signed the Helsinki Protocol agreeing to reduce national annual SO₂ emissions by at least 30% below 1980 levels by 1993; in 1988 Canada signed the UN ECE Sofia Protocol to limit NO_x emissions to 1987 levels by 1994 and in 1994 Canada signed the UN ECE Oslo Protocol which caps SO₂ in eastern Canada. For more details see: http://199.212.18.79/~ind/english/acidrain/bulletin/ar_iss_e.htm.

which generates the most SO₂²⁰, the trend is more encouraging; as depicted in graph 17, SO₂ emissions have decreased steadily since 1988 with the biggest drop registering in 1994, the most recent year for which data are available. The fact that Eastern Canada is emitting less SO₂ and the national trend is constant implies, however, that elsewhere emissions are on the rise. Data on Canada's NO_x emissions are less available. Measures for the three years 1980, 1985 and 1990 indicate that these emissions are fairly constant.

Overall, the emissions of SO₂ and NO_x have not changed significantly on a national basis since 1980. However, one can track the impact of the improvements in SO₂ emissions in Eastern Canada by looking at the acidity levels in lakes. 202 lakes in Ontario, Quebec and Atlantic Canada were monitored by Environment Canada from 1981 to 1994 of which 33% showed some improvement, 56% had stable levels of acid and 11% were deteriorating. These percentages, however, do not reveal the regional distribution of lake acidity. For instance, improvements were mostly observed in Sudbury, Ontario where stringent controls on SO₂ emissions from nickel smelters have been in place. Most of the lakes elsewhere showed little improvement - which has been attributed to transboundary emissions from the United States.²¹

3.4 Climate Change

Currently, high priority is being given by the government of Canada to the issue of climate change or "global warming". While high on the current affairs agenda, considerable disagreement exists regarding whether climate change is actually occurring and its impact on different regions of the world.

²⁰ The largest source of SO₂ emissions in Canada is smelting which accounts for 50% of Eastern Canada's SO₂ emissions.

²¹ Environment Canada, http://199.212.18.79/~ind/English/AcidRain/Bulletin/arind4_e.htm).

Greenhouse gases (GHGs), which include carbon dioxide, methane, nitrous oxide, ozone, water vapour and CFCs, can accumulate in the atmosphere and help trap heat radiation coming from the earth's surface keeping it warmer than it would otherwise be. Without such gases the earth's average surface temperature would be about -6 degrees celsius instead of its current level of 15 degrees (Houghton, 1997). However, over the past two centuries concentrations of carbon dioxide, methane and nitrous oxide have increased significantly in the atmosphere - leading to, what is called the "enhanced" or human-induced greenhouse effect. The concern is that an enhanced greenhouse effect which will raise the average surface temperature and increase climate variability.

The most important GHG contributor to the enhanced greenhouse effect is carbon dioxide which accounts for as much as 60 percent of the increased radiative forcing. Given that emissions of GHGs have the same affect on temperature change no matter where they are emitted, addressing concerns of climate change is a world-wide issue requiring international cooperation. The Montreal Protocol of 1987 for CFCs, the 1992 Framework Convention on Climate Change and the 1997 Kyoto Protocol all set emission standards for signatory countries for greenhouse gas emissions. In the case of Canada, the Kyoto Protocol requires that by the period 2008-2012 quantified emissions must be 6 percent less than 1990 levels, and demonstrable progress towards this goal should be achieved by 2005.

Emissions of CO₂ have more or less risen steadily worldwide over the past several decades, as illustrated in graph 18. The recessions of 1982 and 1992 resulted in an almost imperceptible decrease of emissions for a couple of years - but not enough to dampen the clear upward trend. In Canada, this trend is different: emissions were clearly on the rise until the early 1970s when they reached a plateau, from this time emissions have fallen slightly then risen again - with 1995 levels being about 9% higher than those of

1990 (which is the base year for the Kyoto Protocol) - see graph 19.

As a result of the increased CO₂ emissions globally, global atmospheric concentrations of this substance have increased by some 4% from 1987 to 1996. Methane has increased by the same percentage over the same time period. In terms of average temperatures, the average global temperature has increased by about 0.5°C since 1866. In Canada, the average temperature has risen about 0.4°C since 1948. It should be noted, however, that scientists disagree about what exactly the “normal” temperature should be and how to take account of the regular cyclical variations in temperature that are normally observed. Nevertheless, in Canada not only has our “average” temperature changed but regional variations in average temperatures have occurred - with Western and Northern Canada attaining “higher” temperatures on average and the Great-Lakes-St.Lawrence area and Atlantic Canada experiencing lower temperatures on average.

3.5 Urban Air Quality

Several factors contribute to the deterioration of urban air quality. Air pollution is caused by burning fossil fuels, e.g., driving vehicles or fueling industrial plants, and various economic activities. The most common substances that pollute the air include No_x, carbon monoxide (CO), SO₂, particulate matter and volatile organic compounds (VOCs) which are found in solvents, oil-based paints and gasoline. Much of the Quebec-Windsor corridor and the Maritimes import poor air quality from their neighbour in the south. Frequently, airborne particles and ground-level ozone combine together, especially in summer, to produce smog.

The health effects of poor air are evident. Hospital admissions for respiratory problems, for instance, clearly rise with the amount of ground-level ozone. Materials like rubber, paint and plastic are

affected also by the quality of air - leading to the deterioration of external structures and other problems.

Since the 1970s, when the problems associated with poor urban air became acute, much improvement has occurred. Several government policies have been enacted to deal with this issue. For instance, the Smog Management Plan introduced in 1990 has resulted in the introduction of catalytic converters in cars, cleaner gasoline and better industrial processes. Furthermore, urban centres report regularly on the quality of air in the region, providing advisories whenever conditions are below some benchmark. The National Ambient Air Quality Objectives (NAAQOs), which determine the “acceptable” level of the different air pollutants, are provided in table 4.

Graph 20 presents indicators of the five most common air pollutants from 1979 to 1993. In particular, this graph shows the percentage by which the pollutant exceeds its acceptable level, as defined by the NAAQOs²². A few points are worthy of note. To begin, a slight downward trend is discernible for three of these substances - SO₂, NO_x and CO. Airborne particulates fell quite dramatically during the first half of the 1980s after which they have experienced some volatility - but the trend has been mostly downwards. By contrast, ground-level ozone measures have been exceeding the standard by an increasing rate, with only a few exceptions, throughout this period. Finally, it is worth noting that all five measures continue to exceed the national acceptable standard in spite of the plethora of government policies in this area.

Sometimes, looking at data on a national basis is not very informative given Canada’s vast size. For instance, graph 21 presents the number of hours in which ground-level ozone measures exceeded the

²² Average measures are calculated from various stations across Canada. See Environment Canada at http://199.212.18.79/~ind/English/Urb_Air/Tech_Sup/uasup2_e.htm for details.

acceptable standard for Canada as a whole. Here we can see that quite a bit of volatility is displayed in this figure from year to year, although in general the measurements in the 1990s are lower than those obtained in previous decades. If we decompose this national figure into four main regions - Windsor-Quebec City corridor, Prairies, Atlantic Canada and Lower British Columbia Mainland (graphs 22-25) - we can observe considerable interregional variation. The Prairies and Lower Mainland have experienced the cleanest air during the early 1990s. Interestingly, measurements in British Columbia were the highest of all regions in 1979 - but experienced a decline to the NAAQO by 1994. It is interesting to note that each region had at least one year of extraordinarily high ground-level ozone - but that this year differs from region to region. Overall, however, cities in Southern Ontario experienced the worst air quality.

Data on the number of days each year in which the measure of airborne particles exceeds the national standard are presented in graph 26. Again, the number of such days is considerably lower during the 1990s than during 1979 and the early 1980s. Airborne particles, as depicted in this graph, are those with a diameter at least 100 micrometres in size. In recent years, attention has been moving towards much finer particles with diameters of a millionth of a metre, and which may be the cause of much of the observed respiratory problems in humans. Because standards are yet to be created for these particulates, an indicator does not presently exist, but is expected in the near future.

4. Explaining Trends in Natural Capital

Several researchers have attempted to examine empirically the relationship between environmental

degradation and human activity.²³ Typically, some measure of environmental degradation (like CO₂) is regressed on a number of variables that measure human activity - like per capita GDP, affluence, or per capita consumption. Cross-country studies seem to suggest a link between wealth or growth and environmental degradation.²⁴ In particular, researchers have found some evidence of a so-called 'Environmental Kuznet's Curve' (EKC) - fashioned after the result made famous by Kuznets that there appeared to be an inverted "U"-shaped relationship between economic inequality and economic growth (Kuznets 1955).

The EKC posits an inverted U-shaped relationship between environmental degradation and wealth or economic growth. Poor countries as they become richer tend to experience an increase in environmental degradation; whereas, once past a certain point, their environment improves. Thus, the EKC literature suggests that there is a threshold income beyond which a rise in wealth leading to a fall in environmental degradation.

Given the focus of this paper on the state of Canada's natural capital, we examine briefly whether a relationship exists in Canada between growth and environmental degradation. Part of our interest in this question, is with respect to the role of government policy in promoting a healthy environment. If environmental degradation subsides as a result of economic growth, then why not focus attention on promoting growth and let the environment basically take care of itself?

Because of data constraints, we decided to use SO₂ emissions as a measure of environmental

²³See the discussion in Rao (forthcoming).

²⁴ See, for instance, Dietz and Rosa (1997).

degradation - mostly because data were available, at least for Eastern Canada²⁵, from 1970 to 1994. Following the basic approach of other studies, we use population, per capita GDP, growth in per capita GDP, the growth rate squared (to take account of non-linearities), and time as our principal independent variables. In addition to using overall GDP, GDP in the manufacturing sector in Eastern Canada was added as another measure of economic activity in the region. Furthermore, metal production in smelters was added because of the clear relationship between smelter activity and SO₂ emissions.

Table 5 reports the estimated coefficients obtained from the simple model proposed. These results typify the findings from several variants of the model. Three points are worthy of note. First, smelter production always exerts a positive and statistically significant effect on SO₂ emissions in Eastern Canada. Looking at the last column of table 5, which presents the elasticity of each variable measured at their mean, we see that a 1% increase in smelter production leads to a 1.3% increase in SO₂ emissions, *ceteris paribus*.

The second point to note is that the coefficient on the time trend variable is always negative and statistically significant. We may interpret the sign and magnitude of this coefficient in several ways. The most obvious one is that it reflects a general trend towards less SO₂ in the environment. Why this is the case, however, cannot be answered by the simple model above. One possible explanation points to the increasing public awareness of the importance of the environment, and the resulting public policies which have emerged in the area. Without further analysis, one simply cannot say with any degree of certainty why the state of the environment, as reflected in the SO₂ levels, appears to be improving over time.

²⁵ Eastern Canada here is defined as all provinces east of Manitoba.

The last point of interest arising from these results is that economic growth appears to have no effect on SO₂ emissions. Our measure of growth is the percentage change in manufacturing output in Eastern Canada each year. Manufacturing was chosen in order to account of the fact that the service sector - the sector which has experienced the greatest relative growth over the past two decades - typically contributes little to environmental degradation. In the version of the model reported in table 5, growthsquared was also added as a regressor on the grounds that the relationship between emissions and growth is likely to be non-linear. The same results were obtained when we used total (per capita) GDP. It would appear that for Canada, wealth, or economic activity in general, does not contribute significantly to explaining SO₂ emissions.

5. Public Policy and Natural Capital

Any discussion of Canadian natural capital and environmental amenities must necessarily recognize the role played by public policy. To begin, it is remarkable to note that, in Canada, less than 10% of land is owned privately--- 50% of land is owned by provincial or territorial governments and 40.3% of land is federally owned.²⁶ This fact alone implies an extraordinary role for government in the management of our natural resources. In addition, because everyone is affected by environmental degradation - and no one “owns” the environment *per se* - environmental protection becomes necessarily the domain of government.

Much has been written regarding the types of instruments available to government to manage resources and the environment. With the risk of trivializing this important area, there are essentially four

²⁶ See, Table 10.8, Statistics Canada, *Econnections* data base.

main categories of policies available: command and control, taxes and subsidies, tradeable allowances (licenses), and legal liability. We have seen throughout the analysis of this paper, command and control type policies - in which government policy basically dictates a course of action - have been very successful in certain areas, especially when it comes to restricting the production and use of particular hazardous substances. Clearly, banning DDT, CFC production and use has had a profound impact on their presence in our environment. They have been less successful in other spheres of activity. For instance, in the fisheries, government regulations concerning the size of the fishing vessel and the length of the season have been circumvented by fishers employing different technologies and fishing more efficiently in a shorter period of time. In other words, sometimes the government can successfully implement regulations and other times individuals and firms can successfully by-pass them.

The other three classes of government policy are considered to be “economic” instruments which are designed to overcome the problems associated with the circumvention of conventional regulations. Again, the fisheries provide us with a good case in point. Implementing a policy of tradeable licenses in the fisheries has met with relative success in comparison to command and control regulations. In other words, giving fishers the economic incentive to behave (i.e., fish) appropriately taking into account the impact that over-fishing has on everyone seems to be a more effective strategy when compared to traditional regulations. Such an approach requires well-designed policies to help devise the right mix of property rights and incentives, and is as important for fisheries as it is for forests and other environmental assets.

Public policy in this area is complicated tremendously by the fact that it is not the sole purview of the federal or provincial governments. Often regulations are set federally, but it is up to the provincial and territorial governments to determine how they are implemented and monitored. Much debate has ensued

as to the appropriate division of powers in these instances. Environmental regulations fall into this category, as do several other key regulations dealing with environmental concerns. As a crude measure of the magnitude of the problem of managing the environment, it is interesting to note that Environment Canada currently solely administers fourteen federal acts²⁷, including the *Canadian Environmental Protection Act* (CEPA); administers part of seven other acts, and helps eleven other government departments in administering their acts. In short, the range of activity which has an impact on the environment is enormous.

Clearly, government policies abound in this area and we cannot hope to cover all of them in this brief discussion. One piece of information rarely examined, but which may be of interest to a discussion of public policy, is government expenditures in the area of natural resources and the environment. The use of such expenditures is fraught with complications. First, it is very difficult to obtain figures of actual spending on natural capital even by the federal government - hindered, in no small measure, by the fact that spending in this area crosses several governmental departments.²⁸ Further, much expenditure takes place at the provincial, territorial and local government level. Finding the required information for a long enough period of time to make some intertemporal comparisons is difficult. It is also extremely hard to make intertemporal comparisons because of the potential relationship between government policy and the *need*

²⁷ These are: *Canadian Water Act*; *Canadian Wildlife Act - Regulations*; *Canadian Environmental Assessment Act - Regulations*; *Canadian Environmental Protection Act - Regulations*; *Canadian Environment Week Act*; *Department of the Environment Act - Regulations*; *Lac Seul Conservation Act*; *Lake of the Woods Control Board Act*; *Migratory Birds Convention Act - Regulation*; *National Round Table on the Environment and the Economy Act - Regulations*; *National Wildlife Week Act*; *Weather Modification Information Act - Regulations*; and the *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act*.

²⁸ One need only look at the plethora of acts managed by Environment Canada - as detailed in the previous footnote - to get some sense of the magnitude of the impact of environmental concerns.

to spend money on the environment. For instance, once an environmental problem has improved, it may not be necessary to continue to spend money on trying to solve it.

Notwithstanding the above caveats, graph 27 displays all government expenditures in real dollars on the environment and natural resources from 1980 to 1996.²⁹ It is interesting to note that these expenditures rose quite dramatically during the early to mid-1980s, and then declined equally dramatically during the last half of that decade. While Public Accounts data end in 1996, information from Environment Canada estimates suggest that spending on the environment at least has continued to fall from 1996 to 1998.³⁰ Graph 28 presents the expenditures on the environment and resources as a percentage of Canadian GDP in order to put these figures into some sort of context. Again, we see that expenditures in this area are relatively smaller in 1995 compared to 1980.

Without an in-depth analysis, it is difficult to know how to interpret these government expenditure figures. They certainly could provide ammunition for activists who think that the government is not committed enough to environmental concerns. Others may argue that environmental problems are improving and hence less money needs to be spent in this area. Not much information is available over time on the expenditures by private business on pollution control. We do, however, have relatively detailed information on such expenditures in 1994. For instance, we know that in 1994 some \$1.6 billion was spent on capital abatement expenditures and some \$2.06 billion was spent on operating expenditures for

²⁹ These data were obtained from Public Accounts.

³⁰ See, *Gallon Environment Letter*, Vol.2, No.14, June 5, 1998.

abatement.³¹ For the same year, most of the capital and operating expenditures were geared towards end-of-pipe facilities - which comprised some 50% of total business expenditures on abatement. Environmental monitoring also made up over 10% of business expenditures on abatement. Table 6 provides a summary of the operating and capital expenditures on environmental protection by activity for 1994.

It is also interesting to note the expenditures on environmental protection by industry. Table 7 provides expenditures by thirteen industries. In terms of capital expenditures, the pulp and paper industry spends by far the greatest amount on abatement control - not surprising when one considers how much this industry emits each year. The second highest capital spender on pollution abatement controls is the mining, crude oil and natural gas industry which also spent the most in 1994 on operating abatement expenditures.

6. Concluding Remarks

The paper brings together the available data on the environment and resources to provide a picture of the state of Canada's natural capital, and how it has evolved over time. The review indicates that although much data are now available thanks to several government departments, many data gaps remain. One important gap concerns wildlife and biodiversity for which consistent and reliable data are difficult to obtain. Moreover, very little has been done and is available on the cost of environmental and resource policies. In order to determine if environmental policies are as effective as possible, it would seem reasonable to determine how much is spent in this area. In this paper, we employed a crude measure of

³¹ See tables EXPOI.IVT, EXPCP.IVT in Environment Canada's *National Environmental Indicators Series*.

these expenditures which suggests that expenditures by governments on natural capital are on the decline.

Finally, the paper indicates the paucity of empirical analysis of environmental policies in Canada. A gap which presumably can be filled as more and better data are become available.

Notwithstanding the lacunae identified in the paper, several comments may be made regarding the current state of Canada's natural capital. The portrait painted in this paper certainly suggests that Canada continues to be rich in natural resources. It is clear, however, that government policy is necessary in the area of renewable resources, although it has not always been effective. The fact that certain policies have been shown to be effective in the management of some resources suggests that resource problems can be improved over time.

The state of Canada's environment also depends upon the particular aspect under investigation. By and large, air and water qualities are better now that they were a couple of decades ago. Environmental policies and controls are likely to be the cause of this improvement. It is clear, for instance, that the ban on DDT has had a significant impact on the pervasiveness of this substance in our environment. However, degradation continues to be a problem in several key areas. The stratospheric ozone layer above Canada is still 10 per cent thinner than it was in 1980. Air pollution remains a problem in certain regions. Lakes continue to acidify, although fewer lakes acidify now in comparison to earlier years. Carbon dioxide levels are still high, keeping the threat of the dire consequences of global warming on the public agenda. In short, while our environment is much improved in important areas in comparison to earlier years, work remains to be done. It would seem that the next step should be to examine in greater detail the impact that certain government policies have had on specific environmental targets, as well as the costs of these policies, in order to determine where to proceed from here.

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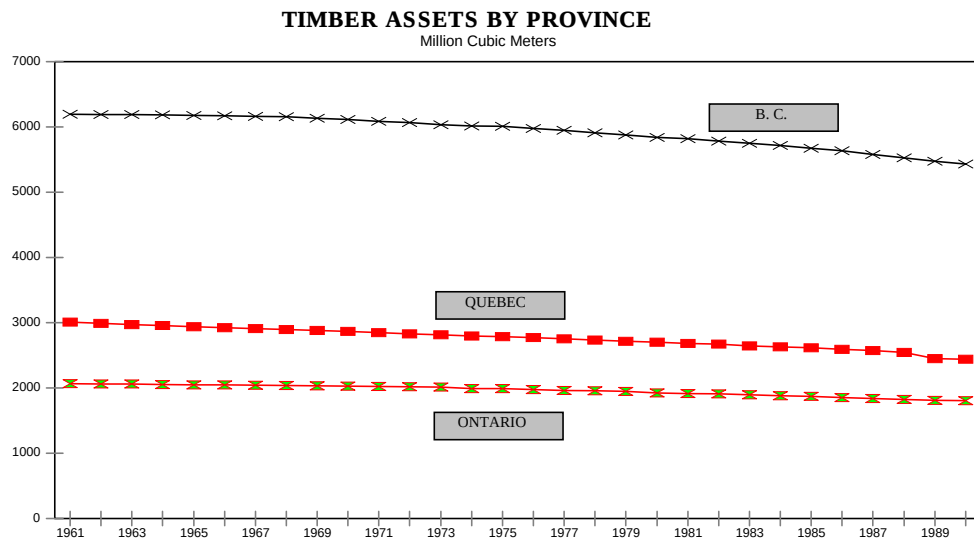
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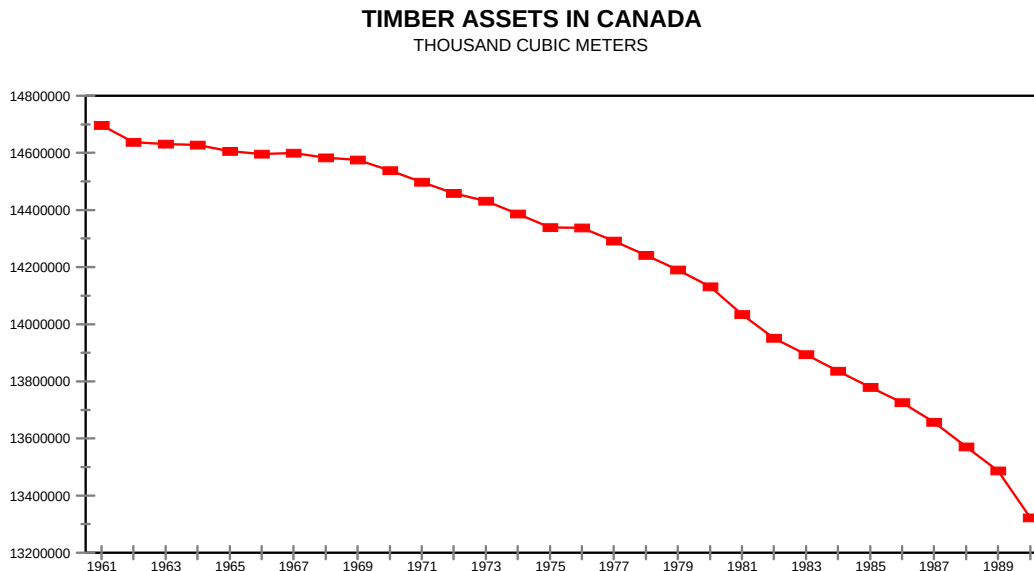
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Graph 1



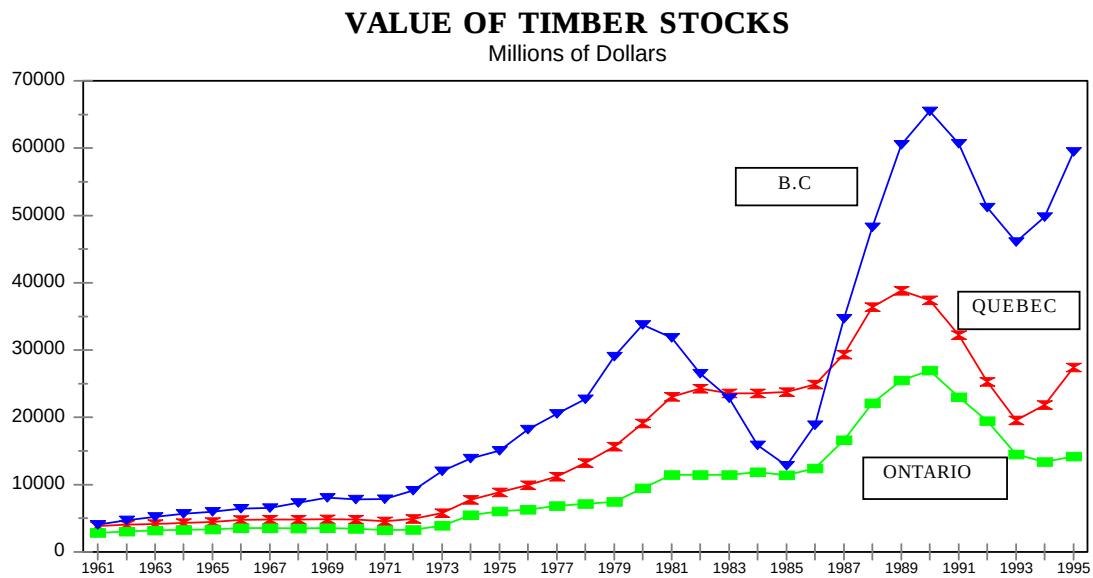
Source: Econnections: Linking the Environment and the Economy (CD Rom), Statistics Canada

Graph 2



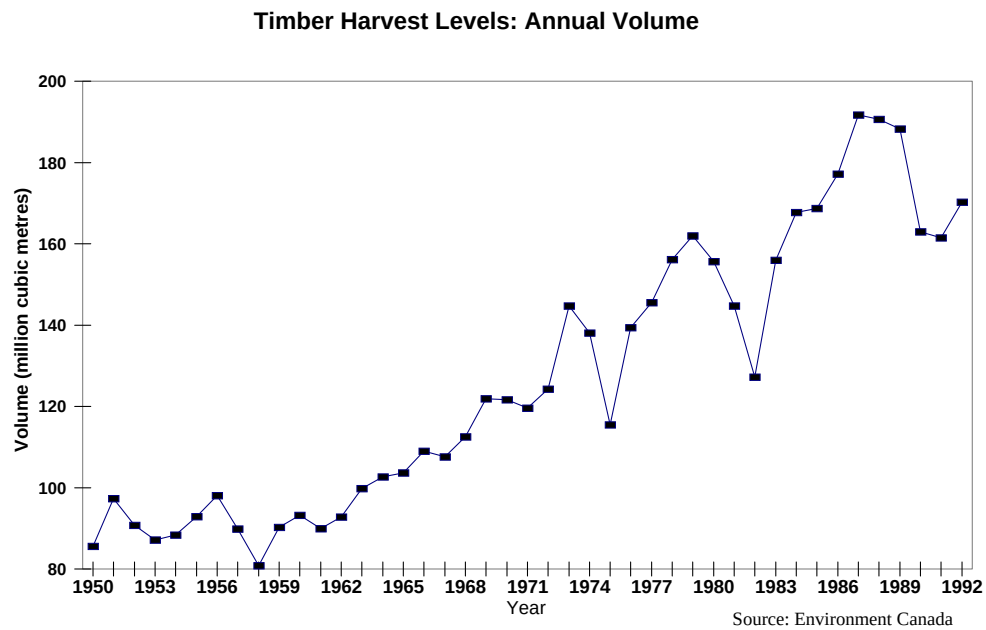
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Graph3

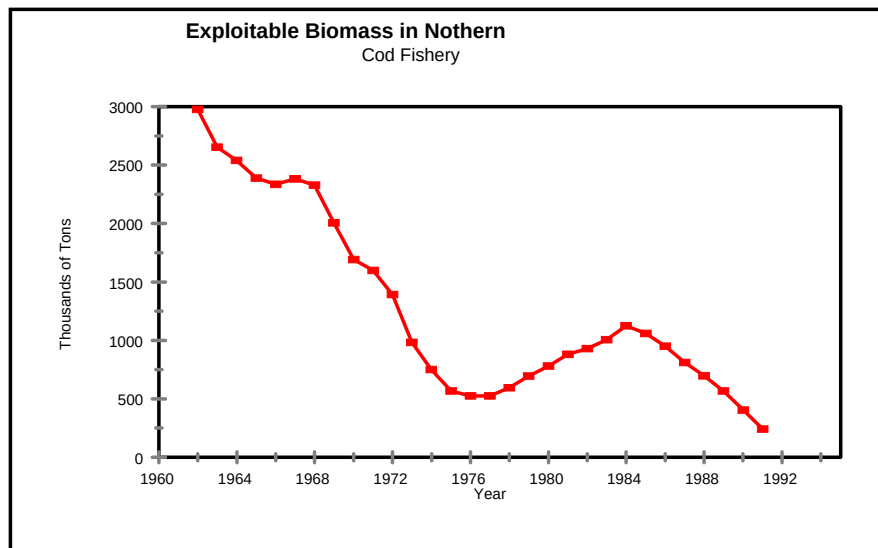


Source: Econnections: Linking the Environment and the Economy (CD Rom), Statistics Canada

Graph 4

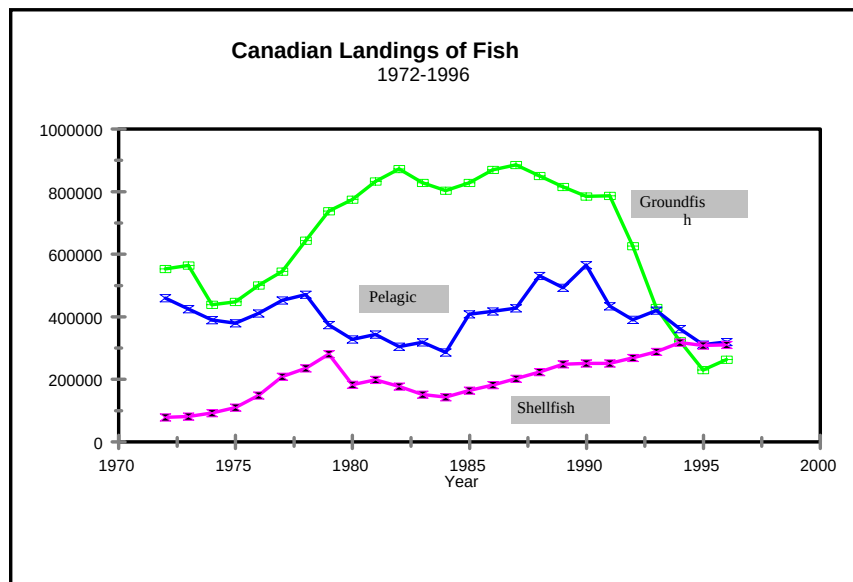


Graph 5



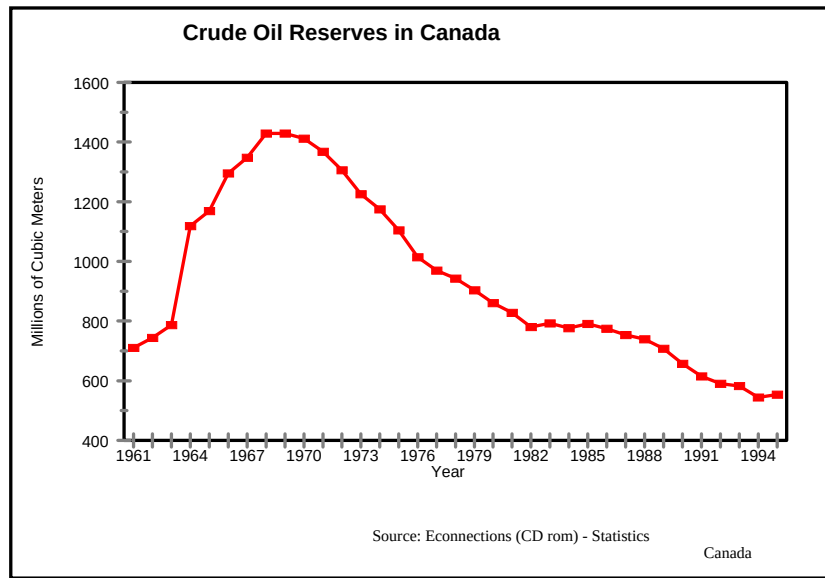
Source: Department of Fisheries and Oceans

Graph 6

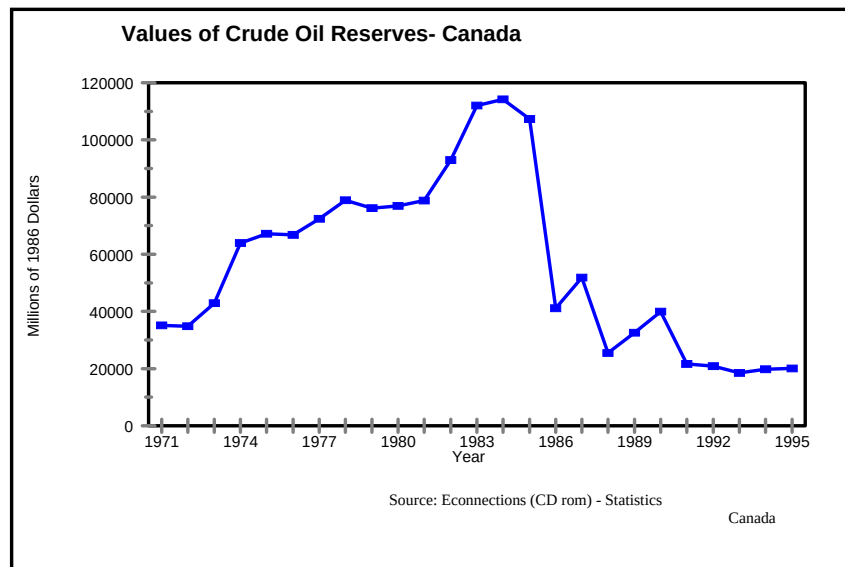


Source: Department of Fisheries and Oceans

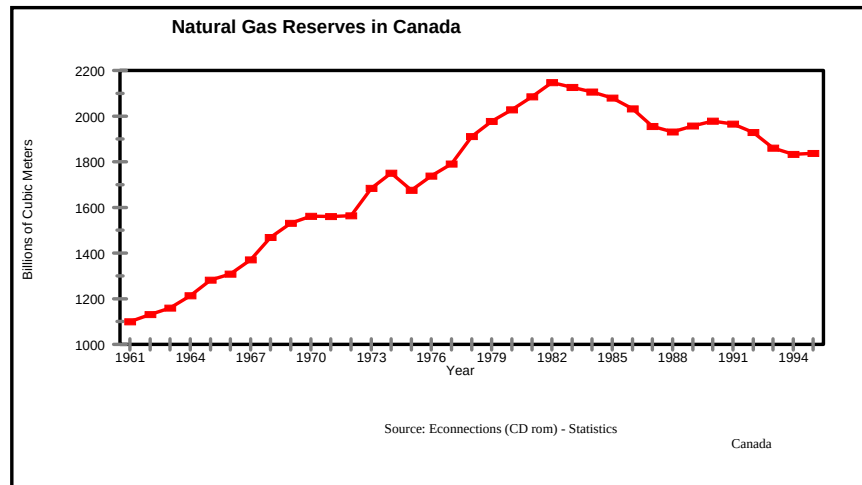
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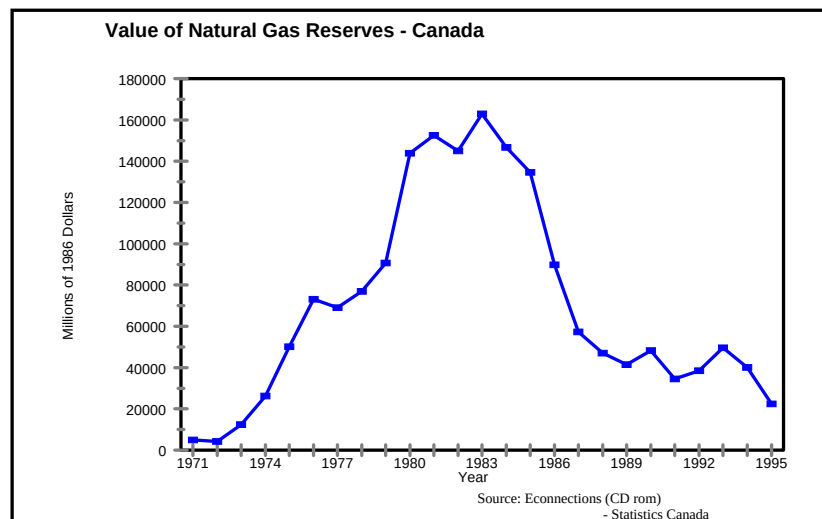
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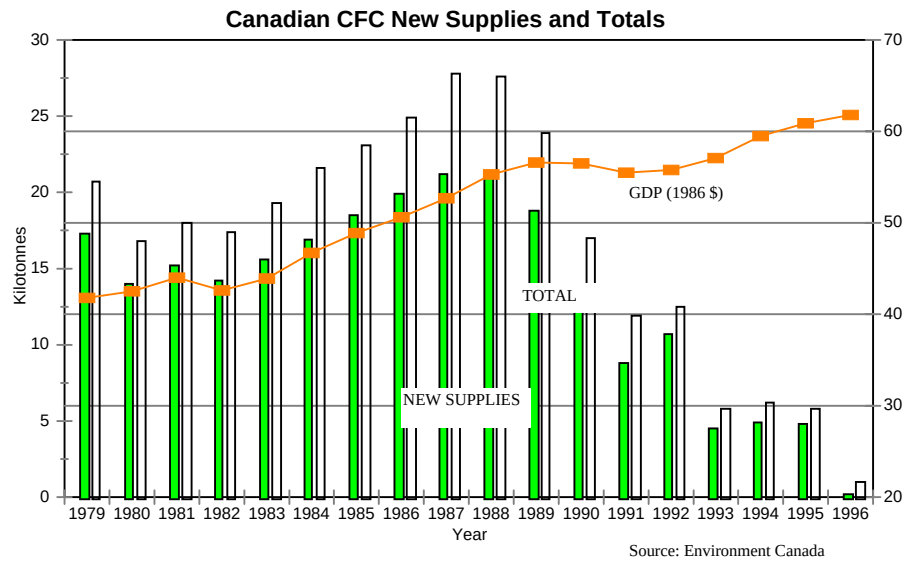
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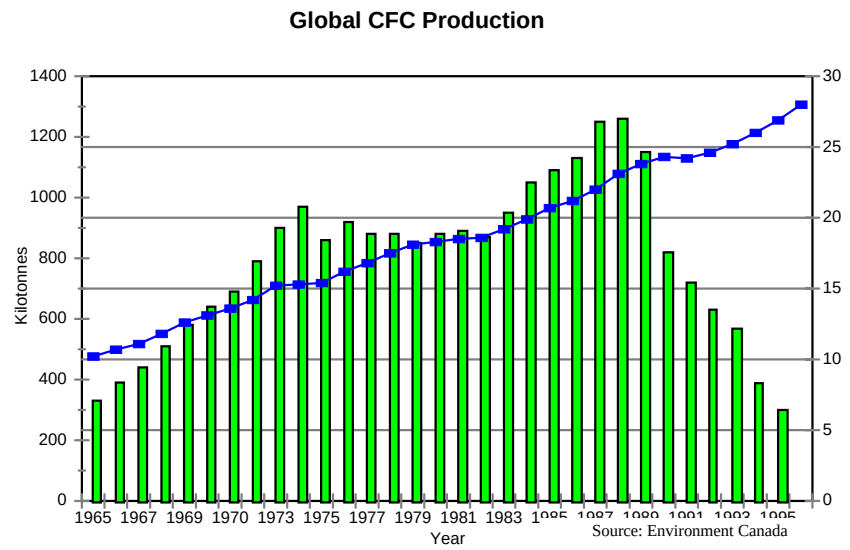
Graph 10



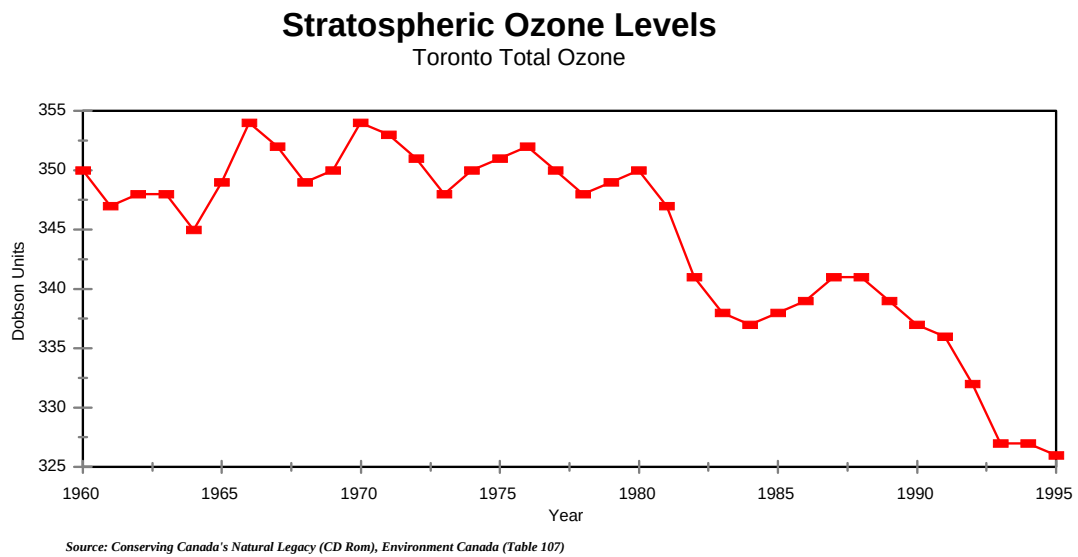
Graph 11



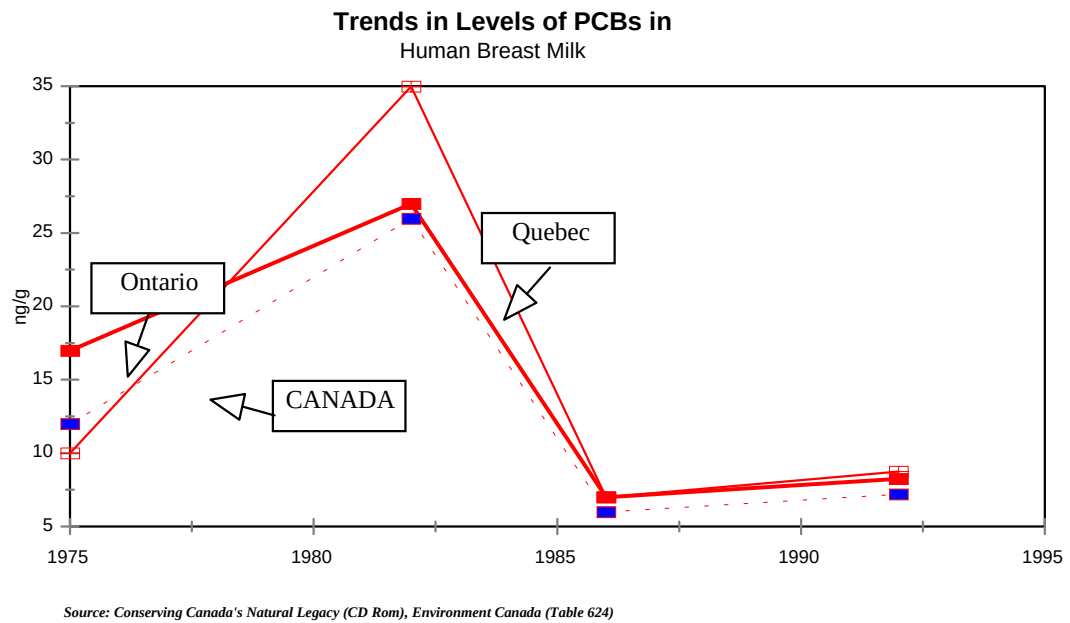
Graph 12



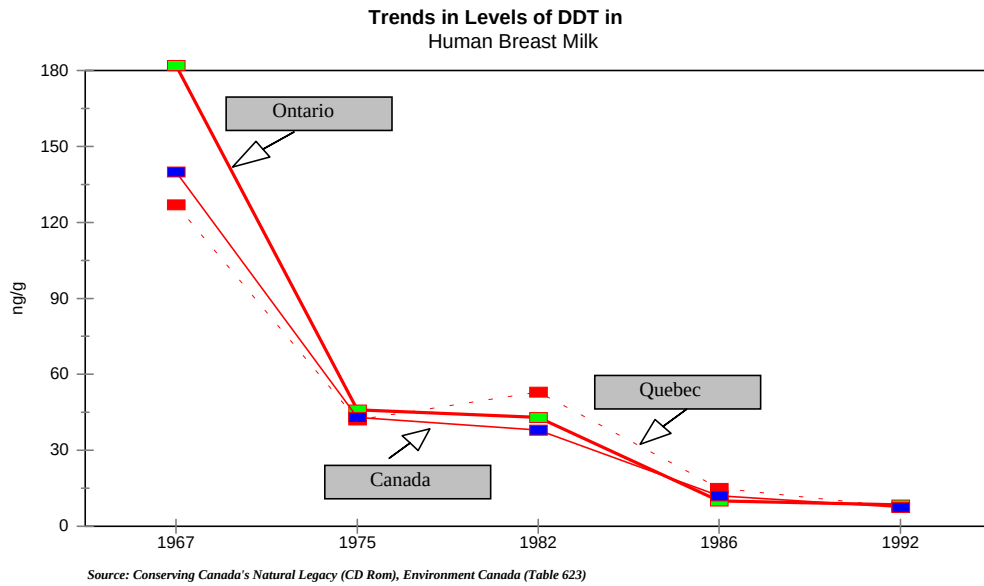
Graph 13



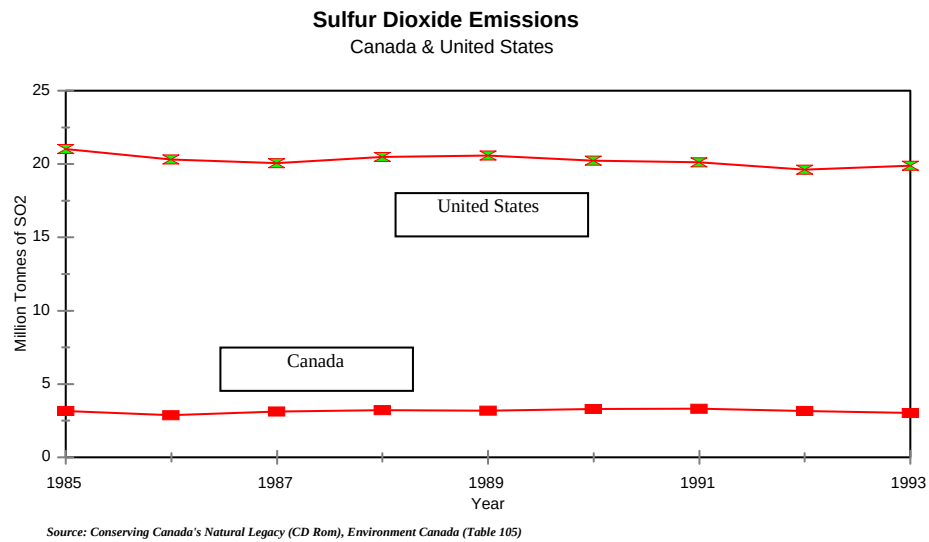
Graph 14



Graph 15

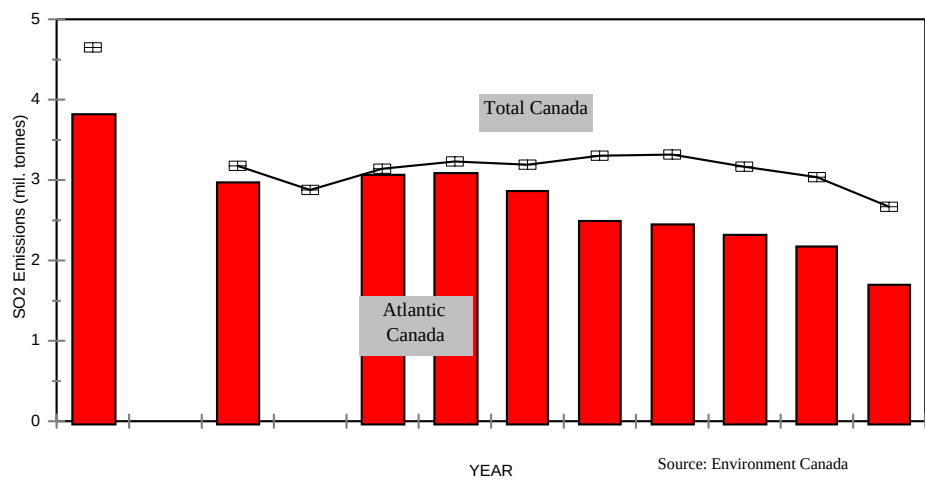


Graph 16



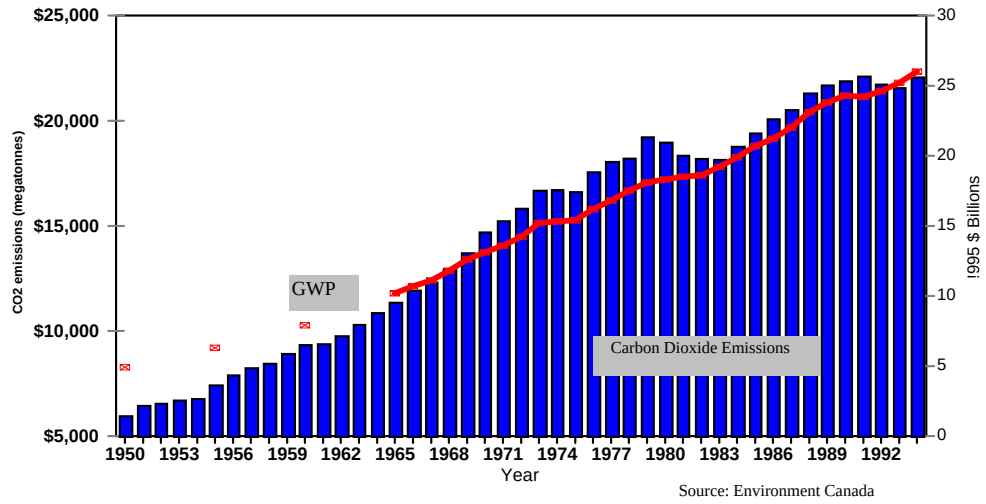
Graph17

EASTERN CANADA



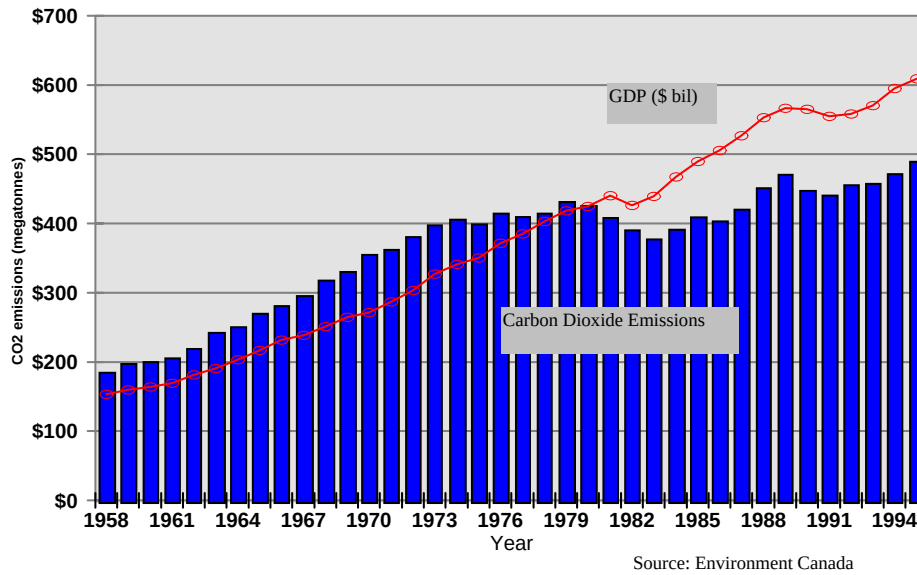
Graph 18

GLOBAL

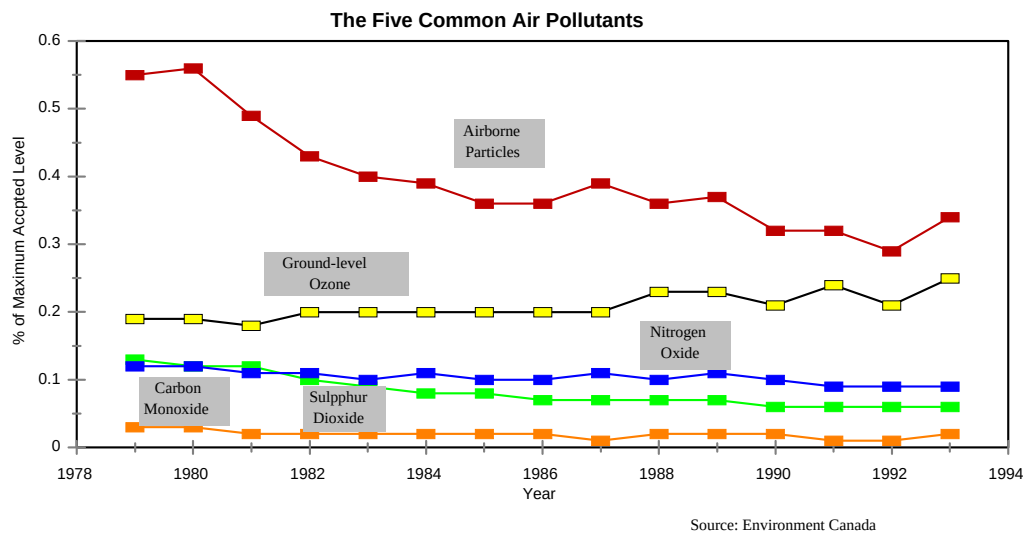


Graph 19

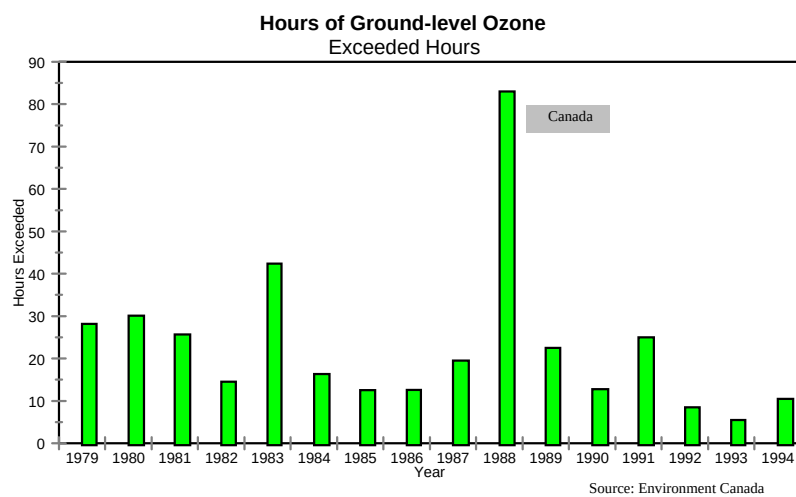
CANADA

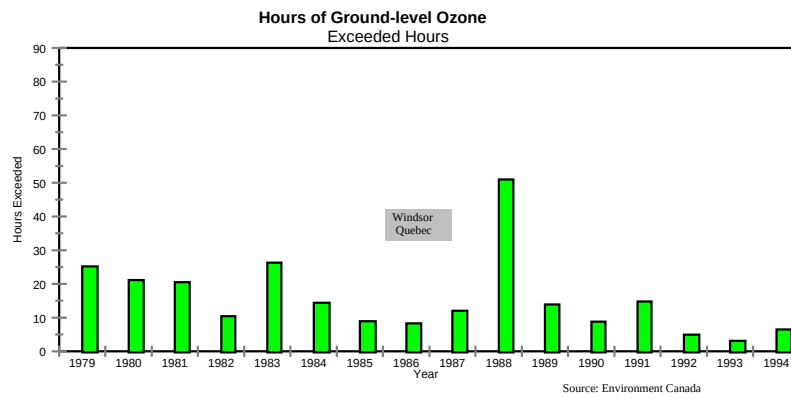


Graph 20

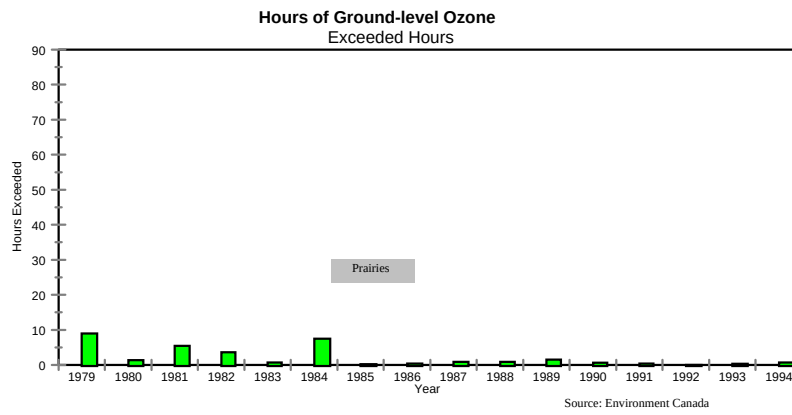


Graph 21

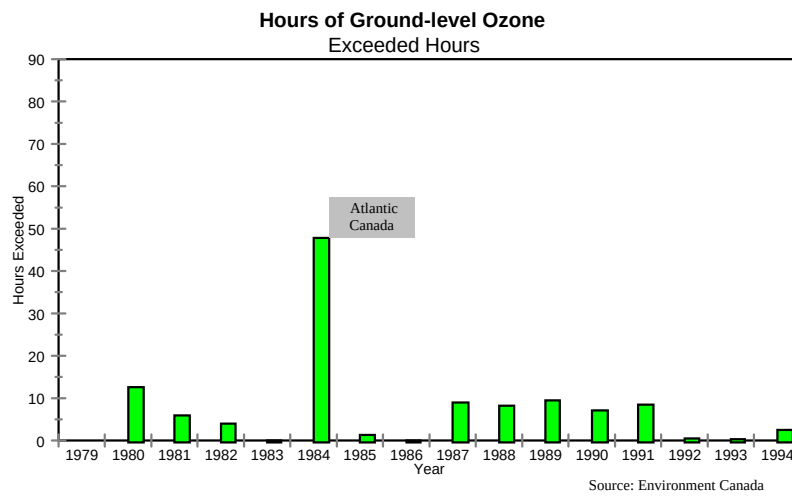




Graph 22

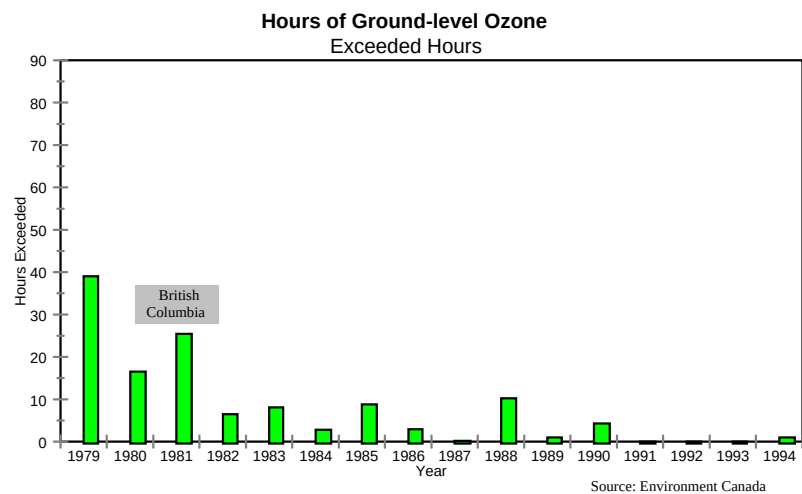


Graph 23

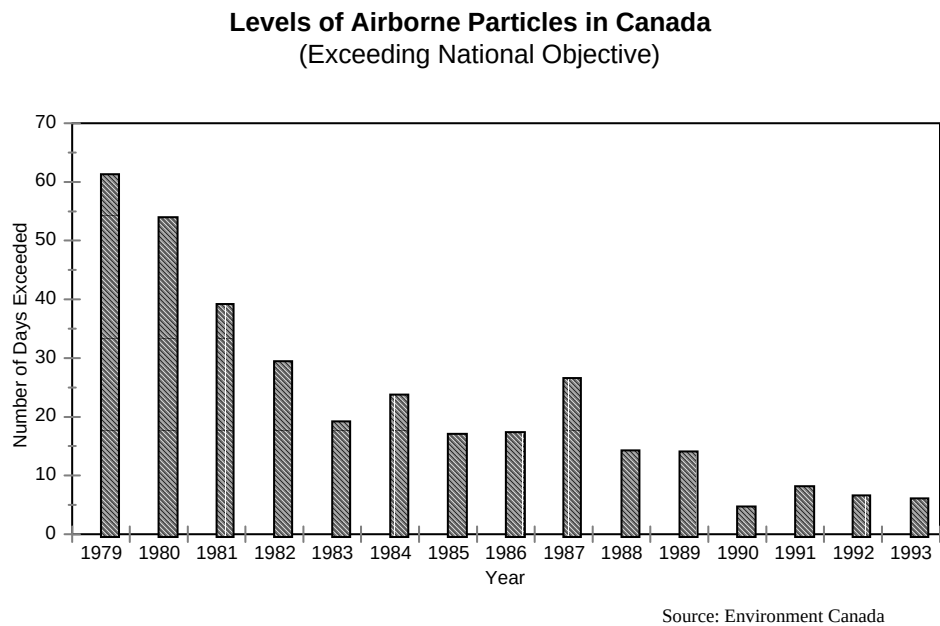


Graph 24

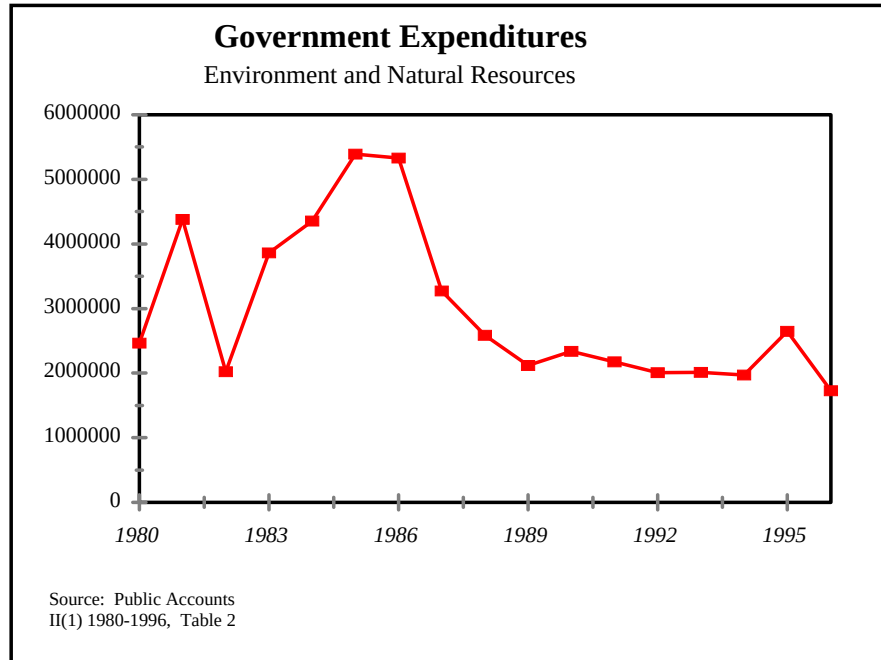
Graph 25



Graph 26



Graph 27



Graph 28

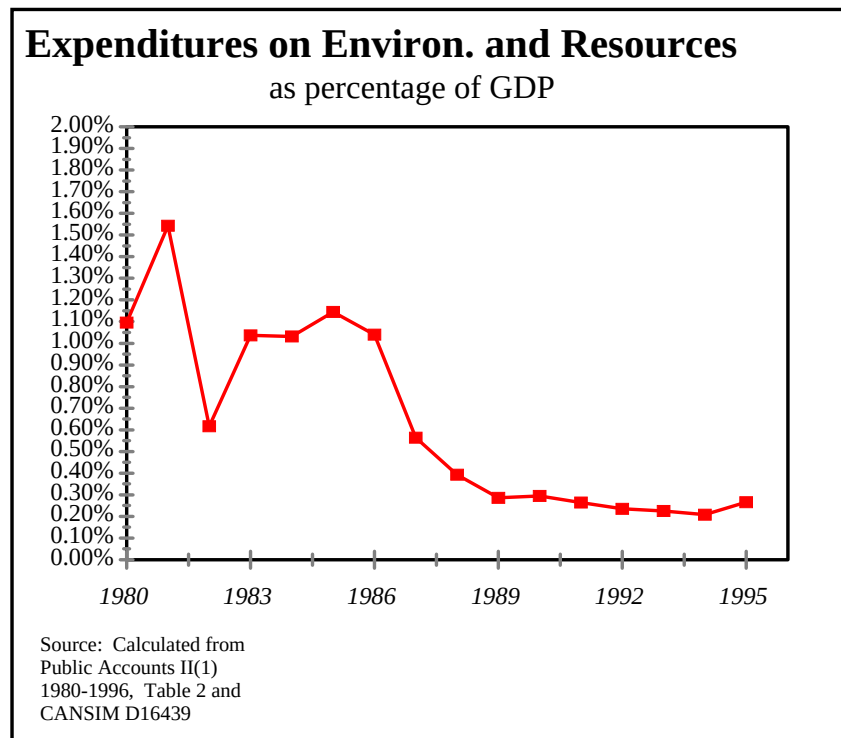


Table 1

Some descriptive biophysical characteristics of Canada's marine and terrestrial ecozones

Ecozone	Landforms	Surface materials/soils	Climate/oceanographic characteristics	Vegetation/productivity	Wildlife (mammals/birds)	Human activities	Main communities
Marine ecozones							
Pacific	Pacific Ocean basin and narrow continental shelf; numerous fjords	Generally ice-free except for local pockets of landfast ice (seasonal)	General eastward-setting oceanic current (Subarctic Current) with divergence point off the shelf; pronounced seasonal upwelling in the south; El Niño influences	One of Canada's most productive oceanic areas	Important seasonal migrations of animals between neritic and oceanic areas; important commercial species include oyster, shrimp, five species of salmon, herring, Pacific Hake, Sablefish, Pacific Halibut, clams, ~~Dungeness Crab~~ , rockfish, and flatfish species	Fishing, tourism	
Arctic Archipelago	Limited to "shelf-type" depths; high Arctic islands, Arctic and Hudson Bay coasts; much is rocky coastline, numerous channels and straits; high coastal relief in east, low in south and west	Seasonal ice; open water 2–3 months in summer	Relatively high freshwater input along northern continental boundary	Higher productivity and abundance of life than permanent ice area	Intense summer migration into region, generally following the ice edge retreat; locally high concentrations of marine birds and mammals, including Beluga, Walrus, seals; Polar Bear	Oil and gas, limited fishing and hunting	
Arctic Basin	Limited to the most northern polar cap areas	Mainly permanent pack ice	Affected by easterly winds driving a clockwise circumpolar gyre in basin; no land components	Low biological productivity and diversity	Polar Bear and seals dominate mammals	Few, if any, activities	
Northwest Atlantic	Primarily continental shelf; generally low coastal relief	Seasonal ice area	Labrador Current exerts strong influence both on shelf and offshore (lower-salinity cold water)	Strongly influenced by the Labrador Current and Arctic waters	Subarctic species in north to boreal species in south; important commercial species include oyster, shrimp, Snow Crab, haddock, hake, Pollock, American Plaice, codfish, halibut, flounder, herring, mackerel, Capelin, and Atlantic Salmon	Fishing, tourism	
Atlantic	Large southern shelf areas (Grand Banks, Scotian Shelf) as well as the Northwest Atlantic Ocean basin	Generally ice-free except for local pockets of landfast ice and some years of seasonal ice	Includes mostly temperate water masses originating from the south; Gulf Stream offshore and Slope Water Current at the shelf break; mixing zone between cold, lower-salinity water from the north and warmer water from the south	A very productive area for many species	Includes both neritic and oceanic species; important commercial ground fisheries occur on shelves; important commercial species include lobster, scallop, codfish, haddock, hake, Pollock, redfish, halibut, mackerel, and Atlantic Salmon	Fishing, tourism	
Terrestrial ecozones							
Arctic Cordillera	Mountains	Ice, snow, colluvium, rock/ Cryosols	Extremely cold, dry; continuous permafrost	Mainly unvegetated; some shrub–herb tundra	Polar Bear (along coast), Arctic Hare; Northern Fulmar, Common Ringed Plover, Snow Bunting	Hunting, tourism	Pond Inlet, Clyde River, Broughton Island
Northern Arctic	Plains, hills	Moraine, rock, marine/ Cryosols	Very cold, dry; continuous permafrost	Herb–lichen tundra	Peary Caribou, Muskox, Wolf, Arctic Hare; Red-throated Loon, Brant, ptarmigan, Greater Snow Goose	Hunting, tourism/ recreation, some mining	Iqaluit, Cambridge Bay, Holman, Arctic Bay, Taloyoak, Pangnirtung, Sachs Harbour, Cape Dorset, Resolute, Igloodlik
Southern Arctic	Plains, hills	Moraine, rock, marine/ Cryosols	Cold, dry; continuous permafrost	Shrub–herb tundra	Barren-ground Caribou, Wolf, Grizzly Bear, Arctic Fox, Arctic Ground Squirrel, lemming; Arctic Loon, ptarmigan, Snowy Owl	Hunting, trapping, tourism/ recreation, mineral development	Tuktoyaktuk, Rankin Inlet, Arviat, Paulatuk, Povungnituk
Taiga Plains	Plains, some foothills	Organic, moraine, lacustrine/ Cryosols, Brunisols	Cold, semiarid to moist; discontinuous permafrost	Open to closed mixed evergreen–deciduous forest	Moose, Woodland Caribou, Wood Bison, Wolf, Black Bear, Red Squirrel; Northern Shrike, Spruce Grouse	Hunting, trapping, tourism/ recreation, oil and gas development, marginal agriculture in south	Inuvik, Fort Simpson, Wrigley, Norman Wells, Aklavik, Hay River, Fort McPherson
Taiga Shield	Plains, some hills	Canadian Shield rock, moraine/ Cryosols, Brunisols	Cold, moist to semiarid; discontinuous permafrost	Open evergreen–deciduous trees; some lichen–shrub tundra	Moose, Barren-ground Caribou, Wolf, Snowshoe Hare, Red Squirrel; Red-necked Phalarope, Northern Shrike	Tourism/ recreation, some mining, some hunting and trapping	Yellowknife, Goose Bay, Uranium City, Churchill Falls, Happy Valley, Kuujuaarapik

Ecozone	Landforms	Surface materials/soils	Climate/oceanographic characteristics	Vegetation/productivity	Wildlife (mammals/birds)	Human activities	Main communities
Taiga Cordillera	Mountains	Colluvium, moraine, rock/Cryosols, Gleysols, Brunisols	Cold, semiarid; discontinuous permafrost	Shrub-herb-moss-lichen tundra	Dall's Sheep, Grant's Caribou, Black Bear, Grizzly Bear; Peregrine Falcon, Ptarmigan	Trapping, hunting, mining, tourism/recreation, oil and gas	Old Crow
Hudson Plains	Plains	Organic, marine/Cryosols	Cold to mild, semiarid; discontinuous permafrost	Wetland; some herb-moss-lichen tundra, evergreen forest	Woodland Caribou, Moose, Black Bear, marten, Arctic Fox; Canada Goose	Hunting, trapping, recreation	Churchill, Moosonee, Attawapiskat
Boreal Plains	Plains, some foothills	Moraine, lacustrine organic/Luvisols, Brunisols	Cold, moist	Mixed evergreen-deciduous forest	Woodland Caribou, Mule Deer, Moose, Black Bear, beaver, Muskrat; Boreal Owl, Blue Jay	Forestry, agriculture, tourism/recreation, oil and gas development	La Ronge, The Pas, Flin Flon, Peace River, Fort Smith, Fort Vermilion, Hinton
Boreal Shield	Plains, some hills	Canadian Shield rock, moraine, lacustrine/Podzols, Brunisols	Cold, moist	Evergreen forest, mixed evergreen-deciduous forest	White-tailed Deer, Moose, Black Bear, Canada Lynx, marten, Red Squirrel; Boreal Owl, Blue Jay	Forestry, mining, tourism/recreation, hunting, trapping	Thunder Bay, St. John's, Sudbury, Sault Ste. Marie, Chicoutimi, North Bay, Sept-Îles, Gander, Thompson
Boreal Cordillera	Mountains, some hills	Colluvium, moraine, rock/Brunisols, Podzols, Cryosols	Moderately cold, moist	Largely evergreen forest; some tundra, open woodland	Moose, Dall's Sheep, Grizzly Bear, Black Bear; Ptarmigan, Spruce Grouse	Hunting, trapping, forestry, tourism/recreation, mining	Whitehorse, Dawson, Faro, Teslin, Haines Junction, Mayo Landing
Pacific Maritime	Mountains, minor coastal plains	Colluvium, moraine, rock/Podzols, Brunisols	Mild, temperate, very wet to cold alpine	Coastal evergreen forest	Black Bear, Grizzly Bear, Mountain Lion; Black Oystercatcher, Tufted Puffin	Forestry, fish processing, urbanization, agriculture	Vancouver, Victoria, Prince Rupert, Nanaimo, Port Alberni, Chilliwack
Montane Cordillera	Mountains and interior plains	Moraine, colluvium, rock/Luvisols, Brunisols	Moderately cold, moist to arid	Evergreen forest, alpine tundra, interior grassland	Woodland Caribou, Mule Deer, Moose, North American Elk, Mountain Goat; Blue Grouse, Steller's Jay	Forestry, agriculture, tourism/recreation	Prince George, Kelowna, Kamloops, Williams Lake, Vernon, Penticton, Nelson, Trail, Cranbrook, Quesnel
Prairies	Plains, some hills	Moraine, lacustrine/Chernozems	Cold, semiarid	Grass; scattered deciduous forest ("aspen parkland")	Mule Deer, White-tailed Deer, Pronghorn, Coyote, Prairie Dog; Sage Grouse, Burrowing Owl	Agriculture, urbanization, recreation, oil and gas development	Calgary, Winnipeg, Edmonton, Regina, Saskatoon, Lethbridge, Red Deer, Prince Albert, Brandon
Atlantic Maritime	Hills and coastal plains	Moraine, colluvium, marine/Brunisols, Podzols, Luvisols	Cool, wet	Mixed deciduous-evergreen forest	White-tailed Deer, Moose, Black Bear, Coyote, Raccoon; Blue Jay, Eastern Bluebird	Forestry, agriculture, fish processing, tourism/recreation	Halifax, Saint John, Dartmouth, Charlottetown, Moncton, Sydney, Rimouski, Sherbrooke
Mixedwood Plains	Plains, some hills	Moraine, marine, rock/Luvisols, Brunisols	Cool to mild, moist	Mixed deciduous-evergreen forest	White-tailed Deer, Red Fox, Raccoon, Striped Skunk, beaver, Grey Squirrel; Great Blue Heron, Blue Jay	Agriculture, urbanization, tourism/recreation	Toronto, Montreal, Windsor, Hamilton, Quebec, Ottawa, London, Mississauga

Source: Wiken (1986); State of the Environment Directorate, Environment Canada; Marine Environment Quality Advisory Group, (1994); Ecological Stratification Working Group, (1996).

Table 2

Some quantitative environmental and socioeconomic characteristics of Canada's terrestrial ecozones

Ecozone groupings ^a	Area					Dominant cover type	Population (1991)					GDP 1991 (\$ millions)
	Total area (% of Canada)	Land		Fresh water			Canada			Urban areas		
		Area (km ²)	% of Canada's total area	Area (km ²)	% of Canada's total area		No. of people	% of total Canadian population	Density (no. of people/ 100 km ²)	No. of people	% of total ecozone population	
Arctic												
Arctic Cordillera	2.5	230 873	2.3	19 717	0.2	Perennial snow/ice	1 047	<0.01	0.5	0	0.0	12
Northern Arctic	15.2	1 361 433	13.7	149 447	1.5	Barren lands	16 328	0.06	1.2	3 450	21.1	379
Southern Arctic	8.3	773 041	7.8	59 349	0.6	Arctic/alpine tundra	10 314	0.04	1.3	0	0.0	150
Taiga												
Taiga Plains	6.5	580 139	5.8	66 861	0.7	Coniferous forest	21 429	0.08	3.7	9 651	45.0	532
Taiga Shield	13.7	1 253 887	12.6	112 513	1.1	Transitional forest	33 589	0.12	2.7	11 860	35.3	1 145
Hudson Plains	3.6	353 364	3.5	8 996	0.1	Transitional forest	9 938	0.04	2.8	1 003	10.1	115
Boreal												
Boreal Shield	19.5	1 782 252	17.9	164 118	1.6	Coniferous forest	2 831 824	10.37	158.9	1 694 777	59.8	49 005
Atlantic												
Atlantic Maritime	2.0	183 978	1.8	19 772	0.2	Mixed forest	2 510 203	9.20	1 364.4	1 235 588	49.2	39 925
Great Lakes–St. Lawrence												
Mixedwood Plains	2.0	138 421	1.4	56 009	0.6	Agricultural cropland	#####	51.35	10 125.7	#####	84.8	325 199
Central Plains												
Boreal Plains	7.4	679 969	6.8	57 831	0.6	Coniferous forest	707 695	2.59	104.1	299 019	42.3	13 744
Prairies	4.8	469 681	4.7	8 429	0.1	Agricultural cropland	3 851 089	14.11	819.9	3 120 032	81.0	90 756
Pacific and Western Mountains												
Taiga Cordillera	2.7	264 480	2.7	360	<0.1	Coniferous forest	309	<0.01	0.1	0	0.0	5
Boreal Cordillera	4.7	459 680	4.6	4 920	<0.1	Coniferous forest	30 839	0.11	6.7	16 335	53.0	946
Pacific Maritime	2.2	205 175	2.1	13 805	0.1	Coniferous forest	2 504 393	9.17	1 220.6	2 174 948	86.8	58 152
Montane Cordillera	4.9	479 057	4.8	13 053	0.1	Coniferous forest	751 761	2.75	156.9	452 418	60.2	14 035
Canadian total	100.0	9 215 430	92.4	755 180	7.5		#####	100.00	296.2	#####	76.6	594 100

^a Marine ecozones are not listed.

Note: Percentages may not add up owing to rounding.

Source: State of the Environment Directorate, Environment Canada.

Table 3

Breeding Bird Survey trends, 1966–1994

Terrestrial ecozone ^a	% annual change in population					
	Habitat type			Migration pattern		
	Forest	Scrubland	Grassland	Long-distance migrant	Short-distance migrant	Resident (nonmigrant)
Pacific Maritime	-0.9	-1.1	-2.8	-1.4 ⁿ	-1.3	+0.6
Montane Cordillera	+0.3	+1.7 ^s	+0.4	+0.3	+0.2	+0.1
Boreal Plains	+1.6	-0.3	-0.6	+0.3	-0.2	-0.2
Prairies	+1.9 ^s	+0.5 ⁿ	-0.6	0.0	-0.1	-0.7
Boreal Shield	+0.2	-0.7 ⁿ	-1.6 ^s	0.0	-0.7 ^s	+2.9 ^s
Mixedwood Plains	+1.4 ⁿ	+0.3	-2.3 ^s	-1.5	-0.4	+0.2
Atlantic Maritime	0.0	-1.3 ^s	-2.5 ^s	-0.5 ⁿ	-0.7 ^s	-0.3
Canada ^b	+0.2	-0.5 ^s	-1.2 ^s	-0.2	-0.4 ^s	0.0

^a Insufficient data were available to calculate trends for the three Taiga ecozones and the Boreal Cordillera and Hudson Plains ecozones, and no data were available for the three Arctic ecozones.

^b Average for the terrestrial ecozones where sufficient data existed.

^s = trends statistically significant; ⁿ = trends nearly statistically significant; for others, trends not statistically significant.

Source: C. Downes, Canadian Wildlife Service, Environment Canada, personal communication.

Table 4

Pollutant	Averaging time	Maximum desirable concentration	Maximum acceptable concentration	Maximum tolerable concentration
Sulfur Dioxide	annual	11 ppb	23 ppb	-
	24-hour	57 ppb	115 ppb	306 ppb
	1-hour	172 ppb	344 ppb	-
Airborne Particles (Total Suspended Particulates)	annual	60 ug/m(cubed)	70 ug/m(cubed)	-
	24-hour	-	120 ug/m(cubed)	400 ug/m(cubed)
Ozone	1-hour	50 ppb	82 ppb	153 ppb
Carbon Monoxide	8-hour	5 ppb	13 ppb	17 ppb
	1-hour	13 ppb	31 ppb	-
Nitrogen Dioxide	annual	32 ppb	53 ppb	-
	24-hour	-	106 ppb	160 ppb
	1-hour	-	213 ppb	532 ppb

Table 5Dependent Variable: SO₂

1971-1994

Autocorrelation-Corrected OLS Estimates

VARIABLE	Estimated Coef.	T-ratio	Elasticity
SMELTER	2148.3	3.16	1.28
GROWTH	-96.605	-0.15	0.003
GROWTH2	1043.2	1.41	0.024
TIME	-96.587	-11.54	-
CONSTANT	0.191*10 ⁰⁶	11.62	-
R ² - adjusted - 0.8664			

Table 6

	Business Environmental Protection Expenditures by Activity '1994 ('000 dollars)		
Expenditures	Operating expenditures	Capital expenditures	Total expenditures
Activity type			
Environmental monitoring	235902	145944	381846
Environmental assessments and audits	81291	55081	136372
Reclamation and decommissioning	217231	109935	327166
Wildlife and habitat protection	68401	54193	122594
Waste management and sewerage services	257725	-	257725
PAC end-of-pipe facilities	828138	999688	1827826
PAC integrated processes	186211	216197	402408
Fees, fines and licences	43560	-	43560
Other	141551	-	141551
Total	2060010	1581038	3641048

Table 7

Environmental Protection Expenditures by Industry ('000s of Dollars)			
Expenditures	Operating expenditures	Capital expenditures	Total expenditures
Industry			
Logging	67353	8565	75918
Mining, crude oil and natural gas	391841	287431	492394
Food	86124	34199	120323
Beverage	22815	21710	44525
Pulp and paper	273307	613323	886630
Primary metals	390560	87001	477561
Fabricated metal products	43550	8086	51636
Transportation equipment	107014	35035	142049
Non-metallic mineral products	31258	20337	51595
Refined petroleum and coal products	181367	118998	487243
Chemical products	200633	84205	284838
Other manufacturing industries	-	-	-
Energy utilities and pipeline transport	264188	262148	526336
Total	2060010	1581038	3641048

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
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Human Capital and Regional Convergence in Canada

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University of Ottawa

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Session 3 Sustainability I: “Intergenerational Bequests of Natural and Human Capital”
October 30 11:30 AM - 12:30 PM

19 October 98

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To be presented at the Conference on The State of Living Standards and the Quality of Life in Canada, October 30-31, 1998, Ottawa, organized by the Centre for the Study of Living Standards.

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A first version of this paper was presented at the 1998 meetings of the Canadian Economic Association and of the Société canadienne de sciences économiques held in May 1998 in Ottawa and Québec City. The authors benefitted from comments from Doug May and the other participants. They also benefitted from discussions with Thomas Lemieux and the other participants of a seminar given at the University of Montréal. They want to thank Andrew Sharpe for editorial assistance. The authors, however, remain solely responsible for any remaining errors or omissions.

1. Introduction

In growth theory, convergence refers to the tendency of poor economies to grow faster than rich ones. Recently, the convergence hypothesis has received considerable support from cross-country empirical analysis for the post-WWII period (Barro and Sala-i-Martin 1995, Barro 1997). The evolution of regional economies in Canada is also characterized by convergence (Helliwell and Chung, 1991, Coulombe and Lee 1993, Lefebvre, 1994, and Helliwell, 1994).¹ The growth rates of a variety of per capita income and output measures and productivity have tended to be higher in the poor provinces than in the rich ones since 1950 and the dispersion across provinces of these economic indicators is considerably smaller today than it was after WWII. Pointing out that convergence was faster for income indicators that include government transfers, Coulombe and Lee (1995) highlight the potential role of interregional redistribution operated through the working of fiscal federalism. Lee and Coulombe (1995) show that productivity across provinces has converged even more rapidly than other income or output indicators. The analysis of Coulombe and Day (1996 and 1998) suggests that, since the mid-1980s, the dispersion of per capita income and output indicators might have reached the neighborhood of its long-run equilibrium value.

The empirical evidence of convergence suggests that the neoclassical growth framework is a good candidate to explain post-WWII regional growth patterns in Canada. Convergence to a steady state that is independent of initial conditions is a key property of the neoclassical growth framework. The further an economy is from its long-run equilibrium, the faster it grows and the growth rates asymptotically decreases to its long-run level during the transition process. The convergence property follows from the law of decreasing returns to capital accumulation. Capital tends to accumulate faster in regions where it is relatively scarce.

In this paper, we show that most of the relative growth profile of per capita income across Canadian provinces since the early 1950s could be explained by the convergence process of human capital indicators. The empirical analysis is a direct application of the 'new-neoclassical

¹The following empirical studies focus on regional convergence in Canada: Coulombe and Day (1996 and 1998), Coulombe and Lee (1993, 1995, and 1998), Helliwell (1994), Lee and Coulombe (1995), and Lefebvre (1994).

growth' model of an open economy suggested by Barro, Mankiw and Sala-i-Martin (1995) to the analysis of regional convergence in Canada. The analysis indicates that in an open economy with perfect capital mobility, the dynamics of human capital accumulation is the driving force of growth. During the convergence process, the accumulation of physical capital is driven by the accumulation of human capital, and per capita income disparities across economies are explained by disparities in human capital stock.

Section 2 focuses on the theoretical foundations of the empirical study by highlighting the role of human capital in neoclassical growth models. Speeds of convergence of human capital indicators and per capita income measures across Canadian provinces between 1951 and 1996 are estimated in section 3. Following the traditional approach in labor economics and in growth studies, we use data on educational achievements as proxies for human capital stock. In section 4, the relative evolution across the provinces of per capita income measures are explained by the provinces' initial relative endowments of human capital. We conclude by drawing some lessons for economic policy.

2. The Role of Human Capital

From a quantitative point of view, the basic Solow-Swan framework is unable to explain adequately many stylized facts observed at the cross-country level². In this section, we show why the introduction of human capital might be a solution to reconcile the neoclassical growth model with stylized facts. We first underline why it is important to increase the capital share above the accounting share of profits in national income. Then, we analyze the role of human capital accumulation in the framework of an open economy with perfect capital mobility.

2.1 The Capital Share

Traditionally, the elasticity of output with respect to capital was associated with the share of profits in national income. Data on national accountings reveal that the share of profits is approximately 1/3 of national income versus 2/3 for wages. The elasticity of output Y with respect to capital K is the exponent α in the familiar Cobb-Douglas production function:

$$Y = AK^{\alpha}(Le^{gt})^{1-\alpha},$$

where g is the growth rate of labor L in efficiency unit and A is an exogenous technological variable. This production function was specifically designed to adequately explain the invariance across time and across economies of the relative share of capital and labor in national accountings.

If the elasticity of output with respect to capital accumulation is limited to 1/3, the neoclassical growth model encounters many problems in explaining important stylized facts of economic development. Two important problems deal with the magnitudes of income gaps and rate of returns differentials. If labor is homogeneous and all economies have access to the same technology, the long-run level of output per capita is determined by the saving rate and the population growth rate. International data show that the saving rate is approximately four times higher and the population growth rate roughly 2 percentage points lower in the richer countries than in the poorer countries. Such discrepancies between savings and population growth could only account for per capita income gaps in the order of magnitude of two to one between the rich

² On this topic, refer to Mankiw (1995).

and the poor countries. The observed gaps often exceed 10 to one. Furthermore, the model predicts that the rate of return on capital should be 100 times higher in a country 10 times poorer than the rich ones.

According to Mankiw, Romer and Weil (1992), most of the empirical problems of the neoclassical growth model could be solved if the concept of capital is broadened to include both human and physical capital. The availability of data largely explains why the earlier formulations of the neoclassical growth model focused mainly on physical capital: Only data on physical capital accumulation are provided by the national accountings. However, on theoretical grounds, the accumulation of capital should correspond to the value of all present consumption forgone for the purpose of increasing future production. Education and on-the-job-training represent forms of investment in human capital accumulation. Since the return to human capital accumulation is implicitly incorporated in wages in national accountings, the contribution of capital accumulation to output growth is underestimated if the capital share is limited to the share of profits.

Following Barro, Mankiw and Sala-i-Martin (1995), a Cobb-Douglas production with a broad capital concept could be specified as:

$$Y = AK^{\alpha}H^{\eta}(Le^{gt})^{1-\alpha-\eta}, \quad (1)$$

where η is the elasticity of output with respect to human capital accumulation. On steady-state, η equals the share of the implicit return to human capital. On the basis of the difference between the average wage and the minimum wage in the US, Mankiw (1995) estimates that η should be approximately 1/2. The elasticity of output with respect to the accumulation of broad capital is then around 0.8. Mankiw (1995) argues that the quantitative predictions of a neoclassical growth model with a broad capital share around 0.8 are relatively consistent with most stylized facts on economic development.

2.2 Capital Mobility in an Open Economy

It is only recently that the neoclassical growth model has been extended to capture the process of capital accumulation in an open economy with capital mobility (Cohen and Sachs, 1986, Barro, Mankiw and Sala-i-Martin, 1995). The open economy framework modifies the fundamental dynamic of capital accumulation because external borrowing breaks the connection between domestic saving and investment. If there were no limit to foreign borrowing and capital was perfectly mobile, the predictions of the neoclassical growth framework would contradict most observed facts. Capital would flow instantaneously to economies where the capital- labour ratio is smaller and all economies would converge to their steady state at an infinite rate. Not surprisingly, one of the roads followed to improve the explanatory power of the neoclassical growth framework in an open economy was to introduce a constraint on international borrowing (Cohen and Sachs, 1986).³

The intrinsic nature of human capital provides an intuitively appealing motivation for modeling of a constraint on international borrowing. In a seminal paper that has contributed to restore the popularity of neoclassical growth models, Barro, Mankiw and Sala-i-Martin (1995) argue that investment in human capital should be financed with domestic saving because domestic residents cannot borrow abroad with human capital, or raw labor, as collateral.⁴ Human capital could hardly be financed through domestic financial markets if lenders want to secure their loans. Without public intervention, human capital investment by the young could only be financed within the family circle, which requires some forms of altruism or implicit inter-generational contracts. It is even hard to have investment in human capital fully recognized by the legal system in case of divorce and assets division. Recent graduates who benefit from public financing of their education have the incentive to default on their debt because their loan could

³ An alternative, and sometime complementary, approach is to model adjustment costs for investment. See Barro and Sala-i-Martin (1995, section 3.5).

⁴ The revival of neo-classical growth theory in the 1990s, following the development of endogenous growth models, came with the empirical and theoretical works of Mankiw, Romer and Weil (1992), Barro and Sala-i-Martin (1995), and Barro, Mankiw and Sala-i-Martin (1995).

not be secured by human capital. From a general point of view, the intrinsic problem of financing investment in human capital in a free-market economy comes from the specific nature of human capital, but it is also the result of modern institutional, political, and legal organizations. The history of human beings demonstrates that other institutional arrangements regarding property rights and political status allow for the use of human capital as collateral on loans.⁵

With a binding constraint for the financing of human capital, the complementarity between the two types of capital in the production function implies that the dynamics of human capital accumulation determines, by an unidirectional causal channel, the evolution of most important macro variables during the transitory process towards long-run equilibrium. The speed of convergence of physical capital, per capita income and output, is determined by, and equal to, the speed of convergence of human capital. If initially, the human capital/labor ratio is below its steady-state level, the physical capital/labor ratio would only gradually adjust to its steady-state value even if physical capital is perfectly mobile across regions.

Consider the example of a region where the physical capital/labor ratio is below the national average. If physical capital and labor are the only two factors of productions, one must conclude that the marginal product of capital is higher in this region than elsewhere and one would expect capital (financial capital or direct investment) to flow from the rest of the economy to this region. However in the framework set out by Barro, Mankiw and Sala-i-Martin (1995), the relative scarcity of human capital in the poor region translates by a rapid decrease in the marginal product of physical capital. Consequently, during the transition towards steady-state, the marginal product of capital is the same in the poor region than elsewhere, even if the physical-capital-labour ratio is smaller. Barro and Sala-i-Martin (1995, section 3.2.3) show that the equalization of the rate of return on physical capital across economies implies that the physical

⁵ The financing of human capital accumulation in financial markets or by direct investments could be achieved without the intervention of the state in slavery or colonial regimes.

capital/output ratio will be constant during the transition process.⁶ This is precisely one of Kaldor's (1963) "stylized facts" regarding economic development.

In a federal system, the centralized funding of education might relax the assumption that investment in education has to be financed by regional domestic saving. In Canada, the Federal government has established an ambitious program of interregional redistribution with the development of the welfare state in the post-WWII period. One of the purpose of interregional redistribution was to assist the provinces in the financing of higher education. But even if important resources are redistributed through the working of fiscal federalism, the dynamic process of human capital accumulation will be the driving force of regional growth if physical capital cannot be financed freely on international markets. The speed of convergence of poor provinces to the rich ones will then be determined by the incentive to invest in education in the poor provinces. As this study will show, the relatively slow speed of convergence observed at the regional level in Canada since the 1950s, despite the amounts involved in interregional redistribution, might be explained by the fact that most of the investment in education is made by young people, only a subset of the population.

Perfect capital mobility, for the financing of nonhuman capital, is one of the key premises of the Barro, Mankiw and Sala-i-Martin (1995) framework. We briefly look at the realistic nature of this assumption for the case of the Canadian provinces before testing the model empirically. On institutional grounds, one must recognize that barriers to capital mobility across provinces are practically inexistent. The Canadian financial system is mainly made up of large multi-branch banks that can redistribute savings across regions. Since regions are relatively homogeneous on cultural, political, and social grounds, Québec and the rest of Canada being a notable exception from the point of view of language, capital should flow freely to finance the most profitable investments. For a given risk, rates of return on physical capital should be equalized across regions.

⁶ Note that the discussion in Barro, Mankiw and Sala-i-Martin (1995, p. 108) regarding the evolution of the capital/ labor ratio during the transitory process is incorrect since Barro and Sala-i-Martin (1995, section 3.2.3) demonstrate algebraically the constancy of the capital/labour ratio for the case of a Cobb-Douglass production function.

From an empirical point of view, the assumption of perfect capital mobility cannot be tested directly. Since Feldstein and Horioka (1980), a common test of the assumption is to look at the correlation between investment and domestic saving across countries. If capital is not free to move geographically, one should observe a positive correlation between domestic saving and investment since the later is constraint by the former. On theoretical grounds however, this approach has been widely criticized.⁷ Barro, Mankiw and Sala-i-Martin (1995) demonstrated that in their neoclassical growth framework with perfect capital mobility and a credit constraint on human capital, the Feldstein-Horioka correlation should be observed on steady-state across economies that differ only from taxation rates.

Despite the theoretical problems of the Feldstein-Horioka approach, Brown (1992) concludes that capital is more mobile across Canadian provinces than across OECD countries on the basis of a Feldstein-Horioka empirical analysis. In Appendix A, correlations between investment and domestic saving across Canadian provinces and across countries are presented for illustrative purposes. Results are compatible with Brown's (1992) findings. Contrary to what is observed at the cross-country level, correlation coefficients between domestic savings and investment are not significantly different from zero across Canadian provinces. We do not however interpret these results as an empirical proof of the assumption of perfect capital mobility across Canadian provinces. Notwithstanding our prudent interpretation of the very indirect testing of this crucial assumption, we think that perfect capital mobility is a palatable working assumption for the analysis of long-run regional growth in Canada.

⁷ See for example Tesar (1991).

3. Convergence of Human Capital and Per Capita Income.

In this section, we estimate and compare the convergence speed of alternative indicators of human capital and per-capita income across Canadian provinces during the 1951-1996 period. We begin with a brief discussion of the problems associated with the measure of human capital.

3.1 The Measure of Human Capital.

As explained above, given its intrinsic nature, human capital is not exchanged in markets. That complicates the economic measurement of human capital. An ideal measure of human capital, that would include both educational achievement and on-the-job-training, does not exist and one has to rely on proxies. Fortunately, in this study, the empirical analysis relies only on relative measures, across provinces, of the stock of human capital. Most of the problems associated with the imperfect measure of human capital are then overturned. Our indexes of human capital are based on the census data that measure the percentage of the population who have at least achieved a given level of education. Even though this approach to evaluate human capital is widely used by labor economists (Romer, 1993), it is not a perfect measure and some problems associated with it need to be discussed.

One can argue that the determinant of growth dynamics is the stock of human capital of the labor force, not of the total population. Since it is practically impossible to account for the entries and exits in the labor pool, it is much tractable to construct a measure of the educational achievement of the total population.⁸ As discussed by Barro and Lee (1993), it might be important to account for the quality of education, not only for the number of years at schooling. The heterogeneity of educational systems complicates the comparison of educational achievement indexes across different institutional frameworks. This problem however is not very important for comparing educational achievement across Canadian provinces since their educational systems are fairly homogeneous. Moreover, one could argue that in order to build an exact index of human capital, one should weight appropriately the different levels of

⁸ However, part of the investment in human capital follows from non-market activities within the family circle and one could argue that the human capital of non-participating members is an input in the human capital accumulation process.

education. It is very difficult however to determine which weights to give to different levels of education. Barro and Lee (1993) argue that one might try to weight each level of education with its average market return. They acknowledge however that such approach might introduce a bias since, on the one hand, the level of education is likely to be positively correlated with individual skills and, on the other hand, market returns of education exclude external benefits generated by human capital.

Even though everyone concedes that on-the job-training contributes to human capital, it is very difficult to measure. Efforts spend by employers and employees for training provide information for investment flows and could not be easily compared with data on educational achievement. Even though measures of the stock of human capital acquired through on-the job-training were available, one would have to determine the appropriate weight of formal education and on-the-job-training in order to combined them in an aggregate measure of the human capital stock . This appears to be a non-palatable exercise, to say the least. Psacharopoulos and Arriagada (1986) argue that for the U.S., the number of workers participating in on-the-job-training activities is almost equal to the number of students in colleges and universities. This fact, as valuable as it is, does not provide much information on the relative weight of on-the-job-training in the production process.

When interpreting the results of the empirical part of this study, one should bear in mind the various difficulties encounter to measure the human capital stock of an economy.

3.2 A Look at the Data and σ -Convergence

The indicators of human capital come from Statistics Canada census data on educational achievement. We use all the information available on a consistent basis since 1951. Given the format of the first census questionnaires, it is possible to build an index going back to 1951 for the ten provinces based on the percentage of the population (15-years and over, 15 to 24-years, and 25-years and over, for males, females and population of both sexes) who have at least achieved two alternative benchmark levels of education: Grade 9 and a university degree. The data are available for the censuses of 1951, 1961 and 1971, and, since, for every five years up to 1996. Such indexes based on the percentage of the population with at least a benchmark level of

education might not be very useful for measuring the total stock of human capital in an economy. However, it is an interesting measure for our empirical analysis that focuses only on relative levels for a province, with respect to the average of the 10 provinces, of alternative indicators of human capital. For the case of the population 15-years and over, the trends in human capital indicators for the 10 provinces are depicted in Figures 1 and 2.

Insert Figures 1-2.

A clear convergence pattern emerges for the visual analysis of the two Figures.⁹ On average, the provinces which were lagging behind in terms of educational achievement seem to get closer to the average during the period. The provinces which were initially better endowed tend to come back to the average. Following Barro and Sala-i-Martin (1995), the concept of σ -convergence, σ refers here to the standard-deviation of the economic indicators cross-sectional distribution, can be used to qualify the evolution through time of the dispersion of human capital indicators. σ -convergence is said to occur if the dispersion of the cross-sectional distribution tends to decrease through time.

Insert Figure 3.

The dispersion of the two human capital indicators across the provinces, shown in Figure 3, unambiguously demonstrates a tendency to decrease through time during the entire period. Regarding the indicators based on university education, the standard-deviation decreases from 45.5% in 1951 to 16.4% in 1996. Since we are using relative indexes, the standard deviation can be interpreted as a coefficient of variation and, for the actual discussion, numbers are translated in %. For the indicator based on grade 9, the standard deviation decreases from 17.5% to 4.2%.

⁹ The analysis presented in section 3 is robust with respect to alternative educational achievement indexes that are available since 1971 only. The main results for the convergence of human capital indicators for alternative age groups and sexes apply to the percentage of the population with at least some post-secondary education since 1971.

The detailed analysis by province reveals some interesting facts. Provinces with higher per capita income, Ontario, and B-C, have a better educated population. In general, provinces with lower per-capita income are below average in terms of educational achievement. Nova-Scotia and Québec are however two notable exceptions regarding the university education indicator. For Québec, the evolution of the indicators based on grade 9 and university education behave asymmetrically. Regarding the grade-9 indicator, Québec behaves like the other relatively poor provinces with, initially, a below average index of human capital. The indicator gets closer to the provincial average, from 82.7% to 93.8%, between 1951 and 1996. However, from the point of view of university education, Québec's indicator starts clearly above the average, like the rich provinces. So in 1951, Québec was very well endowed in specialized labor but general or basic education was lacking. Coulombe (1998) suggests that this interesting phenomenon could be explained by the elitist nature of the educational system in Québec, before the reforms of the 1960s, and to the large exodus of the Anglophone population in the 1970s, a population typically well educated.¹⁰

3.3 β -convergence of Human Capital

During the transitory period toward steady-state, Barro and Sala-i-Martin (1995, chap. 2) demonstrate, from a log-linear approximation in the neighborhood of steady-state, that per-capita output (in effective units of labor) at time t , y_t , is a weighted average of its initial level y_0 and its steady-state level y^* :

$$\ln y_t = e^{-\beta t} \ln y_0 + (1 - e^{-\beta t}) \ln y^* \quad (2)$$

This is the fundamental dynamic equation for the analysis of β -convergence in the neoclassical growth framework. The parameter β is the speed of convergence toward steady-state and it is a function of exogenous variables such as preferences, the depreciation rate, the rate of population growth, the rate of growth of technological progress, and the share of capital. As shown by

¹⁰ Detail analysis of census data indicates that the better educated Quebecers in 1951, relative to the other provinces, were the male population, 25-years and over.

Barro, Mankiw and Sala-i-Martin (1995), this equation could be used to model the evolution of per capita output in an open economy model with a broad concept of capital and a constraint on human capital financing. Under the assumptions of a Cobb-Douglas production function and a constant and exogenous world interest rate, Barro, Mankiw and Sala-i-Martin (1995) demonstrate that the production function could be modified in the following form:

$$y = Bh^{\frac{\eta}{1-\alpha}}. \quad (3)$$

B , a constant term, is a function of exogenous variables (independent of the capital/labor ratio) and h is the human capital/labor ratio (in effective units of labor). Since the production function exhibits constant returns to scale, $\alpha+\eta$ is smaller than one and decreasing returns apply to capital accumulation. The open economy with a credit constraint on human capital behaves like a closed economy with a broad capital share of $\eta/(1-\alpha)$. It could be shown that the capital/labor ratio follows the transitory dynamics imposed by the accumulation of human capital. From equation (2) and (3), one gets the equation that describes the dynamics evolution of the human capital/labor ratio:

$$\ln h_t = e^{-\beta t} \ln h_0 + (1 - e^{-\beta t}) \ln h^* \quad (4)$$

The human capital/labor ratio at time t , as for output per worker, is a weighted average of its initial level h_0 and its steady-state value h^* . The evolution of the human capital/labor ratio can then be described by the same type of equation as the one usually used for estimating the convergence speed β of per-capita output. Furthermore, the predicted speed of convergence of human capital (β) is the same as the one predicted for per capita output.

The hypothesis of **conditional convergence** refers to the case when a cross-section of economies converges to different steady-state values for y^* and h^* . In this case, when estimating β -convergence, additional variables have to be included on the right-hand side of the regression equation like (5) in order to capture the steady-state determinants that differ across economies. Variables used for cross-country empirical analysis of conditional convergence are: saving rates,

growth rates of the population, and variables capturing heterogeneous social and political institutional frameworks. Barro (1997) concludes that the hypothesis of conditional convergence cannot be rejected for a large set of developed and underdeveloped countries. In this study, the empirical analysis of β -convergence for the Canadian provinces is based on the hypothesis of **absolute convergence**. In this case, the speed of convergence is estimated under the assumption that the different economies converge to identical steady-state values. For the analysis of growth patterns within regions of the same country, there is good evidence of absolute convergence for the U.S. States since 1880, for the Japanese Prefectures since 1930, and for the regions of eight European countries since 1950 (Barro and Sala-i-Martin, 1995, chapter 11). This phenomenon is interpreted as evidence that, contrary to a cross-section of countries, regions within a country share important determinants that account for different long-run equilibrium levels of economic indicators (Aghion and Howitt, 1998, section 1.5.2). In Canada, empirical studies following different methodologies, conclude that the hypothesis of absolute convergence cannot be rejected for the ten provinces for alternative indicators of per capita income, output and productivity (Coulombe and Lee (1993, 1995), Lee and Coulombe (1995), Lefebvre (1994) Coulombe and Day (1998)).

Equations (2) and (4) could be tested using a cross-section of economies, a time series of data for an economy, or by pooling time-series and cross-section observations. In this paper, for estimating the average convergence speed of various indicators across the Canadian provinces, we use a variant of the Barro and Sala-i-Martin (1991, 1992) cross-section technique proposed by Coulombe and Lee (1995) and Coulombe and Day (1996) for the purpose of increasing the degrees of freedom in the study of small samples of economies. The idea is to pool cross-section (the provinces) and time-series observations during the 1951-1996 period in order to use all the available information regarding relative regional growth. The 1951-96 sample is divided into five sub-periods. Given the change in the frequency of census observations, from 10 years to 5 years in 1971, we have to use a mix of ten-year periods and at least one five-year period in order to cover the entire period of the survey. We chose to divide the sample in four ten-year periods and one five-year period. As shown in Appendix B, the results are robust to alternative divisions of sub-periods. With five sub-periods and ten cross-section observations, we have 50 pooled

time-series and cross-sections observations. The estimated equation for the convergence speed β of the human capital indicators h is:

$$\frac{1}{10} \ln \left(\frac{h_{i,t+P} / H_{t+P}}{h_{i,t} / H_t} \right) = - \left(\frac{1 - e^{-M\beta_h}}{M} \right) \ln \left(\frac{h_{i,t}}{H_t} \right) + u_i, \quad (5)$$

where the subscript i denotes the province, H denotes the un-weighted provincial average¹¹ of the human capital indicator and u_i represents the error term. P , the length of the period, equals 10 when the date t is set to 1951, 1961, 1971, and 1981 and P equals 5 when t is set to 1991. M is set to 9, the average length of the sub-period, in the coefficient on the right-hand side, in order to obtain estimates of β that could be interpreted as annual speed of convergence. Note that the proposed estimation technique gives the same importance to the information contained in a ten-year period as that in a five-year period. Following Coulombe and Lee (1995), we exclude the common trend component by dividing the provincial indexes by the provincial average. Since both the independent and the dependant variables are measured as deviations from the sample mean, the constant term in the right hand-side of the equation equals zero. Equation (5) is first estimated using linear least-squares and then the speed of convergence β is computed from the value of the estimated coefficient following the non-linear formula specified in equation (5). Estimation results are presented in Table 1 for 18 indicators of human capital based on the percentage of the population according to the age group, the sex, and the benchmark level of education.

Insert Table 1

First, a key finding is that the null hypothesis of no-convergence ($\beta = 0$) could be rejected at the one percent level for all indicators. Thus, indicators of human capital have grown faster

¹¹The empirical analysis is robust with respect with the use of the national average, i.e., the weighted provincial average, for calculating ratios in convergence equations. The use of an un-weighted provincial average follows from the well-established custom in convergence studies to give equal weight to cross-section observations.

since 1951 in the provinces that were originally less endowed in human capital. The high t-statistics for the 18 indicators illustrate the robustness of this result.

Second, it is interesting to note that the estimated speed of convergence varies considerably for alternative indicators. On theoretical ground, Barro, Mankiw and Sala-i-Martin (1995) have demonstrated that, in the framework of their open-economy neoclassical growth model with a credit constraint for the financing of human capital, the speed of convergence of per capita output and human capital should be in the interval [0,014; 0,035]. Estimated convergence speeds for the human capital indicators for the population 15 years and over and 25 years and over are in the neighborhood of the upper bracket of this interval. Convergence speeds are however much faster for the 15 to 24 years. It is also interesting to note that convergence speeds are slightly faster for the females than for the males in the 15 to 24 years. We have computed a Wald statistic to test the null hypothesis $\beta_1 = \beta_2$, where β_1 and β_2 are the convergences speed of two independent samples. For this test, the Wald statistics W is defined as:

$$W = (\beta_1 - \beta_2)^2 / (V_1 + V_2)$$

where V_1 and V_2 are the estimated variances of β_1 and β_2 ¹². The Wald statistics are presented in Tables 2 and 3.

Insert Tables 2 and 3

The results regarding the comparison of the convergence speeds between the 15-24 years and the 25 years are intuitively appealing (Table 2). The null hypothesis is rejected at the 5 percent level in all cases. Thus, the convergence speeds of human capital indicators are significantly faster, from the statistical point of view, for the 15-24 years than for the 25 years and over. This indicates that, if the total population had behaved like the young people in the 15-24 years group, estimated convergence speeds for the total adult population might have been two to three times faster. Based on those findings, one could provide a new interpretation to the relative slowness of the speed of convergence estimated for alternative samples of regional and national economies as in Barro and Sala-i-Martin (1995). If investment in human capital is the driving force of the convergence process, the slowness of the catch-up process could be imputed

¹² Regarding the Wald test, refer to Greene (1993, section 4.8.3b).

to the fact that an important portion of the total population does not have a clear incentive to invest in education. The opportunity cost for investing in education is usually higher for the population over 25 years of age and the expected return of the investment decreases when people get older.

Regarding the analysis of Table 3, the null hypothesis of equality of the estimated convergence speed across sexes cannot be rejected for 5 of the 6 cases. There is one notable exception however, the convergence speed of females is two times faster for the 15-24 age group for the percentage of the population with at least grade 9.

3.4 Comparison of convergence speeds of per-capita income and human capital indicators

We use the same methodology than employed for human capital to estimate the convergence speed of per-capita income across the Canadian provinces during the 1951-1996 period. Two alternative measures of income are used: Personal income, and personal income minus government transfers.¹³ The following equation was estimated using linear least-squares:

$$\frac{1}{10} \ln \left(\frac{y_{i,t+P} / Y_{t+P}}{y_{i,t} / Y_t} \right) = - \left(\frac{1 - e^{-P\beta_y}}{P} \right) \ln \left(\frac{y_{i,t}}{Y_t} \right) + u_i \quad (6)$$

Y is the provincial average of per-capita income indicator y and β_y is the convergence speed of income. Five-year periods are used and P is set to 5. Results are presented in Table 4.

Insert Tables 4 and 5

For the two measures of income, the null hypothesis of no-convergence is rejected at the 5 percent level. As first shown by Coulombe and Lee (1995) for the period 1961-1991, the convergence speed is slower when government transfers are subtracted from income. This was interpreted by the redistributive effect of the fiscal federalism and the tax-transfers system.

¹³ The data for personal income come from CANSIM series D11701-D11710 and those for government transfers from various series in Statistics Canada catalogue No. 13-213. Details available on request.

As predicted by Barro, Mankiw and Sala-i-Martin's (1995) framework, convergence speeds of human capital and per capita income should be equal. The Wald statistics to test for the equality between the convergence speeds of alternatives indicators of human capital on the one side, and the convergence speed of the post- and the pre-transfers measures of income on the other are presented in Table 7.

The null hypothesis is easily rejected for all the convergence speeds estimated for human capital indicators of the 15-24 years. This result is not surprising since the human capital indicators of the 15-24 years are certainly bad proxies for the overall level of human capital in a regional economy. On the other side, for the population 25 years and over, the null hypothesis of equality between the convergence speeds of income and human capital could not be rejected at the 5 percent level whatever the sex groups, the benchmark level of education, and the income measure used. The same finding applies for the population 15 years and over with one notable exception: The null hypothesis could be rejected at the 5 percent level whatever the sex group when one considers the human capital indicator based on the population with at least grade 9 on the one side and per capita income minus transfers on the other side. This result suggests that the human capital indicator based on the percentage of the population with at least grade 9 might not be an appropriate proxy for the overall level of human capital in the framework of Barro, Mankiw and Sala-i-Martin (1995).

4 The Contribution of Human Capital to Regional Growth

The purpose of the exercise is three-fold. First, the analysis of section 3 does not establish a direct relationship from human capital accumulation to the convergence of income per capita. The convergence of both human capital and per capita income might be only coincidental if, initially, the well-endowed provinces in human capital were the ones with per-capita income below the national average. By testing directly a transformed version of the production function (3), we are measuring in this section the contribution of the human capital accumulation process to the relative growth of per capita income in the 1951-1996 period. Second, we are able to provide an estimation of the elasticity of national income to human capital, i.e., the share of human capital in national income on steady-state, with a transformation of the estimated

coefficient of human capital in the production function. Third, by comparing the estimation results for alternative indicators of human capital, we can highlight which one is the best predictor of relative income growth at the regional level.

Taking the logarithm of equation (3), the per capita income of province i with respect to the provincial average could be expressed as a function of the ratio of the human capital stock of province i to the provincial average:

$$\ln\left(\frac{y_{it}}{Y_t}\right) = \left(\frac{\eta}{1-\alpha}\right) \ln\left(\frac{h_{it}}{H_t}\right) \quad (3')$$

The physical capital share α is measured residually from non-wage income in the national accounts. This share, which is relatively constant through time, averaged 0.287 between 1951 and 1996.¹⁴ The elasticity of output with respect with human capital η can be estimated by equation (3') based only on the relative measure of human capital, an interesting feature again since most of the criticisms of the measure of human capital do not apply when relative measures are used. Equation (3') is estimated by pooling time-series and cross-section observations for the ten provinces and the eight censuses between 1951 and 1996. Here again, the same importance is given to ten-years and five-years periods. As a measure of the human capital stock, we use 18 alternative indicators based on educational achievement of the two benchmark levels (grade 9 and university degree), for three age groups (15 years and over, 15-24 years, and 25 years and over), and, for both sexes, males, and females. Estimation results are presented in Table 6 for the pre- and the post-transfers measure of national income.

Insert Table 6 here

For all indicators of human capital, whatever the subgroup of the population considered, the t-statistics are very high indicating that the accumulation of human capital at the regional level has a significant effect of the convergence on the two per-capita income measures since

¹⁴ For this calculation, we exclude agriculture incomes for which the relative contribution of profits and wages are difficult to separate. The accounting measure varies between 0.33 and 0.25 in the period under study. Data come from Statistics Canada catalogue 13-531.

1951. Many interesting findings emerge from the detailed analysis of Table 6. First, comparing the numbers between the pre- and the post transfers measures (comparing columns 1 to 3, and 2 to 4), one can see that the estimated income-share of human capital is higher for all indicators when transfers are excluded from national income. This result is not surprising since it indicates that investment in education increases the potential to earn labor income and decreases the dependency on income support programs.

Second, the estimated output-share of human capital is very high, in the neighborhood of one, when the grade-9 benchmark level of education is used as a proxy of human capital. If those estimates indicate the actual contribution of aggregate human capital investment to output growth, the sum of the coefficients α and η would be largely superior to one. In this case, the accumulation of both physical and human capital generates increasing returns. This does not mean however that increasing public investment in basic education will generate increasing returns to scale since, nowadays, virtually all Canadians reach at least grade 9. In order to generate increasing returns to scale, the human-capital/labor ratio has to be increased. A detailed analysis of census data indicates that since 1991 the standard deviation across the provinces for the population 15 to 24 years of this indicator of basic skills is extremely low, around 1.5%. Since this number is still below the standard deviation for the population 15 years and over, 4.2% in 1996, one should expect, *ceteris paribus*, further decrease in the dispersion of per capita income in Canada as the population without grade 9 eventually leaves the labor market as they get older.

Third, maybe the most important point that comes out of the analysis, is related with the points estimates of the income elasticity of human capital based on university degree (the last column). The point estimates of η for the population 15 years and over, and 25 years and over, for both sexes and male, are around 0.5 with a confidence interval at 95% typically between 0.42 and 0.57. Those estimates coincide with Mankiw's (1995) estimate of the human capital share for the US based on the gap between the minimum wage and average wage. Furthermore, regressions using this indicator of human capital provide the higher R^2 ; between 0.71 and 0.73. Such R^2 are very high given that the regression does not include a constant term or a dependant lagged-variable on the right-hand side. Slightly more than 70% of relative per-capita income

growth across the Canadian provinces since 1951 could then be explained by the catch up in human capital stocks as measured by the advance-education indicator. That leaves, at most, 30% for the other factors combined! This result corroborates Barro and Sala-i-Martin (1995) and Barro (1997) findings that, at the cross-country level, investment in advanced education is one of the most important determinants of long-run growth. Overall, the analysis indicates that the best proxy of human capital for the purpose of regional economic growth in Canada is the indicator based on university education of both sexes, or the males only, for the population 25 years and over, or 15 years and over. Point estimates for the female population are smaller.

Finally, if one accepts that the best proxy for the overall human capital stock is the percentage of the population with at least a university degree, the analysis suggests that regional economies are facing decreasing returns to the accumulation of broad-capital, as assumed in the neoclassical growth framework. On theoretical ground, the critical value of η is 0.71 since α is set at 0.29 from the national accounting share of profits. In an AK model of endogenous growth (see Aghion and Howitt, 1998, section 1), $\alpha+\eta$ equals 1 and the accumulation of capital is a long-run source of growth. If $\alpha+\eta$ is smaller than 1, the economy is facing decreasing returns to capital accumulation and convergence should be observed when some economies are lagging behind in terms of capital accumulation. Since convergence is observed for both the human capital stock and per capita income, the endogenous growth assumption of $\alpha+\eta=1$ should be rejected for the sake of internal consistency of the results. From the confidence intervals at 95%, one can see from Table 6 that the endogenous growth assumption is rejected for all indicators of human capital based on advance education.

5 Conclusion

The convergence of per-capita income, output and productivity indicators across the Canadian provinces in the post-WWII period is now a well-established fact. However, little empirical analysis has been done before to explain this phenomenon. The explanation matters because convergence of per capita income is consistent with alternative economic frameworks. For example, as pointed-out by Aghion and Howitt (1998, chapter 2), the Schumpeterian approach to endogenous growth, when the model is extended to capture technology transfers, is consistent with convergence across a set of economies. In order to directly relate the convergence process to neoclassical growth and decreasing returns, convergence has to be related to the dynamic accumulation process of capital. The key contribution of this paper is to show that convergence across the Canadian provinces could be explained by the dynamic accumulation of human capital as predicted by the open-economy version of the neoclassical growth framework à la Barro, Mankiw, and Sala-i-Martin (1995). By doing this, this study shed new light on an old Canadian problem. The study contributes to the understanding of regional disparities and clearly indicates directions for economic policy that would aim at alleviating the consequences of the old Canadian problem.

From a quantitative point of view, our findings suggest that the effect of human capital accumulation is not a minor factor, among others, that could explain the relative evolution of regional economies in Canada. By itself, the human capital catch-up process, based on the advance education indicator, explains roughly 70% of the relative evolution of per-capita income since 1951 across the Canadian provinces.

From this paper, a new story comes out for explaining the slow process of convergence across the Canadian provinces observed since 1951 despite the well integrated financial networks, the mobility of physical capital, and the interregional redistribution of resources. Despite the relative scarcity of physical capital in the poorer regions, capital did not flow to these regions because the availability of a well-educated population is a necessary requirement for the productivity of machines. Private markets in Toronto cannot finance the investment in advanced education by a bright young Newfoundlander because he cannot use human capital as a collateral on a loan. Since a subset only of the total population, the young, has a clear incentive to invest

in education, the catch up process of human capital is slowed-down by the stock effect of the less-educated older people who remains in the poorer provinces. One of the findings of this paper is that the convergence speed might have been two to three times faster if all persons had invested in education at the same rate as the young did.

Outside a restraint circuit, individuals have difficulty finding funds to finance their investment in education because of a credit constraint. However, within a federal state, the central government could redistribute resources that could be used to finance investment in education at the regional level. In Canada, throughout the 1950s, 1960s, and 1970s, with the rise of the welfare state and the creation of massive interregional redistribution programs, like equalization payments, unemployment-insurance and the joint-financing of public spending in education, health, and social assistance, the relatively poor provinces have been able to build a public infrastructure that could compare, in quality, with the one of the richer provinces. Coulombe and Day (1998) illustrate that, just after WWII, per capita income disparities across the Canadian provinces were much larger than the ones then observed across the US border states. Economic development seems to have spread out more evenly just south of the Canadian border. Goldin and Katz (1997) relate regional economic growth in the US in the first part of the century to the phenomenal public investment in secondary education in the Far West, the Great Plains, and parts of New England between 1910 and 1940. They show that secondary enrolments were much higher in the US border states at that time than in their Canadian provinces directly to the north. According to Coulombe and Day (1998), the gap in the dispersion index across the provinces and across the border states have gradually decreased since the 1950s. One should note that this catch-up phenomenon coincides with the set-up of the interregional redistribution scheme in Canada. The analysis in this paper does not provide a direct test of the relationship between interregional redistribution and regional convergence. However, it provides an analytical framework that stresses the unidirectional causal relationship between the financing of education and the catch-up process of human capital and per capita income of underdeveloped regions.

Migration is an important phenomenon that has to be added in further research to the analytical framework if one wants to have a more complete picture of the relationship between

human capital and regional growth in Canada.¹⁵ The complete model has to take into consideration some important stylized facts regarding interregional migration in Canada. For example, it is well known in Canadian empirical studies on migration that the younger and better educated people in the poor provinces tend to migrate to richer provinces.¹⁶ This phenomenon by itself can potentially slow-down the convergence process. What this study shows however is that convergence of a variety of human capital stock indicators has been observed at the regional level in Canada since 1951 despite the ‘brain drain’.

From an economic policy perspective, our study emphasizes the key roles of public administration in financing education and redistributing resources at the regional level. If investment in education is the driving force of regional convergence, governments have a role to play in promoting regional development since the financing of education is constrained by institutional factors. At the individual level, the financing of education is often limited to a person’s family. The government can alleviate this constraint with a variety of programs aimed at lowering the cost of education and/or lending money directly to students, or by guaranteeing loans. For local administrations (municipalities, universities, colleges and school boards) the provincial and the federal governments could redistribute resources on a geographical basis for the purpose of improving local public infrastructures. Since the young and well educated tend to migrate from the poor to the rich provinces, the redistributive function of fiscal federalism should prevent provincial governments in poor provinces from under investing in advanced education since part of the local benefits of public investment in education is lost from a regional point of view.¹⁷ In order to achieve this goal, transfers from the federal government to the provinces should be related to the amount actually spend in education at the provincial level. But, since

¹⁵Migration has been introduced in recent studies on growth (Braun, 1993 and Barro and Sala-i-Martin, 1992). Braun’s (1993) Ph.D. dissertation is analyzed in Barro and Sala-i-Martin (1995, chapter 9). Those models however are not directly applicable to the study of regional growth in Canada following the analytical framework proposed in this paper.

¹⁶ For a recent study, see Cousineau and Vaillancourt (1997).

¹⁷ The problem of the lost of regional resources from public spending on advanced education generated by the brain drain is not new. Lacroix and Proulx (1973) estimated the loss by the poor provinces and gain by the rich ones resulting the mobility of the well educated.

1977, with the creation of the Established Programs Financing, this is not the way inter-government transfers have been designed in Canada. Recent modifications introduced with the Canadian Health and Social Transfer have done nothing to prevent the provinces from spending on health or on social security the resources transferred from the Federal government for post-secondary education. If education is the key to economic growth, education policy should be designed to provide the appropriate incentives.

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Appendix A

Correlation between domestic saving and investment of Canadian provinces and countries.

The assumption of perfect capital mobility can be indirectly tested by estimating the correlation between domestic saving and investment of the Canadian provinces. If there is perfect capital mobility we should observe a correlation coefficient equal to 0. We have calculated average rates of investment and saving as a percentage of GDP for each provinces for the period 1961-1991 as well as for three sub-periods of ten years¹⁸. The investment rate is calculated from private investment in fix capital and inventories. The saving rate includes private and public saving. Results are presented in table 7.

Table 7: Correlation between domestic saving and investment of Canadian provinces

1961-1991	1961-70	1971-80	1981-91
$\rho = -0.306$ (-0.908)	$\rho = -0.508$ (-1.667)	$\rho = -0.345$ (-1.041)	$\rho = -0.217$ (-0.630)

ρ = correlation coefficient

T-statistics are in parenthesis

No correlation coefficient is significantly different from 0 at the 95 % confidence level (the critical value is 1.81).

We have also estimated the correlation between the average rates of domestic investment and saving as a percentage of GDP for different sets of countries¹⁹. Results are presented in table 8.

¹⁸ The data are from Statistics Canada publication entitled "Provincial Economic Accounts".

¹⁹ The data are from the following publications:
International Financial Statistics Yearbook, 1994, International Monetary Fund.
World Tables, 1995, John Hopkins University Press, published for the World Bank.

Table 8: Correlation between domestic savings and investment of countries

	# of countries	1967-93	1967-73	1974-80	1981-87	1988-93
World	121	$\rho = 0.195$ (2.17)	$\rho = 0.512$ (6.51)	$\rho = 0.286$ (3.25)	$\rho = 0.157$ (1.73)	$\rho = 0.020$ (0.22)*
Sub-Saharan Africa	40	$\rho = -0.054$ (-0.34)*	$\rho = 0.302$ (1.96)	$\rho = 0.255$ (1.62)*	$\rho = -0.101$ (-0.62)*	$\rho = -0.331$ (-2.16)
Southern Asia	5	$\rho = 0.925$ (4.22)	$\rho = 0.949$ (5.24)	$\rho = 0.912$ (3.86)	$\rho = 0.862$ (2.95)	$\rho = 0.899$ (3.55)
Eastern Asia and Pacific	12	$\rho = 0.104$ (0.33)*	$\rho = -0.061$ (-0.19)*	$\rho = -0.081$ (-0.26)*	$\rho = 0.581$ (2.26)	$\rho = 0.412$ (1.43)*
Latin America and the Caribbean	27	$\rho = 0.264$ (1.37)*	$\rho = 0.820$ (7.16)	$\rho = 0.241$ (1.24)*	$\rho = 0.361$ (1.94)	$\rho = 0.495$ (2.85)
Middle-East and North-Africa	9	$\rho = 0.160$ (0.43)*	$\rho = 0.522$ (1.62)*	$\rho = 0.241$ (0.66)*	$\rho = 0.150$ (0.40)*	$\rho = -0.067$ (-0.18)*
Europe and Mediterranean	9	$\rho = 0.552$ (1.75)*	$\rho = 0.387$ (1.12)*	$\rho = 0.676$ (2.43)	$\rho = 0.804$ (3.58)	$\rho = 0.557$ (1.77)*
Industrialised Countries	19	$\rho = 0.873$ (7.38)	$\rho = 0.680$ (3.83)	$\rho = 0.654$ (3.56)	$\rho = 0.764$ (4.88)	$\rho = 0.712$ (4.19)

ρ = correlation coefficient

T-statistics are in parenthesis

A * means that the t-statistics is smaller than the critical value which indicates that the correlation coefficient is not significantly different from 0.

Appendix B

Table 9: Human Capital Convergence Between Canadian Provinces from 1951 to 1996
(Robustness analysis; 5 year period for 1971-1976)

		Human Capital Indices	
		Percentage of the Population with at Least Grade 9	Percentage of the Population with a University Degree
15 years and over	Both sexes	$\beta = 0.036$ (11.44) $R^2 = 0.73$	$\beta = 0.032$ (6.32) $R^2 = 0.44$
	Males	$\beta = 0.034$ (10.55) $R^2 = 0.69$	$\beta = 0.031$ (8.05) $R^2 = 0.56$
	Females	$\beta = 0.035$ (12.24) $R^2 = 0.75$	$\beta = 0.042$ (5.80) $R^2 = 0.39$
15 - 24 years	Both sexes	$\beta = 0.063$ (12.02) $R^2 = 0.75$	$\beta = 0.071$ (8.23) $R^2 = 0.57$
	Males	$\beta = 0.057$ (10.50) $R^2 = 0.69$	$\beta = 0.074$ (7.38) $R^2 = 0.52$
	Females	$\beta = 0.069$ (14.24) $R^2 = 0.80$	$\beta = 0.095$ (8.27) $R^2 = 0.57$
25 years and over	Both sexes	$\beta = 0.029$ (9.67) $R^2 = 0.65$	$\beta = 0.030$ (6.19) $R^2 = 0.43$
	Males	$\beta = 0.028$ (9.63) $R^2 = 0.63$	$\beta = 0.028$ (7.17) $R^2 = 0.50$
	Females	$\beta = 0.028$ (8.83) $R^2 = 0.61$	$\beta = 0.037$ (5.32) $R^2 = 0.35$

Table 10: Human Capital Convergence Between Canadian Provinces from 1951 to 1996
(Robustness analysis; 5 year period for 1981-1986)

		Human Capital Indices	
		Percentage of the Population with at Least Grade 9	Percentage of the Population with a University Degree
15 years and over	Both sexes	$\beta = 0.034$ (11.52) $R^2 = 0.73$	$\beta = 0.027$ (6.91) $R^2 = 0.48$
	Males	$\beta = 0.033$ (10.30) $R^2 = 0.68$	$\beta = 0.028$ (8.93) $R^2 = 0.61$
	Females	$\beta = 0.033$ (12.04) $R^2 = 0.75$	$\beta = 0.036$ (6.25) $R^2 = 0.43$
15 - 24 years	Both sexes	$\beta = 0.061$ (12.04) $R^2 = 0.75$	$\beta = 0.068$ (9.66) $R^2 = 0.65$
	Males	$\beta = 0.055$ (10.32) $R^2 = 0.68$	$\beta = 0.073$ (8.45) $R^2 = 0.59$
	Females	$\beta = 0.067$ (14.55) $R^2 = 0.81$	$\beta = 0.085$ (9.56) $R^2 = 0.64$
25 years and over	Both sexes	$\beta = 0.028$ (9.29) $R^2 = 0.64$	$\beta = 0.025$ (6.82) $R^2 = 0.47$
	Males	$\beta = 0.027$ (8.77) $R^2 = 0.61$	$\beta = 0.025$ (7.33) $R^2 = 0.51$
	Females	$\beta = 0.027$ (8.63) $R^2 = 0.60$	$\beta = 0.030$ (5.40) $R^2 = 0.36$

Table 1: Human Capital Convergence Between Canadian Provinces from 1951 to 1996

		Human Capital Indices		
		Percentage of the Population with at Least Grade 9	Percentage of the Population with at Least Some Postsecondary ²⁰	Percentage of the Population with a University Degree
15 years and over	Both sexes	$\beta = 0.034$ (11.67) $R^2 = 0.73$	$\beta = 0.038$ (4.81) $R^2 = 0.32$	$\beta = 0.028$ (6.83) $R^2 = 0.47$
	Males	$\beta = 0.033$ (10.30) $R^2 = 0.68$	$\beta = 0.033$ (5.52) $R^2 = 0.38$	$\beta = 0.028$ (8.95) $R^2 = 0.61$
	Females	$\beta = 0.034$ (12.19) $R^2 = 0.75$	$\beta = 0.040$ (5.34) $R^2 = 0.37$	$\beta = 0.036$ (6.09) $R^2 = 0.42$
15 - 24 years	Both sexes	$\beta = 0.061$ (11.83) $R^2 = 0.74$	$\beta = 0.042$ (2.40) $R^2 = 0.11$	$\beta = 0.069$ (9.79) $R^2 = 0.65$
	Males	$\beta = 0.055$ (10.04) $R^2 = 0.67$	$\beta = 0.033$ (2.23) $R^2 = 0.09$	$\beta = 0.078$ (7.90) $R^2 = 0.55$
	Females	$\beta = 0.067$ (14.46) $R^2 = 0.81$	$\beta = 0.067$ (3.22) $R^2 = 0.17$	$\beta = 0.085$ (10.49) $R^2 = 0.68$
25 years and over	Both sexes	$\beta = 0.027$ (9.37) $R^2 = 0.64$	$\beta = 0.040$ (6.49) $R^2 = 0.46$	$\beta = 0.025$ (6.60) $R^2 = 0.46$
	Males	$\beta = 0.027$ (8.90) $R^2 = 0.61$	$\beta = 0.041$ (6.97) $R^2 = 0.49$	$\beta = 0.025$ (7.39) $R^2 = 0.51$
	Females	$\beta = 0.027$ (8.61) $R^2 = 0.60$	$\beta = 0.040$ (6.84) $R^2 = 0.49$	$\beta = 0.030$ (5.25) $R^2 = 0.35$

T-ratios are in parenthesis below each estimated speed of convergence.

²⁰For this human capital index, the speed of convergence is estimated for the period 1971-1996, as the data are unavailable for 1951 and 1961.

Table 2: Wald Statistics for the Comparison of the Speed of Convergence of the 15-24 years and 25 years and over

	Human Capital Indices	
	Percentage of the Population with at Least Grade 9	Percentage of the Population with a University Degree
Both sexes	W = 50.79	W = 50.16
Males	W = 30.41	W = 47.28
Females	W = 79.64	W = 52.62

Table 3: Wald Statistics for the Comparison of the Speed of Convergence of Males and Females

	Human Capital Indices	
	Percentage of the Population with at Least Grade 9	Percentage of the Population with a University Degree
15 years and over	W = 0.07	W = 1.95
15-24 years	W = 4.68	W = 0.59
25 years and over	W = 0.004	W = 0.74

The Wald statistics have a Chi-Squared distribution with one degree of freedom. The critical value at a confidence level of 95% is 3.84.

Table 4: Convergence of Income Between Canadian Provinces from 1951 to 1996

Personal Income per Person	Personal Income per Person Minus Government Transfers to Persons
$\beta = 0.037$ (5.64) $R^2 = 0.26$	$\beta = 0.021$ (4.50) $R^2 = 0.18$

T-ratios are in parenthesis below each estimated speed of convergence.

Table 5: Wald Statistics for the Comparison Between the Speed of Convergence of Human Capital and Income

		Measure of Income and Human Capital Indices			
		Personal Income per Person		Personal Income per Person Minus Government Transfers to Persons	
		Percentage of the Population with at Least Grade 9	Percentage of the Population with a University Degree	Percentage of the Population with at Least Grade 9	Percentage of the Population with a University Degree
15 years and over	Both sexes	W = 0.23	W = 1.84	W = 4.91	W = 1.16
	Males	W = 0.40	W = 2.09	W = 3.98	W = 1.33
	Females	W = 0.23	W = 0.01	W = 4.98	W = 4.21
15 - 24 years	Both sexes	W = 12.66	W = 18.11	W = 36.57	W = 42.04
	Males	W = 6.78	W = 21.04	W = 24.95	W = 41.53
	Females	W = 21.51	W = 37.10	W = 52.99	W = 68.05
25 years and over	Both sexes	W = 2.67	W = 3.41	W = 1.00	W = 0.38
	Males	W = 2.63	W = 3.63	W = 0.99	W = 0.41
	Females	W = 2.59	W = 0.86	W = 0.97	W = 1.49

The Wald statistics have a Chi-Squared distribution with one degree of freedom. The critical value at a confidence level of 95% is 3.84.

Table 6: Share of Human Capital in National Income (1951-1996)

		Measure of Income and Human Capital Indices			
		Personal Income per Person		Personal Income per Person Minus Government Transfers to Persons	
		Percentage of the Population with at Least Grade 9	Percentage of the Population with University Degree	Percentage of the Population with at Least Grade 9	Percentage of the Population with University Degree
15 years and over	Both sexes	$\eta = 0.98$ (9.18) $R^2 = 0.51$ [0.77, 1.19]	$\eta = 0.39$ (13.37) $R^2 = 0.69$ [0.34, 0.45]	$\eta = 1.19$ (8.85) $R^2 = 0.49$ [0.92, 1.46]	$\eta = 0.49$ (13.87) $R^2 = 0.71$ [0.42, 0.56]
	Males	$\eta = 1.02$ (13.73) $R^2 = 0.70$ [0.87, 1.16]	$\eta = 0.40$ (13.50) $R^2 = 0.70$ [0.34, 0.46]	$\eta = 1.24$ (13.00) $R^2 = 0.68$ [1.05, 1.43]	$\eta = 0.50$ (14.23) $R^2 = 0.72$ [0.43, 0.57]
	Females	$\eta = 0.76$ (5.73) $R^2 = 0.29$ [0.50, 1.02]	$\eta = 0.34$ (11.78) $R^2 = 0.63$ [0.28, 0.40]	$\eta = 0.92$ (5.56) $R^2 = 0.27$ [0.59, 1.25]	$\eta = 0.42$ (11.77) $R^2 = 0.63$ [0.35, 0.49]
15 - 24 years	Both sexes	$\eta = 1.19$ (9.70) $R^2 = 0.54$ [0.94, 1.43]	$\eta = 0.24$ (6.43) $R^2 = 0.34$ [0.16, 0.31]	$\eta = 1.40$ (8.79) $R^2 = 0.49$ [1.08, 1.72]	$\eta = 0.29$ (6.16) $R^2 = 0.32$ [0.19, 0.38]
	Males	$\eta = 1.16$ (12.96) $R^2 = 0.68$ [0.99, 1.35]	$\eta = 0.25$ (5.92) $R^2 = 0.30$ [0.17, 0.33]	$\eta = 1.38$ (11.45) $R^2 = 0.62$ [1.14, 1.62]	$\eta = 0.31$ (5.96) $R^2 = 0.30$ [0.21, 0.42]
	Females	$\eta = 1.04$ (6.68) $R^2 = 0.36$ [0.74, 1.36]	$\eta = 0.19$ (4.63) $R^2 = 0.21$ [0.11, 0.27]	$\eta = 1.22$ (6.12) $R^2 = 0.31$ [0.83, 1.62]	$\eta = 0.23$ (4.51) $R^2 = 0.19$ [0.13, 0.32]
25 years and over	Both sexes	$\eta = 0.77$ (8.29) $R^2 = 0.46$ [0.59, 0.95]	$\eta = 0.41$ (14.26) $R^2 = 0.72$ [0.35, 0.47]	$\eta = 0.95$ (8.17) $R^2 = 0.45$ [0.72, 1.17]	$\eta = 0.51$ (14.91) $R^2 = 0.73$ [0.45, 0.58]
	Males	$\eta = 0.84$ (12.37) $R^2 = 0.66$ [0.70, 0.97]	$\eta = 0.41$ (13.58) $R^2 = 0.70$ [0.35, 0.46]	$\eta = 1.02$ (12.05) $R^2 = 0.64$ [0.86, 1.19]	$\eta = 0.51$ (14.38) $R^2 = 0.72$ [0.44, 0.58]
	Females	$\eta = 0.59$ (5.31) $R^2 = 0.26$ [0.37, 0.81]	$\eta = 0.35$ (12.60) $R^2 = 0.66$ [0.30, 0.41]	$\eta = 0.72$ (5.26) $R^2 = 0.25$ [0.45, 0.99]	$\eta = 0.44$ (12.86) $R^2 = 0.67$ [0.37, 0.51]

T-ratios are in parenthesis below each estimated share of human capital.

In brackets is the 95% confidence interval for the share of human capital.

Appendix C
Human Capital Indices²¹

15 Years and Over

Percentage of the population 15 years and over with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	31.4	46.8	51.4	39.7	38.8	53.1	48.9	44.3	54	61	46.9
1961	44.9	54.5	59.5	46.6	47.9	58.6	59.2	53.6	62.9	68.3	55.6
1971	55.6	63.1	68.4	58.8	59.2	71.9	67.9	64.3	76.2	77.2	66.3
1976	63.1	70.7	75.2	66.5	67.6	77.8	73.7	70.9	80.4	82.7	72.9
1981	69.2	75.9	79.1	71.4	72.9	81.9	77.7	76.5	86.8	86.3	77.8
1986	73	80	82.4	75.6	75.7	84.9	81.5	80.4	88.9	88.3	81.1
1991	79.2	84.3	86.4	80	79.3	88.1	84.9	83.7	90.9	90.9	84.8
1996	82.1	86.3	88.5	83	81.5	89.6	87	86.4	92.1	92.3	86.9

Percentage of men 15 years and over with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	27.3	39	44.8	32.9	36.8	49.4	44.8	39.3	49	55.8	41.9
1961	41.3	45.8	53.7	40.8	46.8	55.9	56.2	49.1	59	65	51.4
1971	53	55.7	64.1	54.5	60	71.2	66.2	60.9	74	75.6	63.5
1976	60.9	64.1	71.9	63.2	68.5	77.5	72.5	68.1	81	81.9	71
1981	67.1	70.1	76	68.5	74	82	76.9	74.5	86.2	85.9	76.1
1986	71.2	75.2	80	73.4	76.9	85.2	80.9	78.8	88.4	88.1	79.8
1991	77.6	80.3	84.2	77.8	80.2	88.3	84.6	82.2	90.5	90.8	83.7
1996	80.7	82.9	86.6	81.2	82.2	90	86.7	85.2	91.9	92.4	86

Percentage of women 15 years and over with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	35.6	55	58	46.5	40.6	56.8	53	49.9	59.8	66.4	52.2
1961	48.8	63.7	65.7	52.5	48.9	61.2	62.3	58.6	67.1	71.9	60.1
1971	58.2	70.7	72.8	62.8	58.3	72.5	69.6	67.9	78.4	78.8	69
1976	65.4	77.2	78.3	69.7	66.5	78	74.8	73.9	83.8	83.6	75.1
1981	71.3	81.6	82	74.2	71.6	81.7	78.5	78.5	87.3	86.7	79.3
1986	75	84.4	84.9	77.8	74.5	84.8	82	82.1	89.3	88.5	82.3
1991	80.8	88.1	88.3	81.9	78.5	87.9	85.1	85.2	91.3	91.1	85.8
1996	83.5	89.7	90.3	84.8	80.9	89.2	87.3	87.6	92.4	92.2	87.8

Percentage of the population 15 years and over with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	14.3	19.9	20.9	18.9	20.5	22.6	21.3	19.4	25.8	24.6	20.8
1976	23.9	29.9	30	25.7	29.1	30.9	29.3	26.8	33.4	34.4	29.3
1981	28.4	34.1	34.4	29.6	32.9	36.4	33.5	32.8	41.5	40.4	34.4
1986	31.7	38.8	39	33.7	36.4	40.8	37.4	37.1	45.5	44.5	38.5
1991	36.7	41.6	43.1	37.3	38.3	44.7	40.4	40.1	48.1	48.6	41.9
1996	41.8	44.6	47.2	41.7	42.5	48.9	44.1	43.2	51.3	52.5	45.8

²¹ The data for 1951 to 1991 are from a Statistics Canada publication entitled the nation, catalogue number 93-328. The published data for 1996 were organized under a different division of levels of schooling. The consistent data for 1996 were constructed at our request by Statistics Canada. For the percentage of the population with some post-secondary education, the data are unavailable for 1951 and 1961.

Percentage of men 15 years and over with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	14.9	17.6	20	17.9	23.2	24.2	22	17.4	26.3	25.9	20.9
1976	24.9	26.5	29.6	25.3	31.7	32.8	30	24.9	36.8	36.4	29.9
1981	29.3	31.5	33.9	29.7	35.9	38.1	33.7	31.2	43.3	42	34.9
1986	32.9	35.7	39.3	33.8	39.1	42.4	37.8	35.8	47.1	46.1	39
1991	36.6	37.1	42.7	36.4	39.9	45.6	40	37.7	48.9	49.4	41.4
1996	41.6	40	46.5	40.1	43.4	49.4	43	40.2	51.5	52.5	44.8

Percentage of women 15 years and over with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	13.7	22.3	22	19.7	17.8	21	20.5	21.6	25.1	23.3	20.7
1976	22.8	33.3	30.4	26	26.4	29.1	28.6	28.8	33.9	32.5	29.2
1981	27.5	36.6	34.8	29.5	29.9	34.7	33.3	34.5	39.5	38.8	33.9
1986	30.7	41.7	38.9	33.6	33.8	39.3	37	38.4	43.8	42.9	38
1991	36.9	45.8	43.4	38	36.8	43.8	40.7	42.5	47.3	48	42.3
1996	42	49	47.9	43.1	41.6	48.4	45.2	46	51.2	52.5	46.7

Percentage of the population 15 years and over with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.5	0.8	1.3	0.9	1.9	2.6	1.3	1	1.3	2.2	1.4
1961	0.8	1.5	2.3	1.8	2.9	3.4	2.6	2	3	3.2	2.4
1971	2.1	3.2	4.1	3.4	4.6	5.3	4.6	3.5	5.5	5	4.1
1976	3.7	5.1	6	4.8	5.5	7.4	6.4	4.8	7.5	6.7	5.8
1981	4.7	6.1	7.4	6	7.1	9	7.4	6.1	9.6	8.2	7.2
1986	5.6	7.4	8.7	7.3	8.6	10.8	8.9	7.4	10.8	9.5	8.5
1991	6.6	8.5	10.4	8.4	10.3	13	10.2	8.6	11.9	11.2	9.9
1996	8.1	10.6	12.2	10.2	12.2	14.9	11.6	9.8	13.3	13.6	11.7

Percentage of men 15 years and over with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.6	1.3	1.8	1.4	3	3.6	1.9	1.4	1.9	2.9	2
1961	1.3	2.3	3.1	2.7	4.2	4.8	3.6	2.8	4.1	4.4	3.3
1971	3	4.3	5.4	4.6	6.6	7.3	6.2	4.8	7.2	6.6	5.6
1976	4.6	6.5	7.4	6	7.6	9.7	8.3	6.3	9.4	8.7	7.5
1981	5.7	7.3	8.7	7.1	9.1	11.1	8.9	7.6	11.3	10.1	8.7
1986	6.4	8.4	9.7	8.2	10.5	12.7	10.3	8.5	12.3	11.3	9.8
1991	7.2	9.1	11.1	9	12	14.6	11.1	9.5	13.2	12.9	11
1996	8.4	10.5	12.7	10.4	13.4	16.2	12.3	10.2	14.2	14.8	12.3

Percentage of women 15 years and over with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.3	0.3	0.7	0.4	0.7	1.6	0.6	0.5	0.7	1.4	0.7
1961	0.4	0.7	1.6	1	1.6	1.9	1.6	1.2	1.8	2.1	1.4
1971	1.2	2.1	2.9	2.1	2.7	3.3	3	2.2	3.7	3.3	2.7
1976	2.7	3.8	4.6	3.6	3.4	5.2	4.6	3.3	5.5	4.8	4.2
1981	3.6	4.8	6.1	5	5.1	7	6	4.7	7.7	6.3	5.6
1986	4.9	6.4	7.8	6.4	6.8	9	7.6	6.4	9.2	7.7	7.2
1991	6.1	7.9	9.7	7.8	8.7	11.4	9.3	7.8	10.6	9.7	8.9
1996	7.9	10.8	11.8	10	11.1	13.8	11	9.6	12.4	12.5	11.1

15-24 Years

Percentage of the population 15-24 years with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	42.5	56.2	59.4	49.3	43.5	68	63.3	62.4	69.7	75.9	59
1961	65.7	69.6	70.5	63.6	62.4	78.7	77.6	77.4	80.9	85.4	73.2
1971	72.6	78.1	80.7	77.8	84.5	90.9	87.9	88.4	92.7	92.1	84.6
1976	79.8	84.7	87.4	85.5	92.3	95	91.3	91.8	95.6	95.3	89.9
1981	82.9	89.2	89.3	88.8	94.1	96.5	92.3	92.5	95.8	96.1	91.8
1986	86.8	92.8	90.7	91.5	94	97.3	93.8	93.3	96	96.8	93.3
1991	94.3	95.6	94.2	94.7	93.9	97.9	95.2	94.5	96.6	97.8	95.5
1996	97.3	97.6	96.2	97	93.4	98.4	96.2	96.2	97.4	98.2	96.8

Percentage of men 15-24 years with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	37.1	47.2	52.9	42.4	42	63.2	58.2	55.7	63.9	71.5	53.4
1961	61.8	60.6	65.3	57.2	60.2	75.8	74.3	72.4	77.1	83	68.8
1971	70.2	71.8	77.8	74.4	83.8	90.5	86.8	86.3	91.5	91.1	82.4
1976	77.4	79.9	85	82.5	91.7	94.8	90.3	89.9	94.8	94.6	88.1
1981	79.5	85.1	86.9	85.7	93.4	96.2	91.1	91.2	95.3	95.4	90
1986	84.1	89.5	88.6	89.3	93	97.1	93	92.2	95.5	96.2	91.9
1991	93	93.9	92.7	93.2	92.7	97.8	94.9	94.3	96.3	97.4	94.6
1996	96.6	96.8	95.1	96.2	91.9	98.3	95.7	95.8	97.2	98	96.2

Percentage of women 15-24 years with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	48.1	65.5	65.8	55.7	45	72.8	68.3	69	75.7	80.4	64.6
1961	69.7	79.3	76	70.3	64.5	81.6	80.9	82.7	84.7	88.1	77.8
1971	75	84.7	83.6	81.4	85.3	91.3	89.1	90.5	93.8	93	86.8
1976	82.5	89.8	89.9	88.6	92.9	95.4	92.4	93.7	96.3	95.9	91.7
1981	86.4	93.3	91.7	91.8	94.8	96.8	93.4	93.8	96.6	96.8	93.5
1986	89.5	96	93	93.6	95	97.6	94.6	94.3	96.6	97.4	94.8
1991	95.7	97.5	95.6	96.1	95.2	98.1	95.6	95	97	98.1	96.4
1996	98	98.4	97.3	97.8	94.9	98.4	96.7	96.5	97.7	98.3	97.4

Percentage of the population 15-24 years with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	18.8	23.9	23.5	20	24.5	22.4	23.7	22.8	25.7	23.3	22.9
1976	27.1	29.5	29.7	22.3	32.6	26.9	27	26.1	29.9	26.5	27.8
1981	28.4	29.2	30.1	22.8	34.3	28.7	26.5	26.8	31.5	29.6	28.8
1986	29.1	34.8	34.8	28.8	39.6	33.9	31	32	33.9	33.9	33.2
1991	33.8	35.9	37.1	33.4	41.3	35.8	32.1	33.2	35.5	37.6	35.6
1996	38.8	37.6	39.5	37.8	45	37.7	33.8	33.5	36.3	39	37.9

Percentage of men 15-24 years with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	18.6	21.6	22.2	19.2	25.5	22.8	23.3	20.7	25.6	23.6	22.3
1976	25.8	26.9	29.3	21.2	32.9	26.4	26.2	23.8	29.8	26.2	26.9
1981	25.4	26.9	28.1	21.4	33.5	27.2	24.9	24.2	31.2	28.1	27.1
1986	26.1	30.8	32.8	25.7	37.3	31.5	28.5	28.8	32	31.9	30.5
1991	29.4	31.4	34.1	29.2	37.4	32.5	29.2	29.9	32.6	34.9	32.1
1996	34.3	32.6	35.5	32.8	40.6	34.2	29.8	29.5	32.9	35	33.7

Percentage of women 15-24 years with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	18.9	26.3	24.8	20.8	23.5	22	24.2	25	25.7	22.9	23.4
1976	28.5	32.4	30.1	23.5	32.3	27.5	27.9	28.5	30	26.7	28.7
1981	31.5	31.5	32.2	24.2	35.1	30.2	28.1	29.4	32	31.1	30.5
1986	32.1	38.8	37	31.9	41.9	36.4	33.5	35.3	36	36	35.9
1991	38.5	41	40.2	37.5	45.4	39.2	35.2	36.8	38.5	40.3	39.3
1996	43.4	42.5	43.6	42.8	49.6	41.2	37.9	37.7	39.7	43.1	42.2

Percentage of the population 15-24 years with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.1	0.2	0.4	0.2	0.6	1.2	0.5	0.3	0.4	0.9	0.5
1961	0.4	0.8	1.1	0.7	1.2	1.3	1.3	0.9	1.1	1	1
1971	1.8	2.9	3.3	2.5	3.1	3.5	3.9	2.9	3.7	2.8	3
1976	2.4	3.7	4.3	2.8	2.4	4	4.1	2.9	3.9	2.7	3.3
1981	2.1	3.1	4	2.8	2.9	3.8	3.6	2.6	3.9	2.3	3.1
1986	2.5	4.3	4.9	3.7	3.8	4.6	4.6	3.4	3.8	2.8	3.8
1991	2.7	4.6	5.8	4.3	4.2	5.3	4.7	3.6	4.1	3.9	4.3
1996	3.9	6.5	7.2	5.6	5.1	6.3	5.3	4.3	4.4	4.6	5.3

Percentage of men 15-24 years with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.2	0.3	0.6	0.4	1	1.6	0.7	0.4	0.5	1.2	0.7
1961	0.6	1.1	1.2	1	1.3	1.5	1.5	1.1	1.3	1.2	1.2
1971	2.1	3.2	3.5	3.1	3.6	3.9	4.5	3.2	4	3	3.4
1976	2.2	3.6	4.1	2.8	2.5	3.9	4.3	3.1	3.9	2.7	3.3
1981	2	3.1	3.6	2.6	2.8	3.5	3.4	2.4	3.7	2.1	2.9
1986	2.1	3.5	4.2	3.1	3.4	4.1	4.2	2.9	3.5	2.6	3.4
1991	1.9	3.7	4.5	3.3	3.5	4.4	4	3.2	3.6	3.6	3.6
1996	2.8	5	5.5	4	3.8	5	4.2	3.2	3.4	3.6	4.1

Percentage of women 15-24 years with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0	0.1	0.2	0.1	0.2	0.8	0.3	0.1	0.3	0.6	0.3
1961	0.3	0.5	1	0.5	1	1	1	0.7	0.9	0.9	0.8
1971	1.4	2.6	3.1	1.8	2.6	3.1	3.3	2.5	3.3	2.6	2.6
1976	2.6	3.9	4.5	2.9	2.3	4.1	3.9	2.7	3.9	2.6	3.3
1981	2.3	3.2	4.5	3	3	4.1	3.8	2.9	4.2	2.5	3.4
1986	2.9	5.1	5.6	4.3	4.1	5.2	4.9	3.9	4.2	3	4.3
1991	3.6	5.7	7.1	5.2	5	6.2	5.4	4.1	4.6	4.2	5.1
1996	5	7.9	9	7.3	6.4	7.6	6.4	5.4	5.4	5.5	6.6

25 Years and Over

Percentage of the population 25 years and over with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	27.4	44.1	49	36.7	37.2	49.4	45.1	39	49.4	57.8	43.5
1961	36.9	50.1	56.2	41.1	43.1	53.8	54.4	47.2	57.9	64.4	50.5
1971	47.7	57.3	63.9	50.9	49.4	65.3	60.8	56.2	69.9	72.4	59.4
1976	55.6	65.4	70.6	58.8	58.2	71.9	67.5	63.4	77.1	78.7	66.7
1981	63.7	71.3	75.6	65.2	65.6	77.2	73.1	71	83.1	83.4	72.9
1986	68.3	76	80	70.9	70.9	81.7	78.2	76.8	86.7	86.2	77.6
1991	74.6	81.5	84.5	76.3	76.3	85.8	82.4	81.3	89.4	89.6	82.2
1996	78.3	83.7	86.9	80	79.2	87.8	85	84.1	91	91.1	84.7

Percentage of men 25 years and over with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	24	36.7	42.6	30	35.1	46	41.3	34.8	44.8	52.7	38.8
1961	33.6	41.3	49.9	35.3	42.4	51.1	51.4	43	54.2	60.9	46.3
1971	45.1	49.3	58.7	46.1	50.5	64.4	58.8	52.2	67.5	70.3	56.3
1976	53.6	58	66.9	55.3	59.5	71.5	66.2	59.9	75.5	77.7	64.4
1981	62.2	64.7	72.2	62.3	67.3	77.4	72.1	68.8	82.7	82.9	71.3
1986	66.4	70.7	77.2	68.5	72.6	82	77.5	74.7	86.4	85.9	76.2
1991	72.7	76.7	82.2	73.8	77.4	86	82.1	79.3	89.1	89.4	80.9
1996	76.5	79.5	84.7	77.7	80.2	88.2	84.7	82.6	90.7	91.2	83.6

Percentage of women 25 years and over with at least grade 9

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	31.1	51.9	55.7	43.4	39.2	52.9	48.9	43.9	54.8	63.3	48.5
1961	40.5	59.1	62.5	46.8	43.8	56.4	57.5	51.8	61.9	68.1	54.8
1971	50.2	65.4	69.1	55.5	48.2	66.2	62.8	60.3	72.5	74.2	62.4
1976	57.6	72.7	74.3	62.3	57	72.3	68.8	66.9	78.8	79.7	69
1981	65.1	77.7	78.9	67.9	64.1	77.1	73.9	73.3	83.7	83.8	74.6
1986	70	81.1	82.6	73.3	69.3	81.4	78.8	78.7	87.2	86.5	78.9
1991	76.4	86	86.8	78.6	75.3	85.8	82.8	83.1	89.9	89.7	83.4
1996	80	87.7	89	82	78.2	87.5	85.4	85.6	91.2	91	85.8

Percentage of the population 25 years and over with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	12.3	18.3	20	18.4	18.9	22.6	20.4	18.4	25.7	25.1	20
1976	22.5	30	30.1	27	27.7	32.2	30.1	27.1	37.6	37.1	30.1
1981	28.4	35.8	35.8	32.1	32.4	38.7	35.8	34.9	45.4	43.6	36.3
1986	32.8	39.9	40.3	35.1	35.5	42.7	39.3	38.6	48.8	47	40
1991	37.6	42.9	44.5	38.2	37.7	46.5	42.3	41.7	51	50.9	43.3
1996	42.6	46.2	48.8	42.5	42	51.1	46.4	45.4	54.7	55.1	47.5

Percentage of men 25 years and over with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	13.2	15.9	19.1	17.4	22.2	24.6	21.6	16.3	26.6	26.6	20.4
1976	24.6	26.2	29.7	27.1	31.3	35	31.5	25.3	39.7	39.9	31
1981	30.9	33.1	36	33	36.9	41.7	36.7	33.7	48.3	46.2	37.7
1986	35.3	37.2	41.2	36.3	39.7	45.6	40.5	37.7	51.7	49.5	41.5
1991	38.8	38.7	44.9	38.2	40.4	48.5	42.7	39.5	52.8	52.4	43.7
1996	43.6	41.7	48.9	41.8	44	52.6	46	42.9	55.7	56.1	47.3

Percentage of women 25 years and over with at least some post-secondary education

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1971	11.2	20.8	21.1	19.4	15.6	20.6	19.2	20.5	24.9	23.4	19.7
1976	20.2	33.7	30.6	27	24.3	29.6	28.8	29	35.5	34.4	29.3
1981	25.8	38.4	35.7	31.2	28.2	36	34.9	36.2	42.5	41.1	35
1986	30.2	42.5	39.4	34.1	31.7	39.9	38	39.3	46.1	44.6	38.6
1991	36.4	46.9	44.2	38.2	35.2	44.8	42	43.8	49.3	49.4	43
1996	41.7	50.4	48.8	43.2	40.1	49.8	46.7	47.8	53.7	54.2	47.6

Percentage of the population 25 years and over with a university degree

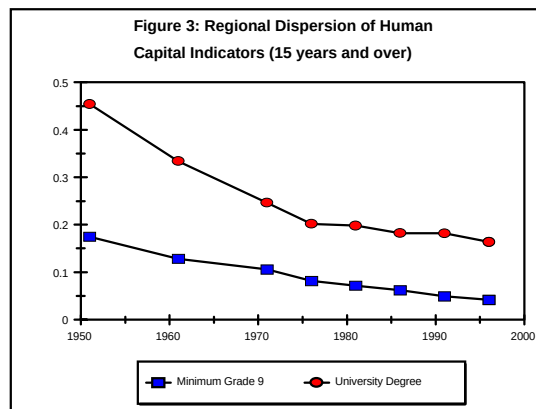
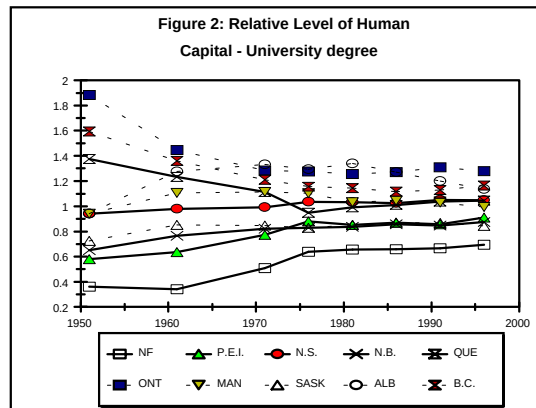
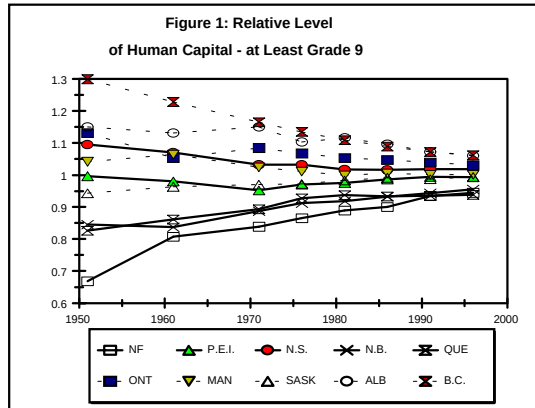
Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.6	1	1.5	1.1	2.3	3	1.5	1.2	1.6	2.4	1.6
1961	1	1.7	2.7	2.2	3.4	3.9	3	2.3	3.5	3.7	2.7
1971	2.3	3.3	4.4	3.8	5.2	5.9	4.8	3.8	6.1	5.7	4.5
1976	4.3	5.6	6.6	5.6	6.6	8.5	7.2	5.5	9	8.1	6.7
1981	5.7	7.1	8.5	7.2	8.5	10.6	8.7	7.3	11.8	9.9	8.5
1986	6.8	8.3	9.8	8.3	9.8	12.5	10.2	8.6	12.8	11.1	9.8
1991	7.8	9.4	11.5	9.4	11.5	14.6	11.5	9.8	13.7	12.7	11.2
1996	9.2	11.6	13.3	11.2	13.6	16.7	13	11.1	15.3	15.4	13

Percentage of men 25 years and over with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.8	1.6	2.2	1.7	3.7	4.2	2.1	1.7	2.3	3.3	2.4
1961	1.5	2.6	3.6	3.2	5.2	5.6	4.1	3.2	4.9	5.1	3.9
1971	3.4	4.7	6.1	5.3	7.7	8.4	6.9	5.4	8.4	7.8	6.4
1976	5.7	7.5	8.7	7.4	9.6	11.7	9.8	7.5	11.7	10.7	9
1981	7.3	8.8	10.5	8.9	11.4	13.6	10.8	9.4	14.4	12.5	10.8
1986	7.9	10	11.3	9.8	12.5	15.2	12.1	10.1	15	13.4	11.7
1991	8.8	10.6	12.8	10.4	13.8	16.9	12.9	11	15.5	14.8	12.8
1996	9.9	11.9	14.3	11.9	15.4	18.5	14.2	11.8	16.6	17	14.1

Percentage of women 25 years and over with a university degree

Year	NFLD	PEI	NS	NB	Qué	Ont	Man	Sask	Alb	BC	Average
1951	0.4	0.4	0.9	0.5	0.9	1.8	0.8	0.6	0.8	1.6	0.9
1961	0.5	0.7	1.7	1.1	1.8	2.2	1.8	1.3	2	2.3	1.5
1971	1.1	1.9	2.9	2.3	2.7	3.4	2.9	2.1	3.8	3.5	2.7
1976	2.7	3.8	4.7	3.9	3.8	5.5	4.8	3.6	6.2	5.5	4.5
1981	4.1	5.4	6.7	5.6	5.7	7.8	6.6	5.3	9.1	7.5	6.4
1986	5.6	6.7	8.4	7	7.4	9.9	8.4	7.1	10.7	8.8	8
1991	6.8	8.4	10.3	8.4	9.4	12.5	10.2	8.6	12	10.7	9.7
1996	8.6	11.4	12.4	10.5	12	14.9	11.9	10.5	13.9	13.8	12



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**The Effect of Welfare on Child Outcomes:
What We Know and What We Need to Know**

Janet Currie
UCLA

Session 4 Sustainability II: Intergenerational Bequests and the Well-being of Children
October 30 2:15 PM - 4:15 PM

The Effect of Welfare on Child Outcomes: What We Know and What We Need to Know

Janet Currie

UCLA and NBER

March, 1996

Revised September, 1997

Paper prepared for the National Academy of Sciences meeting on "The Effect of Welfare on the Family: What Do We Know? What Do We Need to Know?", May 1996. The author is grateful to Lindsay Chase-Lansdale, Greg Duncan, Bentley MacLeod, and Robert Moffitt for helpful comments. Support from Alfred P. Sloan Foundation, the National Science Foundation under grant #SBR-9512670, and from the National Institute of Child Health and Human Development for support under grant #R01HD31722-01A2 is gratefully acknowledged. The author is solely responsible for the opinions expressed.

Abstract

This survey discusses 8 large federal welfare programs that affect children. The available evidence is incomplete but suggests a consistent story: Programs that target services directly to children have the largest measured effects, while it is more difficult to detect possibly positive effects of unrestricted cash transfers. There are also striking and largely unexplained differences between demographic groups in the effects of some programs. The survey concludes with five questions for future research: 1) Do welfare programs have long-term effects on children?; 2) Why do programs appear to have differential effects on different demographic groups?; 3) How do programs interact; 4) How exactly do successful programs work? and 5) Are programs cost effective? These questions indicate that though we know much more than we did even 5 years ago about the effects of welfare on children, there is still much work to be done if we are to make informed decisions about public policy.

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There is broad support for the idea that welfare should benefit poor children. Yet most research on welfare programs, as well as much of the debate about welfare reform, has focused on the way that parents respond to incentives created by welfare, rather than on its effects on children. Less work has been devoted to the fundamental question of whether any of the web of programs supporting poor families benefit children.

If it can be shown that they do, then there are many other questions to be addressed: First, are the benefits short or long term? Second, which types of programs or combinations of programs are most effective; for example, do cash or in-kind programs produce bigger benefits for children? Third, do welfare programs have different effects on different groups, and if so why? Fourth, how exactly do successful programs work? And finally, can efficacious programs pass the more stringent test of cost effectiveness?

This review focuses on the 8 large federal programs shown in Table 1: Aid to Families with Dependent Children (AFDC) which has been replaced with the new Temporary Aid for Needy Families program (TANF); the Earned Income Tax Credit; Housing Assistance; Food Stamps; the Supplemental Feeding Program for Women, Infants, and Children (WIC); School Nutrition programs; Medicaid and Head Start.

The programs are evaluated with respect to their effects on the health and educational achievement of children. Where possible, documented effects on long-term outcomes are noted. The first section of the paper gives a brief discussion of "How We Know What We Know" about these programs. The evidence regarding the effects of cash programs and in-kind programs is then reviewed in sections II and III respectively.

The evidence indicates that contrary to much current publicity, the system is not entirely "broken" when judged using the metric of child well-being: there are specific programs that produce important benefits for children. Nevertheless, not all programs are equally effective, and benefits are not equally distributed across children. Hence, a review of "What We Know" about these programs can provide a useful starting point for welfare reform, as well as highlighting gaps in "What We Need to Know" in order to carry out intelligent reform. The last section of the paper discusses fruitful directions for future research and the importance of enhanced data collection efforts.

I: How We Know What We Know

A comprehensive review of the program evaluation literature is far beyond the scope of this review. However, since several

different methods are used in the studies discussed in this essay, some comment on methodology is in order. A somewhat fuller, non-technical discussion can be found in Currie (1995), or see Heckman (1990).

The fundamental problem facing researchers and policy makers is that the children of welfare recipients may have bad outcomes for reasons that have nothing to do with the receipt of assistance *per se*. It is possible that a program could have substantial benefits for poor children and still leave many children disadvantaged relative to better-off peers.

Evidently, parents of children on welfare are worse off than other parents in observable ways: They are poorer, likely to have less education, and may also have health problems. Many data sets available to researchers contain at least crude measures of these observable variables so that observed differences between parents on welfare and other parents can be accounted for using standard regression models.

To take a simple example, suppose that children of high-school dropouts have lower scores on standardized tests than children of college graduates. Then if mothers on welfare are more likely to be high-school dropouts than college graduates, a simple comparison of the two group's average scores might tell you more about the

effects of maternal education than about the effects of welfare. A simple way to "control" for the effects of education in order to focus on the effects of welfare might involve drawing a sample of high-school dropouts, and comparing children of welfare mothers to other children within this group. Any differences between the welfare children and the others could then be attributed to welfare use and not to maternal education. Multiple regression techniques simply allow one to control for the effects of several observable variables at the same time.

The problem becomes much more difficult however, if parents on welfare also differ from other parents in ways that are not observed. For example, they may lack motivation, or be discouraged by previous misfortune. Failure to properly control for these differences could lead one to incorrectly infer that it was being on welfare that was associated with negative child outcomes, rather than these underlying conditions. Some underlying problem, such as maternal depression, might cause *both* welfare dependence and negative child outcomes.

There are basically two approaches to this issue of unobserved characteristics. First, one may design a social experiment, randomly assigning eligibles to a "treatment" group and a "control" group. Random assignment assures that on average, the two groups

will have the same observed and unobserved characteristics. In principal, one can then assess the effect of the treatment simply by comparing mean outcomes for the two groups, just as one would do in a drug trial. The key advantage of an experimental evaluation is its transparency.

One disadvantage of social experiments is that they may be very expensive. But there are several disadvantages in addition to high cost (Heckman, 1990). These include differential attrition between treatments and controls (which causes the "treatment" group to become less and less like the comparison group over time); the fact that subjects assigned to the control group may not accept their fate passively (for example subjects denied training in a government program might sign up for an alternative program); and the fact that it may be difficult to use the experiment to examine differential effects of the treatment on different groups.

Non-experimental evaluations attempt to control statistically for unobserved variables associated both with participation in the program, and with the outcome of interest. One method of doing this is to find a third set of variables, called "instruments" that are associated with participation in the program, but not with the important unobserved variables. For example, a researcher interested in the effects of participation in Medicaid on child

health might argue that the generosity of state AFDC benefits is associated with participation in the Medicaid because of the link between AFDC reciprocity and Medicaid eligibility, but that the level of AFDC benefits does not have any effect on child health other than through its effect on participation in Medicaid. If this assumption were true then the level of AFDC benefits would qualify as an "instrumental variable".

This instrument would be used (along with other observable characteristics of the mother) to predict Medicaid participation, and predicted participation would be substituted for actual participation in the model explaining child health. The idea is that predicted participation will depend only on observable characteristics and differences in state AFDC benefit levels, and not on the unobserved characteristics of the mother. The procedure is analogous to an experiment in which AFDC benefit levels are varied across states, Medicaid participation responds, and only this source of variation in participation rates is used to identify the effects of Medicaid on health.

The difficulty with instrumental variables techniques is that the key assumptions may not be satisfied. Suppose that states with more generous AFDC benefits also have higher income populations and thus that higher incomes are associated with better child health.

Then unless one takes account of this relationship, one will tend to find a spurious positive relationship between participation in Medicaid and child health. Alternatively, suppose that states raised AFDC benefit levels in response to poor child health. Then one might observe a spurious negative relationship between predicted Medicaid participation and child health.

An alternative approach involves assuming that the relevant omitted characteristics are fixed within a family, or for the same child over time. Suppose for example that the relevant unobserved variable is maternal attitudes towards education, and that this remains fixed over some period of time. Suppose further that one sibling participated in Head Start and one did not. Then comparing the sibling who participated to the one that did not provides a measure of the effect of Head Start that is not affected by the fact that on average, mothers of Head Start children may have more positive (or negative?) views of education than other similarly situated mothers. Of course, the problem with this approach is that the relevant variable may not be fixed within households or over time.

The studies discussed below all rely on one of these methodological approaches. Their conclusions are only as valid as the assumptions underlying the chosen approach. It is in cases

where the same result has been obtained using different assumptions and data sources that we can be most confident of the conclusions.

II: What We Know About Cash Programs

a) Aid to Families with Dependent Children

The term "welfare" has usually identified with the Aid to Families with Dependent Children (AFDC) program. This oldest and largest of the federal welfare programs provided cash transfers to (predominantly female-headed) families with children. This is the program that recent welfare reforms (The Personal Responsibility and Work Opportunity Reconciliation Act of 1996) effectively ended, replacing it with the new Temporary Aid for Needy Families (TANF) program. TANF differs from AFDC because it ends the "entitlement" of all needy families to welfare benefits; because it introduces time limits on welfare benefits; and because it provides states with much more latitude in developing their own welfare programs. Nevertheless, since most of what we know about cash welfare programs comes from studies of AFDC, and because many states will respond to TANF by only gradually altering their AFDC programs, it is of interest to summarize this literature here.

Like TANF, AFDC was administered at the state level within federal guidelines. As a result, program characteristics varied

widely from state to state. For example, as of January 1993, the maximum monthly AFDC grant for a one-parent family of 4 persons varied from \$164 in Alabama to \$923 in Alaska (U.S. House of Representatives, 1993). On average the federal government pays 54% of benefit costs, as shown in Table 1. The continuous erosion of real AFDC benefit levels over the past 15 years provides compelling evidence of the unpopularity of this program: the average monthly AFDC benefit declined from \$483 (1993\$) in 1980 to \$373 in 1993, even though the average family size remained constant at 3 persons (U.S. House of Representatives, 1994).

One of the problems involved in evaluating the effects of AFDC on children is that the benefits of a cash transfer program can be expected to be diffuse. Small increases in household expenditures on a wide range of items may produce overall benefits for children without affecting any one indicator a great deal. A second problem is that although income is often used as a short-hand summary of a household's socioeconomic status, it is in practice extremely difficult to separate the effects of income from the effects of other family background characteristics including neighborhoods (Mayer, 1996).

Most research about the effects of AFDC on children, focuses on the fact that daughters of women who participate in AFDC are

themselves more likely to participate (c.f. Gottschalk, 1990; Murray, 1984). What is less clear is whether the relationship is causal, or whether it merely reflects the fact that the children of the poor are more likely to be poor -- older studies tended to conclude that the relationship was not causal, but studies using more recent data have questioned this conclusion. See Moffitt (1992) for a fuller discussion of this issue.

There has been comparatively little research linking maternal AFDC participation to other child outcomes, but the empirical issues are the same. First, it is necessary to control for some measure of income as well as for AFDC status since otherwise the estimated effects of participation are likely to reflect the relative poverty of AFDC mothers. Second, within the group of poor women, one would like to control for the fact that women choose whether or not to go onto AFDC. Blank and Ruggles (1996) show that only 60% of eligible women actually take up welfare benefits. Those who do are likely to differ from those who do not in many unobservable respects.

Hill and O'Neill (1994) find that, when instrumental variables methods are used to take account of unobserved variables that might be correlated with AFDC status, AFDC participation has no effect on children's scores on a standardized test of vocabulary, given

income. Currie (1995) confirms that their results hold up even when sibling comparisons are used to account for unobserved maternal background characteristics. Currie and Cole (1993) use data from the 1979 to 1988 waves of the National Longitudinal Survey of Youth (NLSY) to examine the effect of AFDC participation during pregnancy on the utilization of prenatal care and birthweight. They use both sibling comparisons and instrumental variables methods to take account of unobserved variables that might be correlated with both participation in the AFDC program and outcomes¹ and find that AFDC participation has no additional significant effect on birthweight given income. Together, these studies suggest that income from AFDC has much the same effect on children as family income from any other source.

b) The Earned Income Tax Credit: A Comparison to the Negative Income Tax

The slack in the growth of AFDC payments over time has been taken up by the growth in expenditures on the Earned Income Tax Credit (EITC), which doubled between 1975 and 1990. The EITC was introduced in 1975 as a means of granting tax relief to low-income

¹ They instrument AFDC participation using state-level variation in program characteristics.

tax payers. Because it is administered through the tax system, the EITC is not always viewed as a welfare program. However, unlike most tax credits, the EITC is "refundable", that is, if the amount of the credit exceeds the tax-payer's federal income tax liability, then the difference is refunded. Table 1 shows that in fact most EITC expenditures are outlays of this kind rather than foregone tax dollars. The EITC differs from traditional cash welfare programs primarily because the majority of recipients work, and benefits are available to all kinds of families. Thus, it creates fewer perverse incentives than AFDC.

If it is difficult to identify the effects of cash transfers under AFDC, the problems involved in identifying the effects of the EITC are even more formidable. The fundamental problem is that the amount of the credit depends on the parents' earnings, and earnings are likely to reflect many unobserved factors relevant to child well-being. However, the EITC is in many respects similar to the "Negative Income Tax" (NIT), an income guarantee program that was subjected to exhaustive scrutiny through four large-scale social experiments, although it was never implemented.² The four

² Under a NIT, a family that earns no income is guaranteed a minimum income, G . Families with earnings, Y , receive a payment D , where $D = G - t_1 Y$. The quantity $B = G/t_1$ is referred to as the breakeven level of income since workers who earn more than B receive no payments. If income is equal to the wage multiplied

experiments were conducted in New Jersey and Pennsylvania, Seattle and Denver, Gary Indiana, and rural areas of North Carolina and Iowa. It is important to note that the North Carolina and Gary samples were much poorer than the others.

The income guarantees paid out under the NIT program were large relative to cash transfers that have been made under the EITC. The average payments in the Seattle/Denver experiment, for example, ranged from \$919. to \$2031. (1972 dollars) depending on the treatment group. By way of comparison, the poverty line for a family of 3 persons was \$3,099 in 1972. In 1992, the maximum EITC was \$1,384 and the poverty line \$11,280. Since NIT participants were randomly assigned to "treatment" and "control" groups, the NIT experiments provide a unique opportunity to assess the effects of income transfers *per se* on the well-being of children in poor families.

Despite the large transfers, findings about the effects of the NIT are inconsistent across studies and experimental populations.

by hours worked, and workers face a tax rate t , then workers on the NIT earn $w(1-t-t_1)$ for every hour of work, whereas workers with incomes above B earn $w(1-t)$. That is, workers on the NIT face a higher tax rate. The EITC differs from the NIT in that the EITC has no income guarantee. Also, since at first the size of the credit increases with earnings, the EITC lowers effective marginal tax rates for the poorest rather than raising them. After a certain level of income the credit begins to be phased out, creating a higher implicit tax rate.

In addition, econometric estimates are sometimes at odds with those derived from simple comparisons of treatments and controls. For example, Kehrer and Wolin (1979) find that the mean birthweight of infants born to the treatment group in the Gary experiment was actually lower than the birthweight of the controls. Yet estimates from their structural model suggest that the infants of treatments had higher birthweights in 9 out of 12 maternal age groups.

O'Conner, Madden, and Pringle (1976), examine the effect of the NIT on child nutrition using data from the rural experiment. Among subjects in North Carolina, they found positive and significant treatment effects on nutrient intakes. However, the treatment did not appear to have any significant effect in Iowa, a finding that the authors attribute to the relative poverty of the North Carolina sample.

Maynard and Crawford (1976) found that elementary school children from NIT families in North Carolina showed statistically significant improvements in attendance, standardized tests, and grades. However, there were no effects for elementary school children in Iowa. Once again, this pattern of results is attributed to the fact that the children in North Carolina were more disadvantaged than those in Iowa. Maynard and Murnane (1979) found that in the Gary experiment the NIT treatment had positive

effects on reading scores of young children but that these effects were statistically significant only among children whose families had been in the program for 3 or more years.

Finally, in an analysis of data from the New Jersey experiment, Mallar (1977) found that teenagers whose parents were enrolled in NIT were 20% to 90% more likely to complete high school depending on the NIT plan. However, Venti (1984) found only an 11% increase in the probability of completing highschool for youth in the Seattle/Denver experiment. This lower estimate seems more probable in view of the relatively short duration of the experiments, and the many long-term factors (such as achievement in early grades) that have been linked to educational attainment. These results may also be related to the fact that, in all 4 experiments, youths in treatment households were less likely to be employed than controls (Robins, 1985).

These studies suggest that the relatively large income transfers made to families under the NIT had a positive effect on the nutritional status and educational attainment of children in the poorest families. However, the magnitudes vary greatly from study to study. Perhaps unsurprisingly, studies of the consumption effects of the NIT also show that families spent much of the subsidy on goods that may not have been directly related to the

well-being of their children. For example, the NIT appears to have had a negative effect on the labor supply of married women³, and positive effects on housing expenditures and purchases of consumer durables (Robins, 1985; Michael, 1978).⁴

II. What We Know About In-Kind Programs

A parallel "in-kind" welfare system has grown up alongside the cash system. This system aims to directly provide for a child's "basic needs": decent housing, food, medical care, and quality early education. Table 1 shows that expenditures on virtually all of these programs have shown steady growth over time (the exception being the School Lunch Program). Table 2 indicates that in contrast to stagnant AFDC caseloads, caseloads for most in-kind programs have been increasing.

Initial evaluation of these in-kind programs is more straightforward than the evaluation of cash transfer programs because we can ask whether the program has an impact on the specific child outcome it was designed to affect. For example, we can ask whether

³No convincing evidence of a link between maternal employment and children's well-being has been found. See Blau and Grossberg (1990) and Desai *et al.* (1989)).

⁴ The NIT may also have increased the probability of marital dissolution, although this finding remains controversial (c.f. Cain and Wissoker, 1990; Hannan and Tuma, 1990).

receipt of housing assistance is associated with improvements in housing, or whether household participation in the Food Stamps program improves a child's diet.

We might then wish to ask whether the program has additional effects on related child outcomes. For example, better nutrition could influence a child's cognitive abilities. Also, subsidies to food and housing may influence child outcomes more generally by relaxing the family's budget constraint (see Moffitt, 1989 and Citro and Michael, 1995 for discussions of the valuation of in-kind benefits).⁵ However, since the effects of income transfers are discussed above, I will focus in this section on any effects of participation in in-kind programs on the specific outcomes that the programs were designed to affect. In practice, this restriction eliminates very few studies from consideration.⁶

⁵ The National Research Council (Citro and Michael, 1995) concludes that for simplicity's sake, "near-cash" benefits such as food stamps and housing assistance should be counted at their dollar value when comparing the resources available to different households and they have a discussion of various procedures for valuing housing benefits. However, the panel also recommends that health insurance be excluded from these comparisons because it is too hard to come up with a meaningful estimate of its value to households in different circumstances.

⁶ An exception that deserves mention is Meyers *et al.* (1993) who found that in a sample of poor children in Boston, those who received housing assistance were less likely to be anemic. The study did not control for selection into public housing.

a) Housing Assistance

In contrast to AFDC and food stamps, housing assistance is not an entitlement: When funds allocated to the program run out, people who are eligible must be wait-listed. It is estimated that about half of federal expenditures on housing assistance directly benefit children while the elderly are the other large group of beneficiaries.

Most expenditures are on rental assistance programs rather than on low-rent public housing (which is what many people think of as "public housing"). And since 1982, most new authorizations for rental housing assistance have been for Section 8 programs (Pedone, 1988). The Section 8 existing housing program provides rent subsidies to families who find an apartment of their own choosing, as long as the rent is below the "Fair Market Rent" established by the Department of Housing and Urban Development (HUD), and the unit meets minimum quality standards. Rental assistance typically reduces a family's rental payments to 30% of its income, after deductions for certain expenses are taken into account.

Deficient housing is hazardous to children. For example, lead poisoning is three times more common among poor children than among non-poor children and is directly related to housing conditions. The risk of accidental death is also three times higher for poor

children, and some of this increased risk may be due to hazards in the home (Starfield, 1985). In 1989, 18% of poor households (2.2 million households), lived in housing with severe or moderate physical problems compared to 7% of non-poor households.⁷

It is not known whether, in general, housing assistance enables families in deficient housing to move to adequate housing. A 1988 HUD study found that more than half of public housing households lived in projects that needed moderate to substantial rehabilitation just to meet HUD's own standards. The estimated cost of bringing these units up to standard would have exceeded \$20 billion 1986 dollars (Lazere *et al.*, 1991).

Section 8 programs require families to locate a landlord willing to participate, and to arrange with the landlord for inspections and repairs within a fixed period of time. One case study of 56 single mothers in eastern Massachusetts in 1985 and 1986, found that after waiting an average of 2 years to receive a certificate, 24 women returned them unused because they were unable to find housing that met program requirements within the allotted time (Mulroy, 1988). On the other hand, there is some evidence

⁷ Problems HUD classifies as severe include lack of basic plumbing facilities, serious heating breakdowns, and rat infestations. An example of a moderate deficiency, is the use of unvented gas, oil, or kerosene heaters as primary heating equipment.

that recipients of vouchers pay higher rent (Kennedy and Finkel, 1987; Apgar 1990) and move to better neighborhoods (Johnson, 1986).

The often dismal social conditions in many public housing projects must be weighed against any improvements in the physical housing stock. However, it is very difficult to identify the effects of neighborhoods and schools because any relationship we observe between neighborhood characteristics and individual outcomes could reflect the characteristics of the individual or of his or her family that placed them in these neighborhoods in the first place.

The Gautreaux program sheds light on this issue. Under the program, residents in public housing projects can apply for Section 8 housing certificates and move to private apartments. Some apartments are in predominantly white suburbs, while others are in the inner city. Although the persons admitted to the program are not a random sample of public housing residents⁸, Rosenbaum (1982, 1992) asserts that the program assigns apartments in an

⁸ Applicants are screened to make sure that they have paid their rent regularly, and that they have adequate housekeeping abilities. The program does not serve families with more than 4 children because few large housing units are available in the suburbs. In addition, the act of applying for an apartment in an unknown location may indicate that a person is strongly motivated to improve his or her circumstances.

approximately random manner, since people get whatever is available when they reach the top of the waiting list. He finds that 7 years after their move, children who had moved to the suburbs were 15% less likely to have dropped out of school, 16% more likely to be in a college-track program, and 34% more likely to be employed than those who had moved within the inner city. All of these differences are statistically significant at the 90% level of confidence.

These findings suggest that voucher programs can have a positive effect on the life chances of children if they enable families to find housing in better neighborhoods. On the other hand, they suggest that the disamenities associated with large public housing projects may have significant negative effects. However, the study is marred by high rates of attrition from the sample. HUD is currently conducting an experimental evaluation of a program similar to Gautreaux in four cities.⁹ An experimental evaluation that took care to minimize attrition could shed great light on the possible beneficial effects of housing vouchers, and on the issue of the effects of neighborhoods more generally.

Despite their bad reputations, housing projects may be better

⁹ Personal communication Lawrence Katz, Dept. of Economics, Harvard University.

than much of the housing available to poor families who do not have access to voucher programs. By combining data from the 1990 Census and the Current Population Surveys, Currie and Yelowitz (1997) are able to examine the effects of residence in public housing projects on housing quality as measured by the extent of overcrowding and the density of the housing complex. They also examine the effect on the probability that a child has been retained in grade, an important index of educational attainment. They find significant positive effects on all three outcomes.

b) The Food Stamp Program

Food stamps are issued in the form of booklets of coupons that may be used to purchase all foods except alcohol, tobacco, and hot foods "intended for immediate consumption." In contrast to AFDC, food stamps are available to all families who meet federally determined income-eligibility requirements, though AFDC recipients are automatically eligible.

The value of a family's food stamp allocation is typically much less than what the family spends on food. Hence, it is likely that the increase in the family's food expenditures will be less than the value of the food stamps because families can spend the same amount on food that they would have in the absence of the program, and use the "freed up" money for something else. In fact,

economic theory suggests that Food Stamp families may spend a little more on food because they feel wealthier, but that there should be no difference between the effects of Food Stamps and the effects of cash transfers to the family. However, recent experimental studies of food stamp "cashouts" conclude that families spend more than the expected amount of their food stamp income on food.¹⁰

In these cashouts, Food Stamp Program (FSP) participants were randomly selected to receive the cash value of their food stamps rather than the coupons. Fraker, Martini, and Ohls (1996) summarize the results of four of these demonstrations. In three of the four, reductions in food expenditures ranged from 7% to 22%. In one site, there was no effect on food expenditures. However, in this site, the change was introduced with little publicity, and recipients continued to receive separate checks from AFDC and the FSP, rather than one combined check. Fraker *et al.* argue that these differences can explain the fact that the switch to cash had little impact at this site.

Two intriguing hypotheses have been advanced to explain why food stamp income might have a different effect on food

¹⁰ Non-experimental studies of this issue have proved inconclusive. See Fraker (1990a, 1990b) and Korenman and Miller (1992) for examples, and Currie (1995) for a discussion.

expenditures than cash income. First, it is possible that households view FSP benefits as a more permanent source of income than other sources--thus they are more likely to spend the money rather than saving it for a "rainy day". Second, women with children may be more likely to spend a given amount of income on food than men, and the female head of household may have more control of Food Stamp coupons (which are likely to be issued in her name) than she has over the household's cash income.¹¹ Neither

¹¹ Some circumstantial evidence pertinent to this hypothesis comes from the Washington State Welfare Reform Demonstration Program. AFDC recipients in demonstration counties had the option of choosing to receive their AFDC and Food Stamp benefits in the form of a single consolidated check rather than continuing to receive Food Stamp coupons. Over 20% of these women opted to continue receiving the coupons.

theory has been subjected to an empirical test.

c) The Supplemental Feeding Program for Women, Infants, and Children (WIC)

In addition to the Food Stamp Program, the federal government offers several feeding programs that give food directly to needy children and their mothers. The WIC program provides nutritional counseling and food supplements to pregnant and lactating mothers and their infants as well as to low-income children up to age 5. All participants must be certified to be nutritionally "at risk". WIC is funded by appropriation and the size of each year's appropriation limits the number of people that can be served. WIC is currently operated out of some 8,330 sites, and serves approximately 60% of those eligible (Jones, 1992). The law requires that the WIC program provide foods containing protein, iron, calcium, vitamin A, and vitamin C. Food packages must be appropriately tailored to meet the needs of each category of recipient.¹² In fiscal year 1991, the average monthly WIC package was valued at \$31.67.

¹² The categories are children 0 to 3 months of age, 4 to 12 months, women and children with special dietary needs, children from 1 to 5, pregnant and nursing mothers, and postpartum non-nursing mothers.

Many studies find that WIC has positive effects on the utilization of prenatal care and on measures of infant health including birthweight, the incidence of low birthweight, gestational age, and infant mortality.¹³ Schramm (1985) and Devaney *et al.* (1990) examine the effects of WIC on the Medicaid costs of newborns. The results are of particular interest because they can be used to compare the costs and benefits of the WIC program. Schramm found that in 1980 a dollar spent on WIC reduced Medicaid costs in Missouri by approximately \$.80 in the first 30 to 45 days after birth. Devaney *et al.* examine Medicaid costs in the first 60 days after birth in 5 states and found that reductions in Medicaid costs over this period more than offset the costs of providing WIC.

Unfortunately, only two WIC studies, by Metcalf *et al.* (1985) and Caan *et al.* (1987), have used random assignment to generate a comparison group. If WIC participants are worse off than non-participants because places are scarce and only the neediest are admitted into the program, then studies that compare WIC participants and non-participants will under-estimate the effects of the program. Conversely, if WIC participants are more highly motivated or better informed than non-participants, then studies of this type may over-estimate the program's effects. Without knowing

¹³ See Devaney, Bilheimer and Schore (1991) for a review.

more about the selection mechanism underlying participation it is difficult to assess the probable direction of this bias.

Still, given that the program is locally administered, the factors governing selection into the WIC program are likely to differ considerably over time and across sites. Hence, the fact that estimated effects are remarkably constant across states and over time suggests that the positive results are not entirely driven by selection. This conclusion is reinforced by a recent study by Brien and Swann (1997) who use both instrumental variables and sibling comparison methods to analyze data from the 1988 National Maternal and Infant Health Survey. They find significant effects of WIC on birth outcomes and on maternal behaviors (such as reductions in drinking while pregnant) among blacks, but they are unable to detect any effect among whites.

Studies of the effects of WIC on the nutrient intakes of children generally find positive effects (c.f. Fraker (1990)), but these studies are also plagued by possible selection bias. One way to control for bias is to follow the same child over time. The Centers for Disease Control (1978) report the results of a study that followed child WIC participants in 6 states over a two year interval. The study found that after 3 WIC visits the percent of children who were anemic fell by more than half. In addition, the

fraction of 6 to 23 month old children below the tenth percentile of length-for-age fell from 21% to 15% after three WIC visits.

Hicks *et al.* (1982) focus on 21 pairs of siblings from rural Louisiana. Because of the design of the WIC program in that state, the younger child in each pair was eligible for supplementation beginning in the third trimester of pregnancy, while the older child became eligible for WIC only after the first year. The results show that the "early supplementation" group had significantly higher scores on a range of cognitive tests.

d) School Nutrition Programs

The federal government supports 6 other programs that provide meals or monthly food supplements to low-income children. The largest is the National School Lunch Program (NSLP). The NSLP is an entitlement that operates by reimbursing schools for each meal served. School lunches are provided free to children with family incomes less than 130% of the federal poverty line, and are subsidized if the family income falls between 130 and 185% of the poverty line. In 1990, lunches were served to approximately 12.8 million students, and 10.3 million students received free lunches. The School Breakfast Program (SBP) serves fewer, typically needier, students.

The effects of school nutrition programs are controversial. Older studies found that participants had higher 24 hour nutrient intakes than non-participants, and that SBP participants were more likely to eat breakfast than non-participants (Hanes *et al.*, 1984). However, more recent studies show higher intakes of some nutrients, but also higher intakes of fat and cholesterol (Gordon, Devaney and Burghardt, 1995).

Surprisingly, there have been few attempts to evaluate the effects of school nutrition programs on cognitive outcomes. In one of the more compelling studies, Meyers *et al.* (1988) examined 1092 third to sixth grade children in Lawrence, Massachusetts before and after the SBP was introduced at their school in 1987. They found that the Breakfast Program participants showed greater improvements on the Comprehensive Test of Basic Skills, relative to their initial scores, than non-participant children. SBP participation also reduced tardiness.

e) Medicaid

Medicaid is the main system of public health insurance for poor women and children. It is a federal-state matching entitlement program, administered at the state level. Table 1 shows that expenditures on children account for a relatively small

share of total Medicaid expenditures: The average expenditure on an AFDC child is \$891 (1992\$) compared to \$3778 for an aged person (U.S. House of Representatives, 1994). Still, both expenditures and caseloads continue to grow as shown in Tables 1 and 2.

States were required to offer Medicaid coverage to AFDC recipients and until recent extensions of coverage to other groups, there was a very close link between AFDC reciprocity and Medicaid eligibility. However, evidence that many children and pregnant women were not receiving adequate preventive care led Congress to expand Medicaid coverage for pregnant women and children beginning in 1984. States are now required to cover all pregnant women and children under 6 with family incomes less than 133% of the federal poverty line, regardless of family structure.¹⁴ Beginning on July 1, 1991, states have been required to cover all children born after September 30, 1983 whose family incomes are less than 100% of the federal poverty line.

The recent 1997 Budget Reconciliation Act allocates \$47 billion over the next 10 years to allow states to expand health insurance coverage to an even larger group of uninsured children, either through the Medicaid program or through separate state

¹⁴The coverage of pregnant women is limited to services related to the pregnancy.

initiatives. States must contribute 70% of what the state would have contributed under the matching provisions of the Medicaid program--that is, states can get federal money to expand health insurance coverage at a very favorable match rate. These new provisions make it more pressing than ever to determine the effects of public health insurance on children.

Currie and Thomas (1995) use panel data that follows the same child over time, and show that when children are covered by Medicaid they are more likely to have had *any* doctor visits in the past 6 months. Moreover, the effect of being covered by Medicaid is larger than the effect of being covered by private health insurance, which probably reflects the fact that Medicaid has no copayments or deductibles. This effect is the same for black and white children. However, white children also receive more visits for illness when they are covered by Medicaid than when they are uninsured, and this is not true for African-Americans. Thus, equivalent insurance coverage does not guarantee equal care.

Currie and Gruber (1996b) look at the effect of becoming *eligible* for Medicaid on the utilization of medical care and on child health. The effects of Medicaid eligibility are identified using the recent federally-mandated expansions of the Medicaid program to pregnant women and children described above. They find

that expansions of eligibility to pregnant women increased the fraction of women eligible from 12 to 43%. This increase was associated with an 8.5% decline in the infant mortality rate.

However, earlier extensions of Medicaid eligibility to very poor women who were already income-eligible for AFDC were much more cost effective than later expansions to higher-income women. The reason is that higher income women were less likely to become covered early in their pregnancies. Hence, they did not avail themselves of free preventative prenatal care available under the Medicaid program. There is evidence however, that hospitals enrolled eligible women in Medicaid at delivery so that costly services received by unhealthy newborns were paid for by the program. These results suggest that outreach programs designed to improve takeup could increase the cost-effectiveness of the Medicaid extensions to pregnant women.

Currie and Gruber (1996a) use the same methodology to look at the effects of extending eligibility to additional groups of low income children. They find that, although many newly eligible children did not take up coverage, becoming eligible for Medicaid reduced the probability that a child went without a doctor's visit in the past year, and also improved the quality of care as measured by the fraction of these visits that took place in doctor's offices

rather than hospital outpatient clinics or emergency rooms. These changes were linked to significant reductions in child mortality from internal causes, and had no effect on mortality from external causes (e.g. accidents). This is the pattern one might anticipate if the changes in mortality were linked to increases in the use of preventive care.

The complex relationship between formal takeup and benefits received is further explored by Currie (1995b) in a study that focuses on differences between children of immigrants and children of the native born. She shows that recent expansions of Medicaid eligibility had smaller effects on Medicaid coverage among immigrant children, but increased utilization of basic services by at least as much among immigrants as among non-immigrants.

The differences in patterns of takeup and utilization by race and natality are consistent with evidence from other countries that extensions of insurance coverage alone will not eliminate socioeconomic differences in health care utilization or health (Currie, 1995c). It is unlikely that lack of information alone can explain the differences, since black and immigrant parents are as likely as other parents to bring their children in for free preventive care when they become eligible for Medicaid. Similarly, purely cultural explanations that posit that some groups value

medical care less than others are difficult to reconcile with this evidence.

Disparities in the availability of private health insurance, in the transactions costs associated with enrolling in the Medicaid program, or in access to providers willing to accept Medicaid payments may all be important determinants of group differences. Currie, Gruber, and Fischer (1995) examine the last of these three factors and show using state-level data that increases in Medicaid fee ratios for obstetrician/gynecologists are associated with significant declines in infant mortality, presumably because of increases in either effective physician supply or in the quality of services provided.

The fraction of children with private health insurance fell over the period of the Medicaid expansions to such an extent that there was actually a small decrease in the fraction of children with any health insurance coverage (U.S. General Accounting Office, 1995). These trends lead one to suspect that public health insurance may have "crowded out" private insurance coverage. Cutler and Gruber (1996) estimate that as many as 50% of the people who became covered by the Medicaid expansions may previously have had private health insurance. While a switch from private to public insurance does not raise the fraction of children covered,

the Currie and Thomas (1995) results suggest that it may still improve the health of children by encouraging the utilization of preventive care.

Other analysts (c.f. Dubay and Kenney, 1997) point out that private health insurance coverage was declining even among groups such as single men whom one would not expect to be affected by the expansions. If one asks what fraction of the total decline in private health insurance coverage is a result of substitution towards Medicaid, the answer is approximately 15%. Clearly, much research remains to be done on the causes and consequences of the decline in private health insurance coverage.

f) Head Start

Head Start is a federal-local matching grant program that aims to improve the skills of poor preschoolers so that they can begin schooling on a more equal footing with their more advantaged peers. Unlike Medicaid, it is not an entitlement program, and only about a third of eligible children are served (Stewart, 1992). Head Start has enjoyed widespread bi-partisan support over a long period, although evidence regarding long-term effects is inconclusive. Experimental studies that focus primarily on inner-city African-American children typically find an initial positive effect on children's cognitive achievement that fades out in 2 or

3 years.

Supporters of the program argue that a narrow focus on cognitive test scores is inappropriate, given that Head Start is intended to affect a range of outcomes (c.f. McKey *et al.*, 1985). Evidence from the Perry Preschool Project which found that Head Start children were less likely to drop out of high school, engage in crime, or to become pregnant as teenagers is often cited. However, since the project included only 58 treatments and 65 controls, was funded at about twice the rate of a typical Head Start program, and did not involve a national sample, it is not clear that the findings generalize.

Currie and Thomas (1995b) examine sibling comparisons from a national sample and find that children who were in Head Start have higher test scores at the end of the program than either stay-at-home siblings, or siblings who went to other preschools. The effects are of the same magnitude for both black and white children and indicate that Head Start closes 1/3 of the gap between these children and others. But consistent with the experimental studies, they find that the effects on black children fade out rapidly. These results suggest that the positive effects of Head Start may be undermined by subsequent deprivation among these children.

In contrast, the effects on the test scores of white children

do not fade out. Moreover, white children 10 and over are significantly less likely to have repeated a grade if they attended Head Start, and are thus less likely to have experienced the age/grade delay that often leads to high school non-completion. Both black and white children who attended Head Start were more likely to be immunized than stay-at-home siblings, although there was no effect on height-for-age, a measure of long-term nutritional status.

In related work, Currie and Thomas (1996) find that Head Start has large and lasting effects on the test scores of Latino students. A closer inspection of the data reveals that these positive effects are largest for Mexican-origin children and smallest for Puerto Rican children. However, due to sample size limitations it is not possible to sort out the effects of ethnicity and the effects of region. It is possible for example, that the ethnic differences reflect differences in the programs available in New York where Puerto Rican children tend to be located, and California and Texas where Mexican-origin children are concentrated, rather than any independent effect of ethnicity *per se*.

Currie and Thomas (1996b) ask whether differences in school quality can explain differences in the pattern of "fadeout" in test

scores between whites and blacks. Specifically, the initial positive effects of the Head Start program may be undermined if Head Start children were subsequently exposed to inferior schools. And since we see fadeout for blacks but not for whites, it would have to be the case that black Head Start children are attending worse schools than other black children but that the same was not true among whites.

They test this hypothesis using a sample of 8th graders from the National Educational Longitudinal Study of 1988 (NELS). Their work builds on earlier research by Valerie Lee and Susanna Loeb (1995) who showed using these data that the schools attended by Head Start children are of worse quality in some observable dimensions than the schools attended by other children. Even controlling for family income and parent's education, children who attended Head Start have lower test scores than other children. This result is to be expected if Head Start does not entirely compensate for early disadvantages.

However, among black children, the gap between Head Start children and other children is virtually eliminated when we compare children within the same school. That is, within schools, black Head Start children do no worse than other black children. But since they perform more poorly than other children on average, they

must be attending schools in which all black children do badly. If a "quality" school is defined as one in which children do well, then these results suggests that black children who attend Head Start go on to attend schools of significantly worse quality than other black children. In contrast, among non-hispanic white children there appeared to be little difference in the schools attended to by Head Start and other children.

III. What We Need to Know

The preceding discussion is summarized in Table 3. The table presents a matrix of programs and effects. Differences in the effects of programs across groups have been suppressed, although one theme that has emerged from the discussion so far is that they are important. The most striking feature of Table 3 is that there are many empty cells -- we clearly need to learn a great deal more about the effects of welfare before we can make informed public policy. In some cases, research has been limited by lack of appropriate data. In others, existing information has not yet been fully exploited. This section highlights some unanswered research questions, and discusses the extent to which better data collection efforts could help.

a) Effects of Welfare on Long-Run Outcomes

Ultimately, what many people care about is whether investments in children today will produce productive, well-socialized adults tomorrow. However, Table 3 highlights the fact that little is known about the effects of welfare on long-term outcomes. Lack of data places major limitations on this type of research. Many important outcomes can only be examined 10 to 15 years after childhood participation in welfare programs. There are few existing data sets that combine information about childhood participation in welfare, other family background characteristics, and the outcomes of interest.

One exception is the National Longitudinal Survey's Child-Mother file (NLSCM). The NLSCM contains information about the children of a sample of approximately 6300 women who were between the ages of 14 and 21 in 1978. Information about childhood participation in AFDC, the Food Stamp Program, Medicaid, Head Start and WIC is available. By the time the 1994 wave is released, there will be over 800 children over 16. Of course, since these children will have been born to young mothers, they will not be a nationally representative sample of 16 year olds. Still, this sample is a valuable resource. If future waves of the survey continue to be funded, it will grow in size and in representativeness, and allow us to address many questions about the relationship between welfare

and long-term outcomes such as schooling attainment, teen parenthood, and crime.

A second exception is a special supplement to the Panel Study of Income Dynamic (PSID) that was fielded in 1995. This module contains retrospective information about early childhood education and criminal activity which can be linked to data about welfare participation from the original PSID file. The PSID is currently undertaking an even more ambitious data collection effort, the 1997 Child Development Supplement. The survey of 3,500 zero to twelve year old children will have assessments of cognitive, behavioral and health status. Data are being collected from the mother, a 2nd caregiver, the absent parent (if relevant), teachers, school administrators, and the children themselves. The survey will also include time diaries for caregivers, children, and teachers, to examine inputs into child development. Finally, other inputs such as resources in the home and neighborhood will also be measured.

Once again, this information can be linked to data about welfare participation from the main files, and followup on these children may help to identify long-term effects of participation. Fielding this type of supplement to existing data sources promises to be a cost-effective method of providing information on the link between the current outcomes of young adults and their

participation in various programs as children.

An additional issue that can be addressed is whether there are links between the short-term outcomes that have been examined in previous research and longer-term outcomes. If it is found that particular short-term outcomes are reliable "markers" for longer-term outcomes, then future evaluations of welfare programs may not require as much costly long-term followup of the participants.

b) Why Do Effects Appear to Vary with Race, Ethnicity, and Natality?

The PSID and NLSCM data sets will both support analyses stratified by race, ethnicity, and natality. However, in many cases the sample sizes are very small. In order to properly document differences in outcomes, or even in utilization, it will be necessary to add questions to existing large-scale data sets. For example, the Census asks questions only about the use of cash welfare, even though expenditures on in-kind programs constitute the largest and fastest growing share of the welfare bill.

A second problem is that large-scale individual level data sets typically lack information about neighborhoods and administrative procedures that could be used to test specific hypotheses about group differences. For example, one might believe that black children on Medicaid receive fewer visits for illness

than white children because the providers that serve them are overcrowded and it is more difficult to get additional appointments. It would be very useful to know the extent to which group differences are associated with the administration of welfare programs, rather than with differences in parental tastes or circumstances.

It is unlikely that many detailed questions of this type will be added to large-scale surveys, but it would be possible to match data from other sources to the surveys if finer geographical information were made available to researchers. While issues of confidentiality are important, the amount of information that could be gained if it were routinely possible to match survey data to say zip-code level data from other sources can hardly be underestimated.

This type of matching is also greatly facilitated by the existence of a central agency that collects program information (and is willing to give it to researchers!). There is a real danger that further devolution of responsibility for welfare to the states will result in a loss of information about the administration of programs, making it more difficult to identify program effects using state-level variation in the programs.

c) How Do Programs Interact?

One glaring omission from this survey is that there has been no discussion of multiple program participation. Many children are covered by more than one program. For example, AFDC participants are covered by Medicaid and are automatically eligible for Food Stamps. As of 1990, half of AFDC children received free school lunches, 35% lived in public or subsidized rental housing, and 19% participated in WIC. Conversely, half of all Food Stamp recipients, 42% of Medicaid recipients, 38% of WIC recipients, and 24% of those in public housing also received AFDC. Moffitt (1992) estimates that in 1984, 26.4% of nonelderly single-parent families received AFDC, Medicaid, and Food Stamps, and 11% received at least one benefit in addition to AFDC.

It is impossible to say how multiple program participation affects the child outcomes discussed above since there has been little research on this topic. Some programs may be duplicative, while others may interact to produce more positive outcomes. For example, Currie and Thomas (1995b) found that children in Head Start were more likely to be immunized than other children, even though many Head Start children would have been eligible for free vaccinations under the Medicaid program in any case. Head Start may help families to enroll in Medicaid, help them locate a Medicaid provider, or it may bypass Medicaid altogether by

arranging for children to be immunized at the Head Start center.

An analysis of multiple program participation would assist us in answering the question of whether the current patchwork system of programs is an efficient way to provide welfare. The proliferation of programs increases possibilities for fraud, waste, and mismanagement. On the other hand, the evidence surveyed here suggests that targeting specific benefits directly to individual children has advantages in terms of ensuring that specific benefits are received. We need to know more about the balance between these benefits and costs.

d) How Do Successful Programs Work?

Data limitations place severe restrictions on our ability to look inside the "black box" of welfare programs. For example, we can show that expansions in Medicaid eligibility have been related to reductions in child mortality rates at the state level, but we do not know why. It could be due either to increased use of preventive care or to more intensive palliative care for sick children. The two possibilities have quite different implications for child well-being as well as for efficiency and program costs. Better information about what goes on during doctor visits, and about objective measures of child health status (short of mortality

statistics) could help us to address this question. It might be possible, for example, to add questions about anemia, lead poisoning, and anthropometrics (e.g. height-for-age, or weight-for-height) to the next National Health Interview Survey.

Still, the most likely scenario is one in which we chip away at these questions using an interactive, multi-disciplinary approach: Analysis of large scale surveys can be used to develop broad hypotheses, which can then be tested using case studies. The case studies can then be used to develop more precise hypotheses about the survey data, and to suggest supplemental survey questions.

e) Cost-Effectiveness

Evidently, if a program has no effect at all on a desired outcome, then it cannot be considered cost effective. Many of the programs discussed above have passed this initial test--they can be shown to have positive effects. The question remains however, of whether they are cost effective, that is whether the benefits outweigh the costs. The figures discussed above for WIC are quite impressive in this regard. Cost effectiveness studies exist for other small-scale early intervention programs (not reviewed here), but have not generally been conducted for large-scale federal programs. Although it is unlikely that there will be agreement on

all of the costs and benefits that should be included in such an analysis, some rough calculations under varying assumptions would no doubt be useful to policy makers.

IV. Conclusions

This survey discusses 8 large federal welfare programs that affect children. The available evidence is incomplete but suggests a consistent story: Programs that target services directly to children have the measured largest effects, while unrestricted cash transfer programs have the smallest, perhaps because their benefits are more diffuse or because the amounts of money involved are typically quite small.

There are also striking and largely unexplained differences in the effects of some programs by race, ethnicity, and/or natality. These differences could reflect non-linearities in the effects of programs -- that is, one might expect larger effects for poorer than for richer children and children from some groups are more likely to be poor. Alternatively they may reflect differences in the programs available to children of different origins, or unobserved differences between participants from different groups that have not been adequately accounted for.

The survey concluded with five questions for future research:

1) Do welfare programs have long-term effects on children?; 2) Why do programs have differential effects by race, ethnicity and natality?; 3) How do programs interact; 4) How exactly do successful programs work?; and 5) Are programs cost effective? These questions indicate that though we know much more than we did even 5 years ago about the effects of welfare on children, there is still much work to be done if we are to make informed decisions about public policy.

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The Well-Being of Young Canadian Children in International Perspective

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Session 4 Sustainability II: Intergenerational Bequests and the Well-being of Children
October 30 2:15 PM - 4:15 PM

The Well-being of Young Canadian Children in International Perspective

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October, 1998

I would like to thank Lynn Lethbridge for her invaluable research assistance, and Peter Burton, Lori Curtis, Tess Cyrus, John Micklewright and Lars Osberg for their very helpful comments. This paper was originally part of a larger study titled "The Best Mix of Policies for Canada's Children?: An International Comparison of Policies and Outcomes for Young Children" prepared for and funded by the Canadian Policy Research Network and Human Resources Development Canada. I would like to thank Suzanne Peters and Allan Zeesman for their support in launching this project.

Abstract

The goal of this paper is to compare children's well-being in Canada, Norway and the United States. Although many economic models focus on children's eventual well-being by adopting an investment perspective, this paper argues that children's well-being today should count when we assess social welfare. Family income is a key input to current child well-being, but this paper focuses on direct measures of child outcomes. Although there is little difference in mean equivalent gross family incomes (in 1994 Cdn\$) for young children in Canada, Norway and the US, if we compare incomes for children in the bottom quintile of the income distribution, children in the US have only half the income available to children in Norway, and more must be purchased out of this income by families in the US (e.g., health care). When we compare direct evidence of child 'functionings' using microdata from the 3 countries, it is clear that Norwegian children are better off than children in the US or Canada. These results are generally consistent with the idea that it is deprivation rather than average incomes levels which matter most for children's well-being. If we are interested in improving the well-being of Canadian children, we should study policies available in Norway.

I. Introduction

The goal of this paper is to establish benchmark comparisons of the current well-being of children living in Canada, Norway and the United States. The perspective taken is that the well-being of children today matters. Children, while they are children, often `disappear' from economic models which use an investment perspective. That is, many economic models of children's well-being or children's attainment (e.g., Becker, 1991; Becker and Toms, 1979; 1986) are interested in the eventual well-being of children, once the children become adults. Examples of the sorts of questions often asked by economists include: what is the role of parent's income and education for the child's eventual education/income level; what is the effect of parental divorce on child's own eventual childbearing experiences (see Haveman and Wolfe, 1995 for a survey). These issues are obviously extremely important, but children are people now, too. They are not simply `human becomings' (Qvortrup, 1990, p. 8) and their current well-being should count in any assessment of `social welfare.'¹

¹ See Phipps, 1998b for a further development of these ideas.

There is already a large and excellent literature which compares current family incomes for children living in different countries.² From this, we know that rates of child poverty are much higher in Canada and particularly in the US than in most other affluent industrialized countries (see, for example, Rainwater and Smeeding, 1995). Microdata from the Luxembourg Income Study indicate that in 1994, 18 percent of young children (i.e., aged 0 to 11 years) living with two parents were poor in the US versus 5 percent in Norway, for example. Canada was on 'middle ground' with 13 percent poor. Rates of poverty for young children living with lone mothers are much higher everywhere, but particularly in Canada (43 percent poor) and the US (60 percent poor). This contrasts with the Norwegian experience where 16 percent of young children living with lone mothers were poor.³

While income may be an extremely important input to the well-being of children,⁴ in itself it is probably not the best measure of children's well-being. Yet, we know relatively little about outcomes for children other than income. For example, are outcomes such as physical and emotional health better or worse for Canadian children than for children living in other countries? Until very recently, a lack of suitable microdata has limited our ability to ask such a question. The goal of this paper is simply to try to establish some benchmark international comparisons of

² Much of this literature makes use of the Luxembourg Income Study -- a set of internationally comparable microdata sets housed in Luxembourg but available to remote users via the internet. Consult the LIS web-site for details: <http://lissy.ceps.lu>.

³ A child is designated as poor if he or she lives in a household with income less than 50 percent of median equivalent after-tax income. OECD equivalence scales are employed. See Phipps, 1998b.

⁴ Ross, Scott and Kelly, 1996 and Dooley and Curtis, 1998, for example, present evidence of the important associations between income and child physical and emotional well-being.

current outcomes for children (other than income).

Canadian outcomes are compared with those experienced in the US and in Norway. Why these two countries? The US is an obvious choice for comparison with Canada, given the proximity and similarities between the two. Norway is chosen as an example of a country with policies and a child-poverty record which is very different from Canada. (Of course, a necessary condition was also that both countries have accessible microdata on child outcomes, which was actually a very limiting condition.)

While the focus of this paper is not on policy, it is important to note at the beginning that there are important differences in the policies available for children in Canada and the US (e.g., universal health care is available in Canada but not in the US; paid maternity leaves are available in Canada but not the US; child benefits are paid to all middle to lower-income families in Canada but such a benefit does not exist in the US). There are even larger policy differences between Canada and Norway (e.g., all Norwegian children receive extremely generous, by Canadian standards, family allowances, maternity/parental leaves are very extensive and well-paid, very generous programmes are available to assist single mothers).⁵ Differences in policy setting add to the interest of the microdata comparisons. While conclusions cannot necessarily be drawn about the link between policy and outcomes for children based on the work presented here, if better outcomes for children are observed in countries with more generous programmes, further research is certainly suggested.

The remainder of the paper is divided into 4 sections. Section 2 provides more detail on the data used. To set the context for the discussion of outcomes which follows, Section 3

⁵ See Phipps, 1998b which discusses these programme differences in detail.

discusses relative and absolute income differences for children in the 3 countries studied. Section 4 presents differences in 10 physical and emotional dimensions of child well-being. Section 5 concludes.

II. Data

Canadian estimates are based on the National Longitudinal Survey of Children and Youth (NLSCY). The Statistics Norway Health Survey and the National Survey of Children for the US are reasonably comparable microdata sets obtained to conduct cross-national comparisons.

In locating data sets for the non-Canadian countries, a key condition was that the surveys contain reasonably similar information to that available in the NLSCY. For the US, this was not a problem, since content is extremely similar. The content of the Norwegian survey is more limited in focus to health-related issues, since the child-related questions which we use were a subset of the 1995 Statistics Norway Health Survey. Unlike the Canadian and US studies, there were no questions about problem behaviours, for example.

One difference across the surveys is whether or not the population of children in the country was the primary focus of the study. In Canada, children aged 0 to 11 years were the principal focus. The main component of the survey consists of children living in households who had recently been part of the Labour Force Survey (thus households living in the North, on Indian Reserves or in institutions are excluded). In Norway, the survey was designed with the population of principal interest being adults who, if they had children, were asked a limited set of questions about the health and happiness of their children. In this case, there was no restriction on the age of the child, though, of course, for comparability we restrict our attention to 0 to 11 year old children.

For the US, the parents were also the original focus of the survey, with the questions about the respondent's children added at a later stage. The child data we use for the US are based on questions asked of the original NLSY respondents about their children. The survey was

not designed to obtain a nationally representative sample of children, as was true for the Canadian data. Fortunately for the sake of making the international comparisons proposed for this paper, the key limitation of the survey is that given the current ages of the parents, the child sample is most representative of *younger* children (mothers in the US would be between the ages of 30 and 38 in 1995). Estimates for the US are considered fully representative of the national population of children for younger children, but not for teens or young adults.

Since the first wave of the Canadian NLSCY only contains information about children aged 0 to 11 years, and thus we only compare outcomes for children in this age range, the relative youthfulness of the US parents is not a serious problem for this analysis. Moreover, while the range of parental age is greater for Canada and Norway than for the US, mean age of mother is nearly identical. We choose to focus on the full samples for Canada and Norway since this gives the best information about child outcomes in these countries.⁶

In the Canadian survey, the person answering the questions is the 'person most knowledgeable about the child' (PMK) -- the mother in 97.7 percent of cases for the Child Questionnaire. For the US survey, only female respondents with children were asked about their children. Thus, the child sample consists of all children born to NLSY female respondents who were living in their mother's household at the survey date (several surveys have been carried out

⁶ Also, we have performed sensitivity tests involving restricting the age of mothers in the Canadian sample to match the US sample. Estimates in no case changed by more than 1 percentage point.

-- we use the 1995 survey). In Norway, the respondent to the health survey would answer the child-related questions, regardless of the sex of the respondent.

For each data set, a small number of individuals did not answer particular questions about children's well-being. These observations are excluded as appropriate for the reporting of levels of child outcomes. Sample size is much the largest for Canadian children, with 21,045 observations for children aged 0 to 11. In contrast, we have only 3961 observations for the US and 1644 observations for Norway (see Appendix Table 2). And, in fact, we most often analyse even fewer observations since many questions were only relevant for sub-sets of the population (e.g., only children of school age can be 'disobedient at school').

III Comparison of Family Incomes for Children in Canada, Norway and the US

To put the discussion of physical and emotional outcomes which follows in context, this section outlines differences/similarities in incomes received by families with young children in the 3 countries. First, as mentioned in the introduction, we already know that child poverty is higher in the US and in Canada than in Norway. Since negative outcomes for children are associated with living in poverty (e.g., Ross, Scott and Kelly, 1996; Dooley and Curtis, 1998), we might thus expect to see, for example, children with poorer physical and emotional health, on average, in Canada and especially the US than in Norway. But, while 20 percent is a very high rate of child poverty, this obviously still means that 80 percent of children in the US are not poor.⁷ Even if poor children have very bad outcomes, average numbers for the population as a

⁷ All of the income comparisons reported here are carried out using the Luxembourg Income Study. We use LIS rather than the child outcomes microdata since income information is more complete in LIS.

whole will also reflect children who are affluent and may have very good outcomes. As Table 1a demonstrates, while 20 percent of children in the US are poor, 20 percent of children are also 'rich'⁸ (versus 10 percent in Canada and 6.5 percent in Norway).

The comparisons provided in Table 1a are relative comparisons. For the purpose of understanding differences in child outcomes, it is also interesting to compare absolute standards of living across the countries, though this is a harder task. Following Hanratty and Blank (1992), we convert all currencies to 1994 Canadian dollars, using the 1990 OECD estimate of purchasing power parity (PPP) for individual consumption by households (OECD, 1990, Table 1.5, pp. 30/31, line 1). We extrapolate PPP to the appropriate year using country-specific deflators for private final consumption (OECD, 1996, pp. 102, 104, 123). This is, arguably, the best procedure available to us, but there are limitations which should be noted. First, it would have been preferable to have had the PPP's for the year of our conversion. Second, even if we did not have to extrapolate the PPP's, there will always be differences across the countries in what is included in final consumption (e.g., medical and health care must be privately purchased in the US). Third, families with young children will likely consume a different bundle of goods than the average household (e.g., relative prices of children's clothing, minivans and daycare will be more

⁸ 'Rich' means that the children live in families with gross equivalent income greater than 1.5 times the median.

important).

With these caveats in mind, Table 1b attempts some absolute comparisons of incomes for families with young children in Canada, Norway and the US. A first important point to note is that average incomes for all families with young children are very similar across the three countries (as Wolfson, 19xx also notes, median gross income is somewhat lower for the US, given the greater degree of income inequality though median after-tax income is very close to the other countries, given somewhat lower rates of income taxation). However, it should again be emphasized that there are differences across the countries in what families must purchase with these incomes (e.g., more private health care in the US; less private daycare in Norway).

The most significant differences in absolute incomes occur at the bottom and top of the income distributions. For example, in the US, median gross⁹ income for families in the bottom quintile is only 50 percent of that received by families with young children in the bottom quintile of the Norwegian income distribution. On the other hand, median income for families with young children in the top quintile of the Norwegian income distribution is only 75 percent of the US equivalent. It is better to be poor in Norway, but to be rich in the US (from a purely self-interested point of view). Canada is again on 'middle ground' in these comparisons.

On the basis of these comparisons, it is not, a priori, clear what we should expect in terms of average outcomes for children. Is it the extent of deprivation, the extent of inequality¹⁰, or the average standard of living which is most important for observed average outcomes for children?

⁹ We focus here on gross income figures, not because this seems more desirable, but because this matches what is possible with the child outcomes microdata.

¹⁰ Health experts argue that the extent of inequality in a country is a critical determinant of health (see, for example, Wilkinson, 19xx).

It is not entirely obvious what we should expect to see in terms of over-all child outcomes in the cross-country comparisons.

IV Comparisons of Young Children's Well-being for Canada, Norway and the US

While economists often conceive of individual well-being as a subjective function of income, $U(Y)$, in practice they often proxy well-being using personal income. This seems particularly inappropriate for a study of the well-being of young children. As argued in the previous section, income is presumably a key input, but it is surely an insufficient proxy for children's well-being. First, as a growing literature on the distribution of well-being within families points out, 'family income' is probably not the best measure of the well-being of any individual family member. Since young children, in particular, have so little direct access to income of their own, they may not always share equally in the benefits associated with family income (e.g., see Phipps and Burton, 1994). Second, household production activities (reading stories, playing games, cooking a healthy dinner) seem especially important for the well-being of young children and are missing from a simple income proxy.

An approach to understanding economic well-being advocated by Sen (1993) seems better-suited for studying the well-being of children. Sen suggests that we think about economic well-being as a set of 'functionings' or 'beings and doings.' Examples of basic 'functionings' are: 'being adequately nourished'; 'being in good health'; 'avoiding escapable morbidity/premature mortality'; 'having a good education.' This seems an extremely reasonable approach to understanding the well-being of children, since children themselves directly experience 'health' or 'good nutrition,' etc. Thus, I use the 'functionings' idea to motivate the choice of variables in

the remainder of this section.¹¹

Unfortunately, data comparability/availability issues have constrained the functionings which we can examine, so what follows is far from ideal or complete. In particular, it is worth noting that we have restricted our attention to outcomes for which the surveys have basically asked exactly the same question. We do this because in earlier versions of this work, some Canadian readers were extremely sensitive to results showing Canadian children to have worse outcomes than, in particular, children in the US. People, frankly, did not believe this could be true, and so looked for reasons to explain away the findings. For example, Phipps 1998b reports that 19 percent of Canadian children 'destroy things belonging to self or another' while only 12.9 percent of US children are reported to be destructive. However, in the US question, the word 'deliberately' is inserted (i.e., 'how often does your child deliberately (emphasis added) destroy things belonging to self or another). This, of course, somewhat alters the meaning of the question, particularly with respect to younger children (e.g., 4 to 11), who are prone to break things without having planned to do so. Another example of the subtleties of question wording can be found in the question used to assess 'worrying' behaviour. In Canada, 48.8 percent of children were reported to 'worry' while only 35.8 percent of children in the US 'worry too much.'

¹¹ See Phipps, 1998a for a more complete discussion of how we might think about the economic well-being of children.

Obviously, the questions on worrying or destructive behaviour are not exactly comparable. Thus, for this paper, great care has been taken to find survey questions worded in the same way. (Exact question wordings are included in the tables for readers to judge whether or not this is so.)

Of course, there will always remain the problem that the Norwegian survey was conducted in Norwegian, and we are working with a translation. Moreover, of course, many Canadians would have been asked the question in French, while presumably some US respondents worked in Spanish.

'Physical health' seems a first key functioning to study. We consider 3 dimensions of physical health for which we have directly comparable information: low birth-weight; experience of accidents/injuries; asthma. First, low birth-weight is very predictive of future health and social problems. Table 2 records the incidence of low-weight births for Canada and the US. (Since this question was only asked of parents with children aged 0 to 3 in Canada, we similarly restrict the US sample. The Norwegian microdata do not record birth weights.) In Canada, 5.2 percent of all children were born weighing less than 5.5 pounds; in the US, 7.0 percent had low birth-weight.¹²

On this dimension, Canadian performance is superior to US performance. On the other hand, OECD data, reported in Appendix Table 1, indicate that Norwegian children are less likely to be born with low birth-weight than Canadian children (5.5 percent for Canada versus 4.6 percent for Norway).

¹² Since restricting the US sample to children aged 0 to 3 reduces sample size to about 300 observations, Appendix Table 1 presents OECD estimates of the incidence of low-weight births for the US. In 1989, the most recent year for which we could find this information, the OECD reports 7.05 percent of US children weighed less than 5.5 pounds at birth.

In both Canada and the US, the incidence of low-weight births is higher for less affluent families, with the difference between bottom and average being greatest in the US. Table 2 reports that 6.3 percent of Canadian children in the bottom quintile of the income distribution¹³ had low birth-weight; 11.2 percent of children in the bottom quintile of the US income distribution had low birth-weight. It is also true for both countries that children currently living in a lone-mother family are more likely to have been low-birth-weight babies (6.5 percent and 13.1 percent, respectively).

¹³ Children are ordered according to gross equivalent family income. Equivalent income is calculated using the OECD equivalence scale.

Tables 3 focuses on the incidence of accidents or injuries requiring medical attention¹⁴ for all children (0 to 11 years) in Canada, Norway and the US. The experience of accidents might be regarded as a good indicator of unsafe physical environment or lack of attention. In the past twelve months, 10.6 percent of children in the US have experienced an accident; 10.2 percent of Canadian children have had an accident or been injured; only 7.9 percent of Norwegian children have had an accident/injury. Thus, children in Canada and the US have basically the same experience of accidents; Norwegian children are less likely to have had accidents than children in the US or Canada.

Less affluent children (i.e., those in the bottom quintile of the country income distribution) have very comparable accident rates to the country average in all cases. While less affluent children may live in less safe environments, affluent children may be more likely to participate in sports, with an associated increase in the experience of injury. Children living with

¹⁴ For the US and Canada, the parent is asked whether the accident was serious enough to 'require' medical attention. For Norway, the parent was asked about accidents or injuries for which the child 'received' medical attention. While this is an important distinction, we hope that universal medical coverage in Norway means that there is a very close correspondence between needing and receiving medical attention.

lone mothers have slightly higher rates of injury than children over-all.

Table 4 reports the incidence of asthma, a partially stress-related problem, for children aged 4 to 11 in Norway and Canada. Note that in this case there is a slight difference in the wording of the question asked of parents. In Canada, parents are asked whether their child ever had asthma 'that was diagnosed by a health professional.' Norwegian parents are simply asked if their child has 'ever been bothered by asthma.' If anything, this wording difference should result in more reporting of asthma in Norway than in Canada. Since we find that children in Norway are less likely to have asthma (8.2 percent) than children in Canada (13.2 percent), we can be quite confident about the conclusion that Norwegian performance in this respect is superior. It is interesting that the incidence of asthma is actually slightly lower in both countries for children in the bottom quintile compared to children over-all. However, children living with lone mothers are more likely to experience asthma in Canada (17.1 percent), perhaps because asthma can be stress-induced and children living with lone mothers have or have had somewhat more stressful lives? (Excellent supportive programmes for lone mother families in Norway might somewhat alleviate stress. See Phipps, 1998b for a programme survey.)

The final measure of physical well-being considered is whether the child has any long-term condition/health problem which limits his/her ability to participate at school, at play or in other activities normal for a child of the same age. Full detail on the wording of the question is provided for each country in Table 5. In the US case, results from 3 separate questions were aggregated to obtain a comparable measure (i.e., limited in ability to attend school, to do regular schoolwork, to do usual childhood games, play, sports). Once again, Norwegian outcomes are better than those for Canada or the US (3.6 percent of children have activity limitation versus 4.7

percent in Canada and 5.2 percent in the US). For Canada and the US, activity limitation increases for children in the bottom quintile of the income distribution (to 5.4 percent and 8.7 percent, respectively). This is not true for Norway, though since this is a low-incidence problem and the Norwegian data set is not large, we may have a small sample problem in this case. Activity limitation is also more common, in all three countries, for children living with lone mothers. In fact, activity limitation is highest for children living with lone mothers in Norway (though again, the small sample caveat must apply). There is, here, the possibility of an endogeneity problem insofar as the serious health problem/physical limitation may have been a stressor leading to marital break-down.

Tables 6 through 11 focus on selected problem behaviours which may signal lower levels of emotional well-being for children. Unfortunately, in order to focus on questions worded in the same way, we have been left with more 'acting out' than 'withdrawing' sorts of behaviours: being disobedient at school; being cruel or a bully; being restless or overly active; lying/cheating versus having trouble concentrating and being anxious or frightened. As summary Table 15 indicates, this leaves the impression that boys have lower levels of well-being than girls in all 3 countries.

For each of the above behaviours, attention is restricted to children aged 4 to 11, for whom these behaviours seem more relevant (generally, 4 to 11 year olds; 6 to 11 year olds if the question relates to being in school). With the exception of fear/anxiety, this information is only available for children living in Canada or the US. We choose to study individual behaviours rather than aggregating to some index of problem behaviours in order that we can point out subtle differences across the countries which might otherwise become buried.

The first two behaviours studied are potentially relevant for school performance: trouble

concentrating and being disobedient at school. With respect to trouble concentrating, children in the US and Canada are very similar. In Canada, 39.8 percent of all children (aged 6 to 11) sometimes or often have trouble concentrating; in the US, 39.4 percent have this problem.¹⁵ In both countries, children living with lone mothers or children living in families in the bottom quintile of the income distribution are more likely to have trouble concentrating.

Parents' reports of the child's disobedience at school are also very similar for children in Canada and the US. In Canada, 17.8 percent of children are sometimes/often/always disobedient at school; in the US, 20.6 percent are sometimes/often disobedient (at school). The reported incidence of this problem increases both for children living in families in the bottom quintile of the income distribution and for children living with lone mothers.

Tables 8 through 11 study other potential indicators of emotional 'ill-health.' First, Table 8 reports that Norwegian children are much less likely to be anxious/frightened than are children in the other countries under study. For 4 to 11 year old children, 35.9 percent of Canadian children are 'sometimes or often' 'too anxious/frightened'; 31.8 percent of US children are 'sometime/often' 'too anxious frightened'; but only 11.3 percent of Norwegian children are 'a little/quite/extremely troubled' by 'constant anxiety or fear.'

Note that this is a case where we continue to analyse a category in which there is a slight difference in wording. While the Canadian and US questions are exactly the same, the

¹⁵ Readers may have empathy for these children at this stage of the paper.

Norwegian question differs. Nonetheless, since we have few 'emotional well-being' indicators available for comparison with Norway, we retain the question and caution readers about the wording difference.

For the remaining categories, we can only compare Canada and the US. First, Table 9 reports that the incidence of 'lying or cheating' is fairly similar for children in the two countries (37.3 percent in Canada versus 40.0 in the US). Again, reported lying and cheating increases for children living with lone mothers or in the bottom quintile of the income distribution.

Table 10 reports that children (aged 4 to 11) in the US are much more like to be cruel or to bully others than are children in Canada (11 percent in Canada versus 26.4 percent in the US - a 16 percentage point difference). In both countries, the reported incidence of bullying/cruel behaviour increases for children in the bottom quintile and for children currently living with lone mothers. The large difference between Canadian and US children persists.

On the other hand, children (aged 4 to 11) in Canada are much more likely to be restless/overly active than those in the US (see Table 11). In Canada, 57.6 percent of children are sometimes or often overly active; in the US, the equivalent figure is only 41 percent -- a 16 percentage point gap. There are particularly large gaps for the 'often' category -- nearly 20 percent of Canadian children are reported to be overly active 'often' while this is true for only 8 percent of children in the US. Again, in both countries, the incidence of this behaviour is higher for children in lower-income families; for children in lone-mother families. And, the gap between the Canadian and US experience actually widens for lone-mother families -- 25.7 percent of children with lone mothers are 'often' over-active while only 13 percent of US children exhibit this behaviour.

In thinking about these results, a general point to make is that when answering questions which contain a subjective element, parental responses will inevitably be mediated by social norms. While we have tried to select questions which minimize this problem, it remains, for example, in parental assessment of whether the child is 'too fearful or anxious.' What is 'too' fearful? Each parent will have to make this assessment, and each will presumably respond relative to what they know -- that is, relative to standards of their community. Appendix Table 1 reports some crime statistics for the 3 countries studied. It is clear, for example, that intentional homicides are much higher in the US than in Canada or Norway. Drug crimes are also more common, though the difference is not so great in this case. The point to be made is that a parent may not respond that her child is 'too fearful/anxious' if everyone else is 'fearful/anxious' and, indeed, this is a rational response given the environment. Of course, the criminal activity statistics reported are national statistics. There will be enormous differences between, say, south-side Chicago and a small farming community in Idaho -- and this is also true for comparisons within Canada.

But, even for less subjective responses, parents will answer questions given what they know. For example, 'how often is your child a bully?' or 'how often is your child overly active'?¹⁶ The parent is left to define for herself what exactly constitutes 'bullying' or 'overly active' behaviour. Thus, her response will be conditioned by standards of the community in

¹⁶ Preliminary regressions results reported in Phipps, 1998a suggest, for example, that parents with other children are less likely to state that the child in question is 'overly active.'

which she lives. Such problems are inherent to international comparisons of the type attempted in this paper.

To help summarize the results presented thus far, Table 12 reports incidence of each of the 10 problem outcomes studied, as available, for young children over-all in Canada, Norway and the US. First, how do young Canadian children fare relative to their counterparts in the US? As Table 12 indicates, the answer to this question is not entirely clear-cut, which is perhaps not surprising when we begin to consider many different dimensions of well-being. First, if we consider the components of physical health for which we are able to make comparisons, outcomes for children in Canada are at least as good as those for young children in the US, and sometimes better. The incidence of low-weight births is lower using either the microdata estimates or OECD published reports; infant mortality rates are lower, according to OECD reports. The experience of accidents/injuries requiring medical attention is very similar in the two countries; rates of activity limitation are similar. (We do not have comparable information about asthma.)

In terms of behaviours which might lead to problems at school (ie., trouble concentrating, disobedience at school), children in Canada and the US appear very comparable.¹⁷ Other indicators of emotional well-being give mixed results. The incidence of lying/cheating is about the same in the two countries. Canadian children are more likely to be anxious/frightened than children in the US and much more likely to be hyperactive. They are much less likely to be

¹⁷ It seems reasonable to pay more attention to small differences, for example, in outcomes which can be more objectively measured (e.g., low birth-weight, incidence of accidents) than to small differences in the more subjective measures. In fact, Canadian outcomes are slightly worse in terms of concentration and disobedience at school, but I do not think these small differences warrant attention.

bullies.

But, average disposable incomes for families with young children are nearly identical for Canada and the US, so perhaps it is not surprising that average outcomes are basically not that different. On the other hand, as Table 1 demonstrated, not only are rates of child poverty higher in the US than in Canada, but if we compare mean incomes of the poorest 20 percent of families (with young children) across the countries, it is clear that the poorest Canadians are better-off (mean income = \$21, 239) than the poorest Americans (\$15,888), presumably at least partially a result of somewhat more extensive social programmes. Perhaps, then, we should look for greater differences in outcomes for children in the bottom quintiles of the income distribution.

Table 13 summarizes outcomes for the poorest 20 percent of children in each country. A first point to notice is that for all countries and all outcomes, poorer children are almost always worse off (accidents and asthma are two exceptions). However, the extent of the deterioration is nearly always greater for the US than for the other countries. That is, there is a bigger difference between the outcomes experienced by the average child and the outcomes experienced by poorer children in the US than in Canada or, especially, Norway. Despite this difference, however, the basic patterns described above hold. Again, it is not entirely clear-cut whether poorer Canadian children are better-off than poorer children living in the US. With respect to the dimensions of physical well-being studied here, poorer Canadian children are probably better-off than their US counterparts, since activity limitation for poorer US children is higher than for poorer Canadian children (in addition to the incidence of low birth-weight being higher in the US). With respect to dimensions of emotional well-being, much the same pattern holds for poorer children as was described for all young children. Poorer Canadian children are more likely to be anxious or

frightened and to be hyperactive; poorer children living in the US are more likely to be bullies and to lie/cheat (lying and cheating is much more prevalent among poorer children living in the US; while the incidence of this behaviour increased for poorer Canadian children, the magnitude of the increase was not so great).

If we compare Canada and Norway, it is clear that children are better-off in Norway, regardless of the outcome we choose to consider. Using the microdata estimates, children are less likely to have accidents, to have asthma, to have a health problem which limits their ability to participate in activities normal for children their age and they are less likely to be fearful/anxious. The conclusion that outcomes for children are better in Norway than in Canada is supported by aggregate data from the OECD -- the incidence of low-weight births is lower in Norway and infant mortality rates are lower.

Notice that the superiority of outcomes for young children in Norway relative to Canada is despite the fact that mean incomes (before or after tax) are slightly higher in Canada. However, rates of poverty are much lower in Norway than in Canada, and those at the bottom of the income distribution have noticeably higher absolute standards of living in Norway.

IV Conclusions

This paper has attempted to provide benchmark comparisons of the economic well-being of children in Canada, Norway and the United States, arguing that the well-being of young children, today, while they are young children, is an important component of social well-being. Since income is an important input to child well-being, evidence is presented of both relative and absolute income differences across the 3 countries studied, using microdata from the

Luxembourg Income Study. Evidence indicates that while average income levels for all children are similar across the countries, there are very large differences in the extent of economic deprivation. First, relative poverty rates are much lower in Norway than in Canada or, especially, the US. Second, despite very similar average incomes, there are very large differences in the absolute incomes received by the poorest 20 percent of children in the 3 countries. For example, children in the bottom quintile of the Norwegian income distribution receive double the income of children in the bottom quintile of the US income distribution.

If we compare direct evidence of child functionings across the countries (e.g., incidence of low-weight births, asthma, activity limitation, accidents/injuries, trouble concentrating, disobedience at school, bullying, lying, hyperactivity, anxiety/fear), it is clear that Norwegian children fare better than Canadian children. This finding accords with the idea that it is deprivation rather than average living standards which are most important for child well-being. Finally, given that outcomes for children are better in Norway, where programmes for families with children are very extensive by Canadian standards, we should consider the role played by policy, both as policy affects income (e.g., through taxes/transfers) and as policy shapes social institutions (e.g., education systems, health care systems, daycare programmes, parenting leave programmes).

Table 1a				
Relative Income Comparisons				
		Canada	Norway	United States
Percentage Poor	Children 0-11 in 2-Parent Families	12.6	4.6	17.9
	Children 0-11 in Lone Mother Families	42.5	15.7	60.7
Percentage Rich	Children 0-11 in 2-Parent Families	10.2	6.5	19.0
	Children 0-11 in Lone Mother Families	1.3	0.3	3.5

Note: For these calculations, it is assumed that the child shares equally the parents' standard of living. "Poor" means family equivalent income is less than 50% of the median country equivalent income; "Rich" means family income is greater than or equal to 1.5 times the country equivalent income. "Equivalent Income" adjusts for family size using the OECD equivalence scale.

Table 1b Absolute Income Comparisons For Children 0-11 Incomes in 1994 Canadian Dollars*					
			Canada	Norway	United States
All Children 0-11 Years of Age	Gross Family Income	mean	56,351	52,530	58,152
		median	50,600	49,848	45,651
	Equivalent Gross Family Income	mean	18,601	18,079	18,978
		median	16,562	17,027	14,368
All Children 0-11 Years of Age with Lone Mothers	Gross Family Income	mean	27,682	29,304	27,443
		median	21,261	23,844	19,897
	Equivalent Gross Family Income	mean	11,173	13,717	9,390
		median	9,097	10,679	6,753
All Children 0-11 in the Bottom 20% of the Income Distribution**	Gross Family Income	mean	21,239	26,821	14,933
		median	20,316	28,382	14,319
	Equivalent Gross Family Income	mean	6,686	8,800	4,310
		median	6,904	9,461	4,604
All Children in the Top 20% of the Income Distribution**	Gross Family Income	mean	103,338	85,608	130,022
		median	90,599	75,624	109,140
	Equivalent Gross Family Income	mean	35,866	30,929	44,950
		median	31,535	26,692	37,346
All Children 0-11 Years of Age	After Tax Family Income	mean	45,216	39,956	46,474
		median	41,689	38,280	39,374
Ratio of mean all kids to mean of the bottom 20%	gross equivalent income		2.78	2.05	4.40

Note: * Incomes for Norway and United States were converted using the purchasing power parity rate for household consumption as calculated by OECD.

**Obtained using the Luxembourg Income Study data, kids files. Incomes were ordered by equivalent gross income to obtain the bottom and top 20%. Equivalent income adjusts for family size using the OECD equivalence scale.

Table 2 Low Birth weight*						
	Actual Question Asked	Responses	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	What was his/her birth weight in kilograms and grams or pounds and ounces? Note: Ages 0 to 3 inclusive.	1. Yes	5.2	6.5	6.3	1.21
United States 1994	weight of child at birth in ounces Note: Ages 0 to 11 inclusive.	1. Yes	6.3	9.0	9.2	1.46
United States 1994	weight of child at birth in ounces Note: Ages 0 to 3 inclusive.	1. Yes	7.0	13.1	11.2	1.60
* Note: Babies born less than 5.5 pounds.						

Table 3 Accident/Injuries Indicators						
	Actual Question Asked	Response	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	The following questions refer to injuries, such as a broken bone, bad cut or burn, head injury, poisoning or sprained ankle, which occurred in the past 12 months, and were serious enough to require medical attention by a doctor, nurse, or dentist. Was the child injured in the past 12 months? Note: Ages 0 to 11 inclusive.	1. Yes.	10.2	11.8	10.0	0.98
Norway 1995	(Has your child had medical attention) due to treatment for an injury or accident that occurred during the past 12 months? Note: Ages 0 to 11 inclusive.	1. Yes.	7.9	9.7	6.5	0.82
United States 1994	During the past 12 months, has your child had any accidents or injuries that required medical attention? Note: Ages 0 to 11 inclusive.	1. Yes.	10.7	12.2	11.0	1.03

Table 4 Asthma						
	Actual Question Asked	Response	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	Has (your child) ever had asthma that was diagnosed by a health professional? Note: Ages 4 to 11 inclusive.	1. Yes	13.2	17.1	12.6	0.95
Norway 1994	Is s/he, or has s/he ever been bothered by asthma? Note: Ages 4 to 11 inclusive.	1. Yes	8.2	8.8	6.6	0.8

Table 5 Limited in Activity						
	Actual Question Asked	Response	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	Does (your child) have any long-term conditions or health problems which prevent or limit his/her participation in school, at play, or in any other activity for a child of his/her age? Note: Ages 6 to 11 inclusive.	1.Yes	4.7	7.1	5.4	1.15
Norway 1995	Does s/he suffer from any illness or disorder of a more long-term nature, and congenital disease or the effect of an injury [which cause] difficulties getting through the day (school/homework) or taking part in games and activities? Note: Ages 6 to 11 inclusive.	1. Yes	3.6	9.1	3.7	1.03
United States 1994	Does (your child) have any physical, emotional or mental difficulties that limit his/her ability to: a) attend school on a regular basis? or b) do regular schoolwork? or c) do usual childhood activities such as play, or sport or games?	1. Yes	5.2	6.0	8.7	1.67

Table 5
Limited in Activity

	Note: Ages 6 to 11 inclusive *					
Note: For the United States, there were three separate questions asked (a,b,c). If the response was yes for any of the three questions then the child was considered to be limited in activity.						

Table 6
Trouble Concentrating

	Actual Question Asked	Possible Responses	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	How often would you say that (your child) can't concentrate, can't pay attention for long? Note: Ages 6 to 11 inclusive.	1. Never or not true. 2. Sometimes or somewhat true. 3. Often or very true.	60.2 32.0 7.8	53.1 34.0 12.9	54.4 33.9 11.8	0.90 1.06 1.51
United States 1994	He/She has difficulty concentrating, cannot pay attention for long. Note: Ages 6 to 11 inclusive.	1. Not true. 2. Sometimes true. 3. Often true.	60.6 30.7 8.7	50.9 37.1 12.0	52.2 34.9 12.9	0.86 1.14 1.48

Table 7 Disobedient at School						
	Actual Question Asked	Possible Responses	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	How often would you say that (your child) is disobedient at school? Note: Ages 6 to 11 inclusive.	1. Never or not true. 2. Sometimes or somewhat true. 3. Often or very true. 4. Always	82.2 16.2 1.4 0.2	75.4 21.5 3.0 0.1	78.7 18.8 2.5 0.0	0.96 1.16 1.79 --
United States 1994	He/She is disobedient at school. Note: Ages 6 to 11 inclusive.	1. Not true. 2. Sometimes true. 3. Often true.	79.4 18.5 2.1	69.9 26.5 3.6	72.7 24.3 3.0	0.92 1.31 1.43

Table 8
Anxious/Frightened Indicators

	Actual Question Asked	Possible Responses	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	How often would you say that (your child) is too fearful or anxious? Note: Ages 4 to 11 inclusive.	1. Never or not true. 2. Sometimes or somewhat true. 3. Often or very true.	63.9 31.7 4.4	54.1 39.2 6.7	58.2 35.4 6.4	0.91 1.12 1.45
Norway 1995	Has s/he been constantly frightened or anxious? Note: Ages 4 to 11 inclusive.	1. Not at all. 2. A little troubled. 3. Quite troubled. 4. Extremely troubled.	88.8 9.5 1.5 0.3	83.1 12.7 3.1 1.1	83.2 14.8 2.0 0.0	0.94 1.56 1.33 --
United States 1994	He/she is too fearful/anxious. Note: Ages 4 to 11 inclusive.	1. Not true. 2. Sometimes true. 3. Often true.	68.2 29.1 2.6	65.6 30.8 3.7	65.0 31.1 3.9	0.95 1.07 1.5

Table 9
Lies or Cheats

	Actual Question Asked	Possible Responses	Response Frequency (percent) -all children	Response Frequency (percent) -children living with children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	How often would you say that (your child) tells lies or cheats? Note: Ages 4 to 11 inclusive.	1. Never or not true. 2. Sometimes or somewhat true. 3. Often or very true	62.8 35.1 2.2	52.1 44.4 3.5	58.7 37.4 3.8	0.94 1.07 1.73
United States 1994	He/She cheats or tells lies. Note: Ages 4 to 11 inclusive.	1. Not true. 2. Sometimes true. 3. Often true.	59.0 38.7 2.3	49.1 47.0 3.9	49.0 47.1 3.9	0.83 1.22 1.70

Table 10
Cruel/Bullies Indicators

	Actual Question Asked	Possible Responses	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	How often would you say that (your child) is cruel, bullies or is mean to others? Note: Ages 4 to 11 inclusive.	1. Never or not true. 2. Sometimes or somewhat true. 3. Often or very true.	89.0 10.3 0.7	80.8 18.3 0.9	83.6 15.3 1.1	0.94 1.49 1.57
United States 1994	He/She bullies or is cruel to others. Note: Ages 4 to 11 inclusive.	1. Not true. 2. Sometimes true. 3. Often true.	73.7 24.8 1.6	69.4 27.9 2.6	70.5 25.9 3.6	0.96 1.04 2.25

Table 11 Restless/Overly Active Indicators						
	Actual Question Asked	Possible Responses	Response Frequency (percent) -all children	Response Frequency (percent) -children living with lone moms	Response Frequency (percent) -bottom quintile	Ratio of the bottom quintile to the average
Canada 1994 - 95	How often would you say that (your child) can't sit still, is restless, or hyperactive? Note: Ages 4 to 11 inclusive.	1. Never or not true. 2. Sometimes or somewhat true. 3. Often or very true.	42.4 37.9 19.7	33.5 40.8 25.7	37.8 39.3 22.9	0.89 1.04 1.16
United States 1994	He/She is restless or overly active, cannot sit still. Note: Ages 4 to 11 inclusive.	1. Not true. 2. Sometimes true. 3. Often true.	59.0 32.9 8.1	50.0 37.0 13.0	49.8 36.7 13.5	0.84 1.12 1.67

Table 12 Summary of Outcomes All Children			
Incidence of Problem	Canada	Norway	United States
Low Birth Weight	5.2	na	7.0
Accidents/Injuries	10.2	7.9	10.7
Asthma	13.2	8.2	na
Limited in Activity	4.7	3.6	5.2
Trouble Concentrating	39.8	na	39.4
Disobedient at School	17.8	na	20.6
Anxious/Frightened	36.1	11.3	31.7
Cruel/Bullies	11.0	na	26.4
Restless	57.6	na	41.0
Lies	37.3	na	41.0

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Table 13
Summary of Outcomes
For Children in the Bottom Quintile of the Income* Distribution

Problem	Canada		Norway		United States	
	Incidence	Ratio of Bottom to Average	Incidence	Ratio of Bottom to Average	Incidence	Ratio of Bottom to Average
Low Birth Weight	6.3	1.21	na	na	11.2	1.60
Accidents/Injuries	10.0	0.98	6.5	0.82	11.0	1.03
Asthma	12.6	0.95	6.6	0.80	na	na
Limited in Activity	5.4	1.15	3.7	1.03	8.7	1.67
Trouble Concentrating	45.7	1.15	na	na	47.8	1.21
Disobedient at School	21.3	1.20	na	na	27.3	1.32
Anxious/Frightened	41.8	1.16	16.8	1.49	35.0	1.1
Cruel/Bullies	16.4	1.49	na	na	29.5	1.12
Restless	62.2	1.08	na	na	50.2	1.22
Lies	41.2	1.10	na	na	51.0	1.24

*Observations ordered according to the equivalent gross family income using OECD equivalence scale.

Table 14 Summary of Outcomes Top Quintile and Ratio of Canada to US				
Incidence of Problem	Top Quintile		Ratio Canada/United States	
	Canada	United States	Top	Bottom
Low Birth Weight	3.6	4.2	0.86	0.56
Accidents/Injuries	10.3	9.0	1.14	0.91
Limited in Activity	4.9	2.4	2.04	0.62
Trouble Concentrating	37.3	30.3	1.23	0.96
Disobedient at School	18.9	13.8	1.37	0.78
Anxious/Frightened	31.3	29.8	1.05	1.19
Cruel/Bullies	8.3	22.3	0.37	0.56
Restless	55.5	30.2	1.84	1.24
Lies	31.0	31.3	0.99	0.81

Table 15 Summary of Outcomes By Gender of Child						
Incidence of Problem	Canada		Norway		United States	
	girls	boys	girls	boys	girls	boys
Low Birth Weight	6.0	4.4	na	na	8.4	5.5
Accidents/Injuries	9.0	11.3	6.6	9.4	8.2	13.2
Asthma	10.5	15.8	8.9	7.5	na	na
Limited in Activity	4.2	5.2	2.8	4.4	4.1	6.3
Trouble Concentrating	31.8	47.5	na	na	33.6	45.1
Disobedient at School	10.0	25.2	na	na	13.9	27.3
Anxious/Frightened	35.9	36.2	10.8	11.7	34.4	29.3
Cruel/Bullies	9.0	12.8	na	na	23.6	28.9
Restless	51.0	63.8	na	na	33.7	47.9
Lies	33.6	40.7	na	na	38.2	43.8

APPENDIX 1

Table A1 Criminal Activity, Infant Mortality and Low Birth Weight			
	Canada	Norway	United States
Intentional Homicides by Men (per 100,000 people, 1985-90)	2.7	1.6	12.4
Drug Crimes (per 100,000 people, 1980-86)	225	116	234
Infant Mortality Rate, 1994 (as a percent of live births)	0.68	0.51	0.85
Low Birth Weight, 1989 (percent of neonates weighing less than 5.5 pounds)	5.5	4.6	7.05
Source: UNDP, <i>Human Development Report 1997</i> . Organisation for Economic Co-operation and Development (1993) <i>OECD Health Systems: Facts and Trends 1960 - 1991, Volume 1</i> .			

Table A2 Number of Observations for Age Groups			
Age of Child	Canada	Norway	United States
0-11 years	21,045	1,644	3,961
4-11 years	13,073	1,099	2,854
0-3 years	7,972	n/a	1,107

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CSLS Conference on the State of Living Standards and the Quality of Life in Canada

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Neighbourhoods, Social Capital and the Long-term Prospects for Children

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Session 4 Sustainability II: Intergenerational Bequests and the Well-being of Children
October 30 2:15 PM - 4:15 PM

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PAPER PREPARED FOR THE CSLS CONFERENCE ON THE
STATE OF LIVING STANDARDS AND THE QUALITY OF LIFE IN CANADA

October 1998

Neighbourhoods, Social Capital, and the Long-Term Prospects of Children

Any discussion of the quality of life in a society must take into account the well-being of its children; not only their well-being as citizens like any other group of citizens, but also their future well-being—that is, their preparedness for adulthood. In fact, the reason “child poverty” has such a resonance among policy makers, and indeed among Canadians in general, has in part to do with the potential long-term consequences of experiencing low-income during childhood. Does being raised by low-income parents scar individuals so that they go on to become low-income adults in their turn? Conversely, do the children of the well-to-do rise to the top of the income distribution as adults? Is the underlying process determining outcomes of these sorts fair? An issue that evokes these kinds of questions touches upon what we must in some sense mean by the “quality of life.”

The process determining the capacity of children to become successful and self-sufficient adults is complicated and involves not just parental income, but also the broader functioning of the family, as well as the roles of community and state. Communities and neighbourhoods play a variety of roles in preparing children for adult life. These span both economic and social factors; a neighbourhood is where individuals live, but it is also the connections and relationships they have to the others around them. Our objective in this paper is to examine the relationship between the long-term labour market prospects of children—their earnings and market incomes as adults—and the characteristics of the neighbourhood in which they lived, focusing on what we refer to as

economic conditions and social capital in the neighbourhood. The analysis begins with a short review of what is known about the relationship between family income and the adult incomes of children in Canada. However, the specific question motivating our research is: what role does “neighbourhood”—both the geographic and the social space—play in determining the adult labour market success of children?

This question has received a great deal of attention among social scientists in the United States in part because of the long-lasting concern in that country with the plight of inner-city neighbourhoods and the development of a so-called “underclass.” In particular, neighbourhood influences have received increasing emphasis as a result of the work of William Julius Wilson (1987, 1996) who detailed the degradation of inner-city areas of Chicago associated with structural changes in employment, the migration of middle-class residents, as well as the resulting decline in community infrastructure and norms of behaviour. As a result there has been a plethora of research including most recently that by: Aaronson (1996), Akerlof (1997), Brooks-Gunn et al. (1993) (1997a,b), Case and Katz (1991), Corcoran et al.(1992), Evans et al.(1992), Gaviria and Raphael (1997), Solon et al. (1997). It is difficult to offer a definitive summary of this literature, but the general picture to emerge would seem to suggest that neighbourhood influences do not represent a major influence on child attainments when data representative of the entire country are used. The empirical research is not nearly as developed in Canada in spite of the fact that public policy debates increasingly use the term “social capital,” a phrase that refers, like “neighbourhood,” to the role of community in determining the prospects of children.

We address this gap in knowledge by grouping Canadian neighbourhoods along economic and social dimensions, and examining the adult labour market outcomes of teenagers according to the economic conditions and social capital of the area in which they grew up. We find that their ultimate adult incomes and earnings is only loosely tied to the income of their parents. In the large, the Canadian labour market is characterized by a good deal of equality of opportunity. But this overall result is misleading as we also find that the influence of parental income is strongly conditioned by the characteristics of the neighbourhood in which the children are raised. Neighbourhood economic conditions and social capital—as we define these terms—are particularly important in understanding the income disparities between the members of the next generation of young adults. Adult labour market outcomes differ between teenagers raised in different neighbourhoods in a way that has little to do with the differences in average parental income. In particular, our results suggest that: [1] economic conditions in the neighbourhood, as reflected mainly in the neighbourhood unemployment rate and youth unemployment rate, have a strong association with adult incomes and earnings of teenagers; [2] the social capital of the neighbourhood, as reflected in the educational attainment of the adults and the affluence of the neighbourhood, also displays such a relationship, though perhaps not as strong; and [3] social capital at the individual level, as measured in the strength of the child's ties to the neighbourhood, also has a noteworthy association with earnings and income in adulthood. These factors—neighbourhood economic conditions and social capital, as well as the capacity of children to access them—are so strong that differences in parental income play a distinctly secondary role in determining the pattern of relative advantages in the next generation. There are certain caveats associated with this interpretation of our

findings, but if these can be shown in future work to be minor, then the results suggest that if government policy is concerned about the long-term prospects of children it needs to address more than simply the level of family income, and recognize the importance of the local macroeconomic and social climate in which children are raised.

1. Methods

Our starting point is the growing literature on intergenerational income and earnings mobility, surveyed in for example Björklund and Jäntti (1998), Mulligan (1997, chapter 7), and Solon (1997). The major analytical approach in this literature is based on the estimation of a simple linear model linking a child's income (as an adult) to his or her parents' income. If y represents the natural logarithm of permanent income, t the child's generation, and $t-1$ the parents' generation then the standard approach is to use least squares to estimate:

$$y_i(t) = \beta_0 + \beta_1 y_i(t-1) + \varepsilon_i \quad (1)$$

where the data are at the individual level with i representing a parent-child pair, and ε_i is a random component usually assumed to be distributed as $N(0, \sigma^2)$. The constant term (β_0) represents the change in income common to generation t , while the coefficient β_1 indicates the extent to which income is associated with that of the parents', that is the extent of intergenerational mobility.¹ If β_1 is less than one the income distribution is said to regress to the mean: while parents with incomes above (or below) the mean will have

¹ This coefficient is often called the intergenerational income elasticity, and is related to the correlation between parent and child incomes by the standard deviation of the logarithm of incomes:

$$\beta_1 = \rho \sigma[y(t)] / \sigma[y(t-1)]$$

where $\sigma[\]$ signifies the standard deviation. Since the standard deviation of the logarithm of incomes is an index of inequality, β_1 will equal ρ if the degree of income inequality is the same between the generations.

children with above (or below) average income levels the deviation from the mean will not be as great. (If it is greater than one the deviation from the mean will be even greater in the next generation.) The larger β_1 (even if it is less than one) the more likely that an individual as an adult will occupy the same economic position as his or her parents, that is the greater the persistence in intergenerational incomes. Even small values of β_1 can be associated with substantial advantages for the children of the well-off. For example, the income advantage associated with having a high-income father relative to having a low-income father is $(Y^H / Y^L)^{\beta_1}$, where the upper case Y denotes the level of income. In Canada, the ratio of the average income of men (working full-year full-time) in the top quintile to those in the bottom quintile during 1981 was 3.84. This would imply an income advantage in the next generation of 14% if β_1 were 0.1. This is a substantial difference, but it becomes even more so with higher values: 31% if β_1 were 0.2 and over 70% if it were as high as 0.4.²

It is easy to understand, therefore, why an accurate estimate of β_1 has been the main concern of studies that adopt this approach. However, the implicit assumption often made is that both β_0 and β_1 are the same for all children regardless of their place in the income distribution. There are both strong theoretical reasons and, at least for Canada, strong empirical results to suggest that this assumption may not be valid.³ In particular, if

² The emerging consensus seems to be that 0.4 (or even higher) is not a bad estimate of the intergenerational earnings elasticity in the United States and the United Kingdom, while 0.2 or perhaps even less seems appropriate for Canada and some European countries. See Corak and Heisz (1998) and Fortin and Lefebvre (1998) for Canadian evidence.

³ For example, Mulligan (1997) offers a clear exposition of various models of intergenerational mobility and points out the possibility of non-linearities. In particular, β_1 will be higher for those parents who are borrowing-constrained and cannot make the optimal level of investment in the education of their children. Durlauf (1996) offers a model of non-linearities based upon neighbourhood differences. Corak and Heisz (1998a) illustrate that the value of β_1 varies across the income distribution in Canada in a way that can be interpreted by the borrowing-constraints model.

neighbourhoods differ in social capital and if social capital is an important influence on the long-term prospects of children—over and above the fact that average family income varies between neighbourhoods—then this would be reflected in different values of β_0 and β_1 . Neighbourhood differences in β_1 reflect differences in how family income is transformed into the economic status of the next generation; differences in β_0 reflect differences in the factors common to all members of the neighbourhood. If this is the case then the income advantage of someone from a high status neighbourhood relative to someone from a low status neighbourhood would be:

$$\frac{Y_t^H}{Y_t^L} = \frac{e^{\beta_0^H}}{e^{\beta_0^L}} \times \left(\frac{Y_{t-1}^H}{Y_{t-1}^L} \right)^{\beta_1^H} \times Y_{t-1}^L^{(\beta_1^H - \beta_1^L)} \quad (2)$$

The relative incomes of the children in adulthood is the result of three factors as reflected in the three terms of this equation: differences in β_0 between the neighbourhoods in which they were raised, differences in the incomes of their parents, and differences in the β_1 between their neighbourhoods. The first and third terms offer a means of assessing the relative importance of neighbourhood characteristics, beyond the fact that average incomes vary.

Equations (1) and (2) form the analytical framework for our research. Using equation (1) we estimate values for β_0 and β_1 by neighbourhood, and then use equation (2) to assess the relative advantage of individuals living in a reference neighbourhood relative to all others. The analysis is based upon income tax information on a cohort of young men and women in 1995 and upon similar information on their parents during the late 1970s and early 1980s. Briefly, we select a sample of individuals aged 16 to 19 years

of age in 1982, who filed an income tax return in that year (while still living with their parents) and who are therefore 29 to 32 years of age in 1995. We relate the adult earnings and market income (defined as the total of earnings, self-employment income, asset income and other market incomes) of the children to that of their parents between 1978 and 1982.⁴ The sample size is very large, numbering up to almost 850,000 parent-child pairs, and not subject to problems of attrition or reporting errors that are endemic to survey data. We attach census geographic codes to this information by using the postal code reported on the parents' 1982 T1 form.⁵ This permits us to link neighbourhood characteristics from the 1981 census to the individual parent-child pair.

2. The Definition of Neighbourhoods

The first challenge in implementing the framework described in equation (2) concerns how to define a neighbourhood in terms of "social capital." While this is an often used term, it is not clearly defined nor easily measured. Becker (1996, p.4) simply states that social capital "incorporates the influence of past actions by peers and others in an individual's social network and control system." Portes (1998) offers a broad review of the concept, noting in particular the difficulty of extending it from an individual asset to a feature of communities and nations. One of the clearest definitions probably belongs to Coleman (1988, 1990) who considers social capital to have three dimensions: the set of expectations and obligations (essentially reputations) that develop in a community, the set

⁴ The construction of the data is described in the Appendix to Corak and Heisz (1998b). The data used here is an updated version of that employed in Corak and Heisz (1998b) in that it uses 1995 incomes of the children, and includes individuals who were raised in lone-mother households. For a discussion of data quality and the potential for sample selection bias see Corak and Heisz (1988a).

⁵ The way in which this is accomplished is described in an appendix available from the authors.

of information channels, and the set of norms or sanctions that exist at the community level. While all three are important in the intergenerational mobility of children, he focuses on the conditions that allow the latter to arise. A well-established set of norms or sanctions can serve to reinforce parental human capital investment in children. In particular, he suggests that this will be strongest when the relationship between children, say in the context of a school, is mirrored at the level of the parents so that the parents' friends are also the parents of their children's friends. He refers to this as "intergenerational closure." In this sense, social capital might be considered as an aspect of network or peer group effects, as in Becker's interpretation.

While Coleman does not offer a direct measure of intergenerational closure he suggests that an appropriate proxy is the number of times the child has moved, in particular the number of school changes, as this indicates a lack of continuity and hence the breaking up of networks. Parents who have moved into a new neighbourhood are likely, in Coleman's argument to not have as much information or be as well connected as those who are long-term residents. Nonetheless, social capital as defined is not tangible and inherently difficult to measure with the kind of data sets generally available to analysts.⁶ Accordingly our approach is rather eclectic. We use information from the 1981 Canadian Census at the Census Tract (CT) and Provincial Census Tract (PCT) level. These categories are defined by Statistics Canada to correspond to what roughly might be considered a neighbourhood, and they certainly capture important aspects of geographic but probably also of social space. Even so it should be recognized that CTs

⁶ Since social capital is also related the amount of time invested in children by parents Coleman suggests that the number of siblings, the presence of a working mother, or being raised in a lone-parent family are relevant measures: more siblings, a two-earner family, or a single parent family leading to inferior child outcomes.

and PCTs may not reflect the neighbourhood as experienced by residents, who may relate to smaller areas within it or to areas outside of it (Furstenberg Jr. and Huges 1997, p.34).

This being said the advantage of using the 1981 census is that all areas of Canada are tracted, either as CTs or as PCTs. The Provincial Census Tract program has since been discontinued so that only larger urban areas are tracted in other censuses. All 24 Census Metropolitan Areas (CMAs) and 12 of the 88 Census Agglomerations (CAs) are census tracted in the 1981 Census, while the remaining 76 CAs and all rural areas are provincially census tracted. Thus the availability of PCTs allows us to distinguish neighbourhoods in smaller urban areas (the CAs), and also to include rural areas in the analysis. There are 4,967 geographic units used in our analysis with an average population of 4,833, varying from 262 to a maximum of 20,483.⁷

Our approach is to: first, define a host of characteristics for each CT/PCT that may relate to the characteristics of the neighbourhood important in determining child attainments; second, to use factor analysis to group these characteristics into a small number of factors and score each CT/PCT along these fewer dimensions; third, to cluster

⁷ A Census Tract refers to a permanent small geostatistical area established in large urban communities with the help of local specialists interested in urban and social science research. Census Tracts are reviewed and approved by Statistics Canada according to the following criteria: (1) the boundaries must follow permanent and easily recognized lines on the ground; (2) the population must be between 2,500 and 8,000 with a preferred average of 4,000 persons, except for Census Tracts in the central business district, major industrial zones, or in peripheral rural or urban areas that may have either a lower or a higher population; (3) the area must be as homogeneous as possible in terms of economic status and social living conditions; (4) the shape must be as compact as possible. Provincial Census Tracts exist in the area not included in the Census Tract programme. The populations captured in PCTs vary between 3,000 to 8,000, with a preferred size of 5,000. As much as possible boundaries of PCTs follow permanent physical features and /or geographic units suggested by the provinces.

Overall there are 5,088 Census Tracts and Provincial Census Tracts. We excluded 117 of these because the population of 15 to 19 year olds was less than 50, and a further four because they had missing values for at least one of the characteristics used in the analysis (in all cases this was the average value of dwellings). The reason for the first exclusion was the need to ensure that derived characteristics were reasonably accurate, especially those pertaining to the cohort of main interest. These exclusions have a minimal effect on our estimate of the total Canadian population leading to an underestimate of only about 78,500 from the total of 24,084,000. Of the 4,967 geographic units used in our analysis 3,185 are census tracts, and 1,782 provincial census tracts.

the almost 5,000 neighbourhoods into a smaller number of like groupings; and finally to estimate equation (1) using the administrative income tax data for each cluster and to use these estimates in equation (2) to quantify the impact of neighbourhoods. Although the administrative data on individual parent-child incomes is large the sample sizes per CT/PCT can be quite small. Factor analysis and clustering is used to develop a grouping of neighbourhoods permitting large enough samples to obtain reasonably accurate estimates of β_0 and β_1 .

In defining the relevant neighbourhood characteristics we roughly follow the general framework offered by Brooks-Gunn, Duncan, Leventhal, and Aber (1997, pp. 289-93), and consider neighbourhood variables that measure: (1) income/affluence; (2) employment and education; and (3) social integration.⁸ The descriptive statistics of the 14 variables used is presented in Table 1.

It is difficult to characterize these variables as representing exclusively social capital or economic conditions. Neighbourhood affluence is measured by the low-income rate (the proportion of economic families with income below Statistic Canada's Low-Income Cut-off), the proportion of well-to-do families in the CT/PCT (those with 1981 incomes above \$40,000, the average Canadian family income being about \$26,700), and the average value of owner occupied dwellings. All of these variables relate to peer groups and networks, but also to the local property tax base, child-care settings, school quality, and the quality of other economic and social infrastructure. In fact, Brooks-Gunn et al. (1997) suggest that the concentration of poor and affluent neighbours may have differential influences on adolescent development, and that these variables are correlated

⁸ Our characterization omits measures of community participation and safety, two additional categories outlined by Brooks-Gunn, Leventhal and Aber.

with other measures of socio-economic status. In a similar way the six variables under the rubric of employment and education relate to the economic conditions in the neighbourhood, but also more broadly to human and social capital. Three unemployment rates are used to, on the one hand, capture the economic opportunities in the neighbourhood, but also peer group effects. It is for this reason that the youth unemployment rate and the proportion of youth receiving unemployment insurance are defined for the population 20 to 24 years old, the cohort slightly older than the group of adolescents at the heart of the analysis. The three remaining variables may offer proxies for the role models or peer groups influencing educational decisions of youths: the proportion of the adult population with university education, the proportion with less than high school education, and the proportion of youths not attending school. All of these variables are also associated with the economic status of the neighbourhood. Finally, social integration refers to a group of variables that attempt to measure the ethnic and religious aspects of the community (the proportion of immigrants and the proportion belonging to the two most homogeneous religious groups that could be readily identified in the Census). These might be taken to offer an indication of the extent of closure in Coleman's terms, but they could certainly also be associated with economic conditions. In addition, Borjas (1992, 1993) points out the importance of "ethnic capital" in referring to the impact of the environment in which immigrant families pass their skills and attitudes along to their children. He argues that the labour market skills of the next generation depends not just on investments made by parents, but also on the average quality of skills in the ethnic community.⁹ This "ethnic capital" seems to be another

⁹ His analysis of data from the U.S. suggests that "the intergenerational progress of workers belonging to ethnic groups that have relatively low levels of human capital is retarded by the low average quality of the

dimension of social capital. The proportion of immigrants in the population may be a rough indicator of degree of the strength of these community ties, and the proportion of the population speaking a non-official language may indicate the skill level or at least signal the challenges the community may have in relating to the wider society and political system. Finally, adapting Coleman's emphasis on residential moves, the proportion of the population that did not reside in the same CT/PCT during the last Census (five years earlier) may reflect the degree to which networks are underdeveloped in the community. That being said it may also reflect economic conditions, newer or more affluent neighbourhoods attracting families able to move up, and less affluent neighbourhoods attracting those experiencing declines in their economic well-being.

The use of factor analysis reveals that these 14 dimensions can be reduced to three separate factors. We refer to these as social capital, economic conditions, and ethnic capital. The factor loadings underlying this characterization are presented in Table 2. We call that term determined for the most part by the education variables, the proportion of affluent, and the dwelling value as Social Capital, and the term driven by the overall unemployment rate and the youth unemployment rate as Economic Conditions. The third term is associated pretty well exclusively with the proportion of immigrants and the proportion speaking a language other than French or English, and therefore referred to as Ethnic Capital. These factor loadings are scored and used to develop three indices, each centered around a mean of zero and with a standard deviation of one; higher values of each index indicating either more social capital, better economic conditions, and more ethnic capital.

group.” (Borjas 1992, p.124)

These indices are used to partition the 4,967 CT/PCTs into 100 clusters. A broad picture of the nature of these clusters is presented in Table 3. On average there are 50 CT/PCTs per cluster, but this varies from a minimum of one (10 cases) to a maximum of 454. Clusters have on average a total population of 240,050, and an average 15 to 19 year old population of 22,986.

3. Results

Following Corak and Heisz (1998a), we undertake two sets of analyses: one based on the relationship between parent-child earnings, another on parent-child market incomes. As mentioned earlier, market income is a concept broader than earnings, incorporating self-employment income, asset income (interest, dividends, and rental income), and other incomes with market sources. These are all defined as reported on the T1 form that Canadians are required to submit to the tax authorities. Market income is probably a better measure of the total purchasing power available to the household. It should be noted that we explicitly exclude all non-market sources of income, that is government transfers. We do this because our focus is on the ability of the next generation to succeed in the marketplace. However, the distinction between market income and earnings may be important in understanding the role of self-employment and the direct transfer of financial resources in the intergenerational process.¹⁰

¹⁰ As such our analysis does not address issues associated with the intergenerational transmission of the reliance on government support. This issue, however, might be considered to fall into the scope of our study in two ways: as a direct indication of the self-reliance of adult children, but also as an assessment of the long-term implications government transfer payments. A complete analysis is precluded by the fact that Income Assistance payments generally are not reported to Revenue Canada, this is particularly so during the period in which we capture parental incomes.

The descriptive statistics associated with the data used in the regressions are presented in Table 4 for both the sample using market income and that using earnings. To be included in the analysis individuals had to have an income/earnings level of at least \$1,000.¹¹ (All incomes are measured in 1986 constant dollars using the Canada-wide Consumer Price Index as the deflator.) A host of other variables are also included in the regression analysis to control for differences in social capital at the individual level, that is to capture the functioning of the family. These follow, for the most part, the suggestions of Coleman discussed in footnote 6 and include: indicator variables for whether the family was headed by a single parent; the number of children (present in the household); two separate indicators of whether the family changed residence between 1978 and 1982 (moved once, and moved twice or more often); and controls for the child's gender as well as the child's and the parents' age and age squared. These last variables are included to control for gender and life-cycle differences in incomes.

The sample of individuals used in the analysis are found in all but one of the 100 neighbourhood clusters. This cluster (which happens to be in Kamloops BC) is relatively small, accounting for a total population of 609. Some preliminary least squares regression results at the Canada-wide level are presented in Table 5. The intergenerational income elasticity is 0.163 when no other controls are used, while the intergenerational earnings

¹¹ Parental income/earnings are measured as the average annual value between 1978 and 1982. To be included in the analysis either one of the parents had to have filed an income tax return for at least three of these five years. An average of both their incomes was taken over the total number of years one or the other filed, and if this average was below \$1,000 the observation was excluded. The logarithm of the average is then used in the regression analysis. Estimates of β_1 may be downwardly biased due to measurement errors arising from temporary income fluctuations. A multi-year average income is closer to the permanent income of the parents, and thereby helps to reduce this bias. See Solon (1989, 1992), Zimmerman (1992), and the exploration of this issue with our data in Corak and Heisz (1998a).

elasticity is somewhat lower at 0.115 (see columns [1] in the Table).¹² The results using controls for family background are presented in columns [2] and lead to a higher market income elasticity (0.187), but not much change in the earnings elasticity. With the exception of coming from a single parent family, all of the individual level measures of social capital have the expected negative sign. The greater the number of siblings the lower the adult income and earnings. Further, experiencing a residential move also lowers adult income through an impact on β_0 , the intercept. This impact is even greater for those experiencing two or more moves, and this experience may also dampen the elasticity with respect to parental income, β_1 . Indices for the social capital, economic conditions, and ethnic capital in the cluster of residence are included in columns [3] and [4], the latter column including controls for the population of the cluster and the proportion of rural neighbourhoods. Social capital, economic conditions, and ethnic capital are all positively related to adult incomes and earnings. Furthermore, including these neighbourhood characteristics in the model significantly reduces the value of β_1 : for market income from 0.187 to 0.148; and for earnings from 0.118 to 0.0849. These differences are statistically significant.

Least Squares regression of the model presented in columns [2] of the table were performed for subsets of the data divided into each of the 99 neighbourhood clusters. A partial summary of these results is presented in Table 6.¹³ There are some clusters in which a negative value of β_1 is estimated (three in the case of market income). In all cases

¹² Both of these results are much lower than estimates generally offered for the United States. See Mulligan (1997, table 7.6).

¹³ These findings are not weighted in any way. However because of concerns over the reliability of the resulting estimates we excluded two clusters from further analysis because they contained fewer than 25 children.

these are due to small sample sizes (for example, ranging from 89 to 114), and the 95% confidence interval for the estimate includes positive values. Even so there is significant variation in the value of β_1 across neighbourhoods, with the highest market income value being almost 0.47, and the highest earnings value about 0.54. The same conclusion holds with respect to the impact of residential moves, with about 25% of the clusters actually having positive point estimates.

A sense of how the β_0 and β_1 estimates vary by neighbourhood characteristics is depicted in the panels of Figure 1a and 1b, which present scatter plots of the estimates against the associated value for each of Social Capital, Economic Conditions, and Ethnic Capital. These diagrams also present an estimate of the kernel density smooth. The intercept term is positively related to social capital and economic conditions, and the relationship seems to be linear, particularly for earnings. The relationship with ethnic capital is not as clear cut, possibly being positive at low levels and then negative (or neutral) at higher levels. The correlation between β_1 and these indices is not as strong but would appear, if anything, to be slightly negative. These univariate results suggest that neighbourhoods differ in their value of β_0 , but not so much with respect to β_1 .

A multivariate version of these relationships is presented in Table 7, and confirms this finding. This table offers weighted least squares estimates of the regression of each parameter— β_0 , β_1 , but also the moved once variable, and the moved twice or more variable—against the indices of neighbourhood quality and interactions of them. The regressions are weighted by the number of observations in each cluster. (Thus small neighbourhood clusters with less reliable parameter estimates are given less weight.) Higher values of the indices are associated with larger values of β_0 , most strongly with

economic conditions and least with ethnic capital. (All of these relationships seem to be slightly stronger with respect to the earnings model.) The proportion of the total variance explained by these variables is about 80 to 85%, implying that variation in the β_0 's is closely related to neighbourhood conditions. The partitioning of the CT/PCTs by the Social Capital, Economic Conditions and Ethnic Capital indices is being reflected in the intercept term. Further, the intergenerational elasticities seem to be negatively associated with the neighbourhood indicators. Higher Social Capital, better Economic Conditions, and higher Ethnic Capital seem to reduce the association between parent child incomes. The adult outcomes of individuals coming from lower quality neighbourhoods has a tighter association to their parents' income/earnings than for those from high quality neighbourhoods. Even so the variation of the β_1 's is less closely tied to neighbourhood characteristics than the variation in the β_0 's, with less than 50% of the total variance being explained in the case of market incomes and less than 40% in the case of earnings. Finally, higher social capital seems to attenuate, but not completely eliminate, the negative impact of moving on child incomes. The other variables do not seem to play a role, and with one exception none of the indices are statistically significant for the coefficient associated with the individual moving twice or more. These models fit even less well than the others suggesting that much of the variation in the moves parameter has little to do with neighbourhood quality. Moving has an impact on the long-term prospects of children that is not linked to the quality of the neighbourhood being moved into.

The impact of these results is more clearly illustrated by using them in equation (2). We predict the income advantage of someone living in the cluster with the greatest population relative to each of the other 96 clusters by using the relevant parameter

estimates and setting the income levels to the average incomes in the cluster. We then repeat the calculation three times: once letting only the intercept terms differ between the clusters, once letting only average incomes vary, and finally letting only the intergenerational elasticities vary. In other words, each of the three terms in equation (2) take their predicted value, while the others are set to one. The results are depicted in Figure 2 for market income, and Figure 3 for earnings. In both figures the clusters are ordered by the magnitude of the total effect. Individuals in about 7 clusters obtain less than 80% of the income of those residing in the modal cluster, and those in about 10 are in same situation with respect to earnings. In fact, the individuals from a few neighbourhoods have less than 60% of the income/earnings of the reference case.

Each of the three other lines in the Figures can be interpreted as what the total relative advantage of those in the modal cluster would be if the other two factors played no role. (The product of these three lines equals the total impact.) The first implication is that differences in β_1 between neighbourhoods make little difference to the income advantage of living in any particular neighbourhood. Rather, differences in neighbourhood incomes and differences in β_0 are the major correlates of the differences in child outcomes across neighbourhoods. In the case of earnings the impact of differences in intercepts tracks the total impact very closely with the possible exception of the very bottom and top extremes. Even in these clusters, however, it remains the dominant influence. The disparity in average income between the worse off neighbourhoods and the modal neighbourhood would lead to an earnings difference of only about 10% in the next generation. The fact that children from these neighbourhoods end up earning 20 to 45% less than their counterparts has much more to do with a broader

set of forces than simply the earnings of their parents. A similar conclusion holds for the earnings advantage of those at the top end of the earnings distribution.

In the case of market income it would appear that differences in β_0 are more important in determining the relative disadvantage of those not doing as well as the modal cluster, while income disparities are as important or more important in determining the relative advantage of those doing better, especially those at the very top. A relative market income advantage of 30 to over 50%—as predicted for the top three neighbourhoods—has a great deal to do with the second term of equation (2).¹⁴ This differs from the results for earnings. In an accounting sense relative neighbourhood incomes are more important in characterizing the circumstances of those from well-to-do neighbourhoods because market income can be so much larger than earnings. For example, the parents in the top neighbourhood cluster have an average market income of over \$118,000, and the ratio used in the second term of equation (2) is 3.73. In contrast, the parents in the top earnings cluster have an average earnings of about \$68,000, and the equivalent earnings ratio is 2.61. However, the more substantive implication has to do with the fact that those with substantial market incomes have more avenues to affect an intergenerational transfer to their children. The successful self-employed can transfer an “entrepreneurial” capital to their offspring (Dunn and Holtz-Eakin, 1996). This may include a set of attitudes that encourage self-employment, a set of contacts or networks

¹⁴ In fact, to suggest that differences in β_1 do not matter may be a simplification. The formulation of equation (2) is such that the second term implies that β_1 changes with each comparison being made. This does not seem to make a difference in the analysis of earnings, but it does for some market income clusters. Both differences in income and differences in β_1 are driving the sharp rise in the impact of relative incomes depicted in Figure 1 for the top four or five neighbourhoods. However, reconfiguring equation (2) so that the β_1 in the second term remains constant at the value for the reference neighbourhood leads to a pattern that does not change the substantive conclusion described in the text. (However, the income advantage of the most advantaged individuals is, at slightly over 30%, not as great.)

that reduce the difficulties to self-employment, as well as financial resources that ease financial barriers to pursuing self-employment. In a similar vein, those with significant incomes and assets are in a position to have made an optimal amount of investment in the education of their children. As suggested by Becker and Tomes (1986) this would imply that further investments are made as direct financial transfers so that the children end up having significant levels of assets and derive an income from them. All of these arguments imply that the relative role of neighbourhoods—as reflected in β_0 —is diminished.

Figures 4 and 5 depict the impact on β_0 of our other individual level measure of social capital, experiencing a move. The relative income advantage/disadvantage due to differences in β_0 from Figures 2 and 3 are juxtaposed with an estimate of the first term in equation (2) for individuals experiencing two or more moves. (The results, not shown, for those experiencing one move are the same, but not as great in magnitude.) The reference case throughout is an individual from the modal cluster who did not experience a move as a child. The major conclusion to be drawn from these figures, which is foreshadowed in Table 7, is that residential moves are associated with inferior child outcomes regardless of the quality of the neighbourhood. Someone raised in the modal cluster who experienced two or more moves as a young teen earns about 10% less than his or her counterpart who did not experience a move. This relative disadvantage is roughly the same throughout the distribution of neighbourhoods (the exception being the very top and very bottom clusters). In general, children who have moved are at a disadvantage as adults regardless of to which neighbourhood they moved.

4. Conclusions and Caveats

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Table 1
CHARACTERISTICS OF CENSUS TRACTS AND PROVINCIAL CENSUS TRACTS

	Average	Minimum	Maximum
1. INCOME / AFFLUENCE			
Proportion of Economic Families below the LICO	0.138	0	0.703
Proportion of Census Families with Income above \$40,000	0.163	0	0.866
Average Value of Dwellings	\$72,747	0	\$545,030
2. EMPLOYMENT AND EDUCATION			
Unemployment Rate	7.9	0	43.6
Unemployment Rate of 20 to 24 year olds	12.2	0	100
Proportion of 20 to 24 year olds receiving UI	0.156	0	0.753
Proportion of Population 25+ with a University Education	0.169	0	0.757
Proportion of Population 25+ with Less Than Grade 9 Education	0.257	0	0.710
Proportion of 15 to 19 year olds not attending school	0.316	0	0.924
3. SOCIAL INTEGRATION			
Proportion of Population who are Immigrants	0.160	0	0.713
Proportion of Population who speak a non-official language	0.131	0	0.872
Proportion of Population who are Catholic	0.481	0	1.0
Proportion of Population who are Jewish	0.12	0	0.905
Proportion of Population 5+ who moved since last Census	0.531	0	0.846

Note: Total Sample size is 4,967 Census Tracts and Provincial Tracts from the 1981 Census, consisting of 3,185 Census Tracts and 1,782 Provincial Census Tracts. The total population varies from 262 to 20,483 with an average of 4,833. All dollar values are based on 1981 information.

Table 2
RESULTS FROM THE FACTOR ANALYSIS OF NEIGHBOURHOOD CHARACTERISTICS

	Social Capital	Economic Conditions	Ethnic Capital
1. INCOME / AFFLUENCE			
Proportion of Economic Families below the LICO	-0.558	0.408	0.256
Proportion of Census Families with Income above \$40,000	0.876	-0.204	0.110
Average Value of Dwellings	0.640	-0.277	0.396
2. EMPLOYMENT AND EDUCATION			
Unemployment Rate	-0.263	0.857	-0.138
Unemployment Rate of 20 to 24 year olds	-0.043	0.815	-0.167
Proportion of 20 to 24 year olds receiving UI	-0.325	0.484	-0.385
Proportion of Population 25+ with a University Education	0.801	-0.196	0.198
Proportion of Population 25+ with Less Than Grade 9 Education	-0.694	0.567	0.103
Proportion of 15 to 19 year olds not attending school	-0.587	0.003	0.039
3. SOCIAL INTEGRATION			
Proportion of Population who are Immigrants	0.158	-0.353	0.803
Proportion of Population who speak a non-official language	-0.123	-0.269	0.813
Proportion of Population who are Catholic	-0.229	0.530	-0.145
Proportion of Population who are Jewish	0.315	0.036	0.302
Proportion of Population 5+ who moved since last Census	-0.012	0.380	-0.174
Variance Explained by each Factor	3.329	2.904	1.933

Note: Table entries are Factor Loadings from....

Table 3
DESCRIPTIVE CHARACTERISTICS OF NEIGHBOURHOOD CLUSTERS

	Average	Standard Deviation	Minimum	Maximum
Total Population per Cluster	240,050	458,331	609	2,239,280
Total 15 to 19 year old Populaton per Cluster	22,987	44,245	58	217,101
Number of CT/PCTs per Cluster	49.7	89.2	1	454
Social Capital	0.410	1.759	-2.557	5.283
Economic Conditions	0.582	1.315	-2.690	5.365
Ethnic Capital	0.956	1.394	-1.724	4.492

Table 4
DESCRIPTIVE STATISTICS OF PARENT CHILD DATA USED IN THE REGRESSION ANALYSIS

	Market Income					Earnings				
	Average	Median	Standard Deviation	Minimum	Maximum	Average	Median	Standard Deviation	Minimum	Maximum
	Number of observations = 849,662					Number of observations =750,534				
Child's 1995 Income	22,606	20,764	66,757	1,000	58,297,015	22,458	21,178	17,329	1,000	3,692,884
Average Parental Income ¹	41,323	36,897	39,829	1,000	8,105,157	36,019	34,253	24,659	1,000	1,945,390
Log(Child's Income)	9.756	9.941	0.810	6.908	17.881	9.773	9.961	0.793	6.908	15.122
Log(Parents' Income)	10.394	10.516	0.746	6.908	15.908	10.245	10.441	0.819	6.908	14.481
Daughter	0.431			0	1	0.436			0	1
Single Parent Family	0.120			0	1	0.115			0	1
Number of Children ²	2.560			1	19	2.546			1	19
Moved Once	0.161			0	1	0.164			0	1
Moved Twice or More Often	0.055			0	1	0.056			0	1
Moved Once*Parent Income	1.670			0	14.5	1.681			0	14.2
Moved Twice*Parent Income	0.561			0	15.3	0.568			0	14.5
Child's Age	30.6		1.1	29	32	30.6		1.1	29	32
Child's Age Squared	936		67	841	1,024	935		67	941	1,024
Parents' Age ³	48.2		6.6	28	72	47.9		6.5	28	72
Parents' Age Squared	2,363		653	784	5,184	2,343		642	784	5,184
Social Capital	0.064	-0.124	0.902	-2.864	5.284	0.075	-0.110	0.896	-2.864	5.284
Economic Capital	-0.076	-0.242	0.868	-2.734	5.603	-0.077	-0.239	0.865	-2.734	5.603
Ethnic Capital	-0.086	-0.313	0.901	-1.778	4.784	-0.078	-1.778	0.905	-0.302	4.784
Observations per Cluster	8,582	1,604	16,587	14	79,932	7,581	1,469	14,507	13	70,004

Notes: (1) Income from both parents averaged over 1978 to 1982. (2) Number of Children present in the Household. (3) Age of the eldest parent.
The moved variables are defined as any residential move between 1978 and 1982.

Table 5
INTERGENERATIONAL INCOME AND EARNINGS MOBILITY FOR CANADA: LEAST SQUARES ESTIMATION RESULTS

	Market Income				Earnings			
	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]
Constant	9.795	9.955	9.952	9.959	9.801	9.972	9.967	9.969
Log(Parents' Income)	0.163	0.187	0.148	0.146	0.115	0.118	0.0849	0.0842
Daughter		-0.352	-0.356	-0.357		-0.348	-0.354	-0.355
Single Parent Family		0.0983	0.0624	0.0608		0.0192	-0.00947	-0.0103
Number of Other Siblings		-0.00485	-0.00265	-0.00221		-0.00705	-0.003645	-0.00352
Moved Once		-0.0223	-0.0380	-0.0386		-0.0215	-0.0419	-0.0417
Moved Twice or More Often		-0.0619	-0.0799	-0.0804		-0.0606	-0.0844	-0.0844
Moved Once*Parent Income		-0.00424	0.00432	0.00617		0.00184	0.00843	0.00909
Moved Twice*Parent Income		-0.0148	-0.00278	-0.000698		-0.00497	0.00399	0.00477
Social Capital			0.0480	0.0380			0.0550	0.0542
Economic Capital			0.0501	0.0445			0.0699	0.0702
Ethnic Capital			0.0413	0.0380			0.0474	0.0462
Proportion Rural				-0.0251				-0.00718
Population of Cluster				-0.000903				-0.00188
R ²	0.0226	0.0725	0.0800	0.0801	0.0140	0.0649	0.0776	0.0777
Number of Observations		849,662				750,534		

The dependent variables are the natural logarithms of total market incomes and earnings of children in 1995, at the age of 29 to 32. All dollar values are measured in 1986 constant dollars using the CPI as the deflator. The models also include the age and age squared of the child (in 1995) and the eldest parent (in 1982). Standard errors are calculated to be robust to heteroscedasticity, with shading indicating that an estimate is NOT statistically significant, having a p-value greater than 0.05.

Table 6
SUMMARY OF ESTIMATED PARAMETERS FROM LEAST SQUARES ESTIMATION AT THE NEIGHBOURHOOD LEVEL

	Mean	Minimum	5 th Percentile	25 th Percentile	Median	75 th Percentile	95 th Percentile	Maximum
1. Market Income								
Constant (β_0)	9.950	9.477	9.662	9.872	9.955	10.028	10.213	10.346
Intergenerational Elasticity (β_1)	0.154	-0.028	0.043	0.118	0.148	0.173	0.289	0.469
Moved Once	-0.055	-0.528	-0.316	0.078	-0.040	-0.012	0.126	0.561
Moved Twice or More Often	0.025	-0.637	-0.342	-0.122	-0.079	0.003	0.322	6.121
2. Earnings								
Constant (β_0)	9.969	9.443	9.629	9.872	9.990	10.054	10.279	10.367
Intergenerational Elasticity (β_1)	0.085	-0.370	-0.011	0.059	0.084	0.110	0.230	0.542
Moved Once	-0.056	-0.779	-0.304	-0.087	-0.041	0.003	0.130	0.466
Moved Twice or More Often	-0.008	-0.881	-0.434	-0.144	-0.084	-0.027	0.286	7.105

Table entries are descriptive statistics of the estimated least squares coefficients for 97 neighbourhood clusters.

Table 7
SECOND STAGE LEAST SQUARES ESTIMATION RESULTS OF INTERGENERATIONAL PARAMETERS

	Market Income				Earnings			
	β_0	β_1	Moved Once	Moved Twice	β_0	β_1	Moved Once	Moved Twice
Constant	9.967	0.157	-0.048	-0.071	9.975	0.099	-0.055	-0.066
Social Capital	0.027	-0.012	0.014	0.007	0.037	-0.010	0.021	0.006
Economic Conditions	0.060	-0.018	-0.005	-0.021	0.078	-0.022	-0.005	-0.021
Ethnic Capital	0.012	-0.007	0.001	-0.004	0.026	-0.010	0.001	-0.009
Social * Economic	0.001	-0.009	0.001	-0.008	-0.003	-0.001	0.006	-0.005
Social * Ethnic	0.002	0.008	0.002	0.000	0.004	0.001	-0.002	0.003
Economic * Ethnic	0.009	-0.007	-0.004	-0.010	0.004	-0.002	-0.001	-0.005
Proportion Rural	-0.058	-0.029	0.033	-0.011	-0.28	-0.048	0.053	-0.046
Population of Cluster	-0.005	0.009	0.000	0.012	-0.006	0.009	-0.002	0.009
R ²	0.791	0.385	0.159	0.048	0.849	0.469	0.24	0.06
Number of Observations	97				97			

The dependent variables are parameter estimates from the least squares model of intergenerational mobility at the neighbourhood cluster level. Table entries are regression results from weighted least squares, with shading indicating that the p-value is less than 0.05 and **bold** with shading indicating a p-value less than 0.01.

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
niveaux de vie*

The National Child Benefit: Another Hiccup or Fundamental Structural Reform?

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Session 4 Sustainability II: Intergenerational Bequests and the Well-being of Children
October 30 2:15 PM - 4:15 PM

**The National Child Benefit:
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*Presentation at the Conference on the State of Living
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*by
Ken Battle*

For an initiative touted as a major advance in Canadian social policy, the National Child Benefit has made scarcely a ripple in the public consciousness. The relatively few media stories have portrayed the reform at best as an incremental improvement and at worst as a slap in the face of welfare families. Social groups and children's advocates for the most part have panned the new child benefit as inadequate if not pernicious.

Certainly the new social policy's announcement in the 1997 federal Budget left budget-watchers puzzled. One reason was the Finance Department's ill-considered decision to phase in the Canada Child Tax Benefit over two years (1997 for working poor families, though it was still called the Child Tax Benefit/Working Income Supplement, and 1998 for other families) in an arcane fashion that few outside policy-making circles could fathom.

Confusion and suspicion were fuelled by new, more complicated terminology. The 'National Child Benefit System,' as it is formally titled, is a joint federal-provincial/territorial undertaking. The federal component is called the Canada Child Tax Benefit, not to be confused with its predecessor the Child Tax Benefit. The provincial/territorial components of the National Child Benefit are a broad variety of differing initiatives to assist low-income children and families.

Increased spending is being concentrated on poor families, as one would expect from an anti-poverty initiative. However, the Canada Child Tax Benefit also serves the majority of non-poor families in the same way as did its predecessor, the Child Tax Benefit. Small wonder that most reporters gave up and, if they bothered to mention the measure in their accounts of the Budget, simply characterized it as an incremental and unimpressive increase in federal child benefits.

On the face of it, the National Child Benefit might appear to offer only a modest contribution to the well-being of Canadian children – and only a minority of children at that. Ottawa's initial investment of \$850 million increased federal child benefit expenditures by only 16.7 percent (from \$5.1 billion to \$5.95 billion). Critics were quick to point out that such a sum pales in comparison with the recent \$6 billion cut to federal

social transfer payments to the provinces. When the new Canada Child Tax Benefit came into effect in July 1998, low-income families not on welfare – i.e., mainly the working poor and those receiving Employment Insurance – saw relatively small gains in their federal child benefits, especially small families (the large majority these days). Increases ranged from \$105 for families with one child (a 6.9 percent increase over the previous Child Tax Benefit/Working Income Supplement) to \$510 for two children (a 20.1 percent increase), \$840 for three children (23.1 percent more) and \$1,170 for four children (a 24.7 percent increase).

The aspect of the National Child Benefit especially upsetting to welfare rights groups is that social assistance families with children generally will not see an increase in their incomes. On the one hand, like other low-income families, welfare families receive an increase in federal child benefits. Indeed, welfare families' gains in *federal* child benefits exceed those of working poor families (because the latter used to receive the Working Income Supplement, over and above the basic Child Tax Benefit, whereas welfare families got only the Child Tax Benefit). Federal child benefits for welfare families with one child increased by \$605 or 59.3 percent as of July 1998, for two children by \$1,010 or 49.5 percent for two children, by \$1,340 or 24.7 percent for three children and by \$1,670 or 39.5 percent for four children.

On the other hand, under the terms of the federal-provincial/territorial National Child Benefit System agreement, the provincial and territorial governments can reduce welfare expenditures on children by the amount of the increase in federal child benefits. The proviso is that such savings are to be 'reinvested' in other programs and services for low-income families with children (such as income-tested child benefits, earnings supplements, child care, early childhood development, supplementary health care and training). Accordingly, all provinces and territories, except New Brunswick and Newfoundland, have reduced their basic social assistance benefits on behalf of children.

The overall effect on welfare families is meant to be neutral, so that welfare families will see no increase in their overall amount of their child benefits; the only difference is that their federal child benefits are going up and their provincial/territorial child benefits should be going down by an equal amount. No family on welfare is supposed to experience an increase and certainly not a decrease in their total income. However, two provinces did not follow this formula: New Brunswick and Newfoundland decided to pass through the increase in child benefits (at least in the first phase of the Canada Child Tax Benefit) arguing that their welfare benefits are substantially lower than other provinces.

Social groups' initial response to the 1997 Budget announcement was to castigate the National Child Benefit as too little and too targeted to the working poor. However, the 1998 federal Budget announced a second \$850 million installment on the National

Child Benefit, raising federal child benefit expenditures to \$6.8 billion. This second increase will be phased in between 1999 and 2000.

The forthcoming 1999 federal Budget will announce the details of how this second \$850 million increase in the Canada Child Benefit is to be implemented. Depending on the particular design chosen, we are looking at an increase in the maximum Canada Child Tax Benefit in the order of \$340 per child for the second phase. Assuming \$340 more per child, the Canada Child Tax Benefit for a working poor family with two children would increase from \$3,050 to \$3,730 – \$1,190 or 47 percent more than what they used to get from the Child Tax Benefit/Working Income Supplement (\$2,540). An increase of close to 50 percent is nothing to sniff at, though as we note later, it still cannot make a large dent in the poverty gap and will have little impact on the poverty rate.

Welfare families will receive the same amount from the second-phase Canada Child Tax Benefit as the working poor, but will enjoy a larger increase – \$1,690 or about 80 percent over their Child Tax Benefit – since they did not qualify for the Working Income Supplement under the old system. Again, though, welfare families' provincial/territorial social assistance benefits on behalf of their children will be reduced dollar for dollar (the money being redirected to other programs for low-income families with children), leaving them no farther ahead in terms of net income even after the second round of investment in the National Child Benefit. (Whether New Brunswick and Newfoundland decide to deduct the federal increase from their welfare child benefits or pass through the second phase of the Canada Child tax Benefit to welfare families remains to be seen.)

How families fare in terms of the provincial/territorial reinvestment will vary considerably from province to province and, to some extent, according to families' major source of income (i.e., welfare or other). In some provinces, working poor families will see an increase in income from new provincial income-tested child benefits and/or earnings supplements and/or will benefit from income-in-kind from the extension to them of supplementary health benefits. Some families will benefit from increased provincial investment in child care or early childhood services. The amount and distribution of these provincial reinvestments by family income source, family type and other characteristics will vary from jurisdiction to jurisdiction and will be an important issue for evaluation and for monitoring by social groups.

So the amount of increased income to the working poor from the National Child Benefit's first two phases will be welcome but not overwhelming. Welfare families likely will not experience an increase in their income, unless they live in the few provinces that have decided to pass through the federal increase (more precisely, the first phase; what they choose to do in the second phase has yet to be seen). The net impact of the National Child Benefit overall – i.e., not just the federal Canada Child Tax Benefit but

also the provincial/territorial reinvestments – will vary according to province/territory and various family characteristics and will not be known until after evaluators have investigated the changes. Little wonder that the reaction so far generally has been ho-hum. Little wonder – except that this reaction completely misses the point.

To understand the real implications of the National Child Benefit, the reform must be analysed in the context of the longer term development of the Canada's security system, and not simply as a stand alone, one-time program change. It has to be seen as a cornerstone *structural* change in the way we organize social security in Canada, marking a critical turning point in the evolution of our system. When the National Child benefit is understood in this broader context, we argue that it promises to become one of the key social reforms of the last few decades, one that could, over time, provide the basis for a substantial material improvement in the well-being of the low- and middle-income majority of Canadian families with children. At the same time, it will improve the fairness of the overall system and help tear down barriers currently preventing many families on social assistance from improving their incomes. Indeed, the National Child Benefit's importance extends beyond child poverty and income security policy to social policy more broadly and, no hyperbole intended, the future of federalism.

The authors have written extensively on the subject of child benefits and their various reforms over the years, including our comprehensive 1997 report *Child Benefit Reform in Canada: an evaluative framework and future directions* [Battle and Mendelson 1997]. Here, we focus on two fundamental issues: why we view the National Child Benefit as a major structural change to Canada's welfare state, and what it will take to nurture and grow the new-born initiative into a mature child benefit that will function as a *de facto* 'guaranteed income' for children.

A structural problem: the welfare wall

Contrary to popular mythology, Canada's social security system was not constructed according to the carefully crafted designs of the architects of the modern universalist welfare state, most notably the great Leonard Marsh of McGill University (the Canadian counterpart to Britain's Lord Beveridge). Instead, it grew by fits and starts, mainly in the 1960s and 1970s rather than in the immediate postwar period, blending old and new conceptions of social welfare and their attendant contradictions and tensions – not unlike Canada itself. Pieces were added from time to time and, despite several high-profile and generally unsuccessful attempts at grand reform (most notably the comprehensive 1974 federal-provincial social security review lead by the then federal Minister of Health and Welfare, Marc Lalonde), did not always fit well together, in no small part because responsibility for social policy in this country is divided between the federal and provincial governments to an extent undreamed of in most federations.

Child benefits are one of the loose ends of Canada's messy approach to social policy. (By child benefits, we mean government programs that provide cash benefits, directly by means of cheques or indirectly by means of income tax reductions, to families with children.) Over the years, a two-tier federal-provincial system of child benefits emerged.

The federal government got into the child benefits game at the dawn of the modern welfare state during the First World War when it created the children's tax exemption in the second year of the new personal income tax system, 1918. World War Two brought Family Allowances, a cash payment to families at all income levels (paid to mothers, initially) on behalf of children. The late 1970s introduced the refundable child tax credit, a tax-delivered benefit for low- and middle-income families with children. The 1980s brought a series of significant changes under the Mulroney government, culminating in the 1993 income-tested Child Tax Benefit that is parent to the Liberals' 1998 Canada Child Tax Benefit. (Unchanged by the current reform is the equivalent-to-married non-refundable tax credit, providing income tax savings equal to those from the married credit for single-parent families.)

Meanwhile, a separate tier of child benefits arose in the form of provincial social assistance (i.e., welfare) systems, which provide income security benefits for children as well as adults. In addition to welfare-delivered child benefits, a few provinces have offered income-tested child benefits, and Quebec maintained a universal child benefit.

Prior to the National Child Benefit, welfare-delivered child benefits totalled an estimated \$2 billion (equal to about 40 percent of the budget for the federal Child Tax Benefit). Welfare benefits for children ranged in most provinces between about \$1,200 and \$1,800 per child per year for basic needs (excluding shelter costs), though a few provinces were below or above this range. This figure does not include other child-related welfare benefits such as special allowances (e.g., winter clothing allowances), in-kind benefits (such as supplementary health and dental care and prescription drugs) and housing subsidies.

Depending on their major source(s) of income, low-income families received significantly different amounts of child benefit. Welfare families got the federal Child Tax Benefit and provincial welfare benefits on behalf of their children. Except in a few provinces, other low-income families not on welfare received only federal child benefits: Working poor families got the basic Child Tax Benefit and up to \$500 per family from the Working Income Supplement, while Employment Insurance families received only the Child Tax Benefit (though they might qualify for the Working Income Supplement if they had sufficient employment earnings).

Welfare families got up to double or more the amount of child benefits as working poor families, the ratio varying according to the amount of each province's welfare-delivered child benefits. For example, before BC replaced its welfare program's child benefits with the pioneering BC Family Bonus (an income-tested child benefit paid to low- and modest-income families regardless of their work status), a welfare family with two children 7 and 11 got \$4,512 (\$2,040 from the federal Child Tax Benefit and \$2,472 from provincial welfare) – 1.8 times a working poor couple's \$2,540 in federal child benefits. Using a rough national average of \$1,500 per child in provincial child benefits, a welfare family with two children (one under and one over age 7) got \$5,253 in combined federal-provincial payments or almost twice as much (1.9 times) as a same-size working poor family's federal child benefits of \$2,753.

This marked differential in child benefits contributed to what the Caledon Institute of Social Policy called 'the welfare wall' in a study of the interaction of Ontario's welfare system and the tax system. The term was inspired by a graph illustrating the high marginal tax rates facing welfare recipients if they try to supplement their social assistance benefits with outside earnings - the major (though not sole) cause being the high welfare tax back which reduces benefits dollar for dollar of earnings above a relatively low level of exempt earnings [Battle and Torjman 1993].

Caledon later applied the concept of 'the welfare wall' to the child benefits system to illustrate its contribution to the barriers standing in the way of people on social assistance who want to get off. A parent moving from welfare to the workforce loses thousands of dollars in cash; usually loses in-kind child benefits provided by welfare; can incur significant employment-related expenses (e.g., clothing for work, transportation and child care); and has her (more than likely low) wages reduced by Canada/Quebec Pension Plan contributions, Employment Insurance premiums and federal (and, in some provinces, provincial) income taxes. Note that we are *not* saying that two-tier child benefits are the only or even necessarily always the most important part of the welfare wall. Other major barriers – notably the lack of affordable child care and decent jobs, and the loss of in-kind welfare benefits (supplementary health and dental care especially) – also make it hard for many families with children to get off welfare.

The issue of barriers to work was a compelling argument to governments – the provinces in particular, which under the new CHST no longer receive federal cost sharing for welfare – of the need for fundamental reform of federal-provincial child benefits. To the extent that a new child benefit system could reduce barriers and increase incentives to find work (and keep working) in the paid labour force, it might help reduce welfare caseloads and the attendant costs.

But there is an equity consideration as well. Though social groups typically characterize welfare recipients as 'the poorest of the poor,' this is not always the case, at

least not in economic terms (there is no question that the stigma that always has been attached to welfare often imposes harsh social and psychological costs). Some working poor families end up with a lower disposable income than those on welfare, though of course others (depending on the relative levels of welfare and wages) have somewhat more. More to the point, though, is the inherent unfairness of a child benefits system that pays some poor families half the amount of other poor families, the categorical test being whether they are on welfare (in which case they get more) or not (in which case they get substantially less).

One structural solution: an integrated child benefit

All the major studies of the social security system that have most influenced Canada – the Beveridge Report, the Marsh Report, the Castonguay-Nepveu Report – have recognized that there is a fundamental problem in the relation between employment compensation and the income requirements to raise a family. Even with full employment and a good minimum wage, it is not realistic to expect low-income earners to earn enough to support a family, let alone a large family. Yet the basic social safety net program (i.e., what we call ‘welfare’) has to pay benefits sufficient to sustain a family. This means that low-income earners might be better off to go onto the safety net program, and hence could be deprived of their basic human right to raise a family in dignity, with full participation in community life, through their own effort.

The solution recommended by these studies was some form of child-related payment to all low-income families regardless of whether they are working or not. In practice, though, governments found it impossible to provide universal child benefits large enough to accomplish both fundamental goals of child benefits – helping to meet the basic costs of child-rearing for low- and modest-income families and assuring horizontal equity for all families vis-à-vis childless families and individuals with the same earnings – because of the large budget costs involved. In fact, to limit expenditures, Quebec’s influential Castonguay-Nepveu report recommended a mixed universal and income-tested system, with the income-tested tier being large enough to allow the child-related benefits in the welfare system to be completely replaced. But until the coming of the federal refundable child tax credit in 1979, the technical capability did not exist to deliver a large income-tested child benefit through any system other than welfare. In fact, Saskatchewan’s early experiment with its Family Income Supplement Plan may have floundered largely on the province’s incapacity to develop an acceptable income-testing mechanism.

Over the years, a hodge-podge of child benefits developed at both the federal and provincial levels. Some were direct spending programs (e.g., Family Allowances and welfare) and others were tax-delivered (such as the children’s tax exemption, non-

refundable child tax credit and refundable child tax credit). But the largest per family child benefits were embedded in welfare programs – because it was welfare programs that were charged with the responsibility of ensuring that children really did have the basics of food, clothing and shelter. A two-tier child benefits system favouring welfare families resulted; welfare families received both federal and provincial (welfare-delivered) child benefits, while working poor families typically got federal child benefits only. Low-income working families, as warned in all the major studies and proven by experience, thus found themselves in many cases worse off financially than if they were on welfare.

One response to this core dilemma of social security has been to tack on yet another social program, in this case meant to ‘close the gap’ between welfare and working poor families with children, by providing a special program providing child benefits only to families in the paid labour force. For example, the US Earned Income Tax Credit pays benefits only to the working poor. Perhaps in consequence, American working poor families with children now get substantially *more* than those on welfare. In (pale) imitation of the US Earned Income Tax Credit, Canada’s federal Working Income Supplement (part of the 1993 Child Tax Benefit) provided benefits for the working poor only, excluding those on welfare, to address the child benefits gap between welfare families and the working poor. But the Working Income Supplement was short-lived and we ended up taking a different route – the National Child Benefit.

The National Child Benefit is founded on the concept of an ‘integrated child benefit.’ An integrated child benefit provides a common level of child benefits equally to all low-income families in a stand-alone program separate from welfare or social insurance. Ideally, Ottawa and the provinces would combine all their various income benefits and tax expenditures on behalf of children into a single income-tested system or program. We distinguish between system and program because an integrated child benefit could be delivered either as one big-bang federal program or as separate federal and provincial programs that mesh together in a coordinated system. The latter, asymmetrical approach is being followed for the National Child Benefit, at least for the immediate future, as several jurisdictions (to date the Northwest Territories, BC, Saskatchewan and Quebec) are replacing their welfare child benefits with income-tested child benefits paid to all low-income (and in some cases modest-income) families.

The concept of an integrated child benefit calls for a common level of child benefit for purposes of fairness, income security and to avoid barriers to work. The principle of horizontal equity, normally associated with middle-income and upper-income families, also should apply to low-income families: The amount of child benefits to which a low income family is entitled should depend only upon the *amount* of income the family has, not upon the *source* of that income. Child benefits thus should be ‘portable,’ to borrow a term from pension terminology, providing a stable and assured source of income for eligible families regardless of where they live and work (or are not presently working,

in the case of many families receiving Employment Insurance or welfare) and whatever their pattern of movement in and out of the workforce. To avoid barriers to work, low-income families in the workforce should receive the same amount of child benefits as low-income families on Employment Insurance and social assistance.

The National Child Benefit promises – we emphasize ‘promises,’ since there is a long way to go yet – to make a major improvement in the architecture of Canada’s social security system. To do so, the Canada Child Tax Benefit must first, and quickly, be raised to the level where it will replace basic welfare benefits made on behalf of children. This amount has been estimated to be about \$2,500 per child as a rough national average. After it reaches that crucial level, all future increases to the Canada Child Tax Benefit would be result in improvements in net income for *all* low-income families, whether they are on welfare or are working – because there would no longer be any welfare child benefits for the provinces to decrease. We estimate that it would cost Ottawa in the order of another one billion dollars (i.e., over and above the \$1.7 billion increase already committed to the first and second phases) to raise the Canada Child Tax Benefit to the \$2,500 level. In total, a \$2,500 Canada Child Tax Benefit would cost some \$7.8 billion – a not unreasonable amount in the grand scheme of federal expenditures given that it would achieve a lasting legacy of structural reform to Canada’s social security system. Incidentally, Ottawa spent \$6.9 billion (in constant 1998 dollars) on child benefits in 1984, which just under \$1 billion off the cost of a Canada Child Benefit that would fully displace welfare child benefits!

After the \$2,500 target is achieved, the second stage gradually would increase the Canada Child Tax Benefit to pay the necessary costs of raising a child for low-income families. Our conservative, tentative estimate is a maximum benefit of about \$4,000 per child, although further study of current child-rearing costs is needed to determine the actual amount.

A \$4,000 Canada Child Tax Benefit finally would realize the dream of social reformers of the first part of this century to help fill the gap between wages and family income needs, since many Canadian parents could not then – and still cannot – earn a living wage to properly support their children. It would begin the vital task of structurally reforming the welfare system and would provide a sound basis for the future development of our income security system. At \$4,000, a mature Canada Child Tax Benefit also would make a very substantial dent in the extent of poverty among families with children in Canada.

Our vision of a fully developed child benefit certainly would require a substantial commitment of funds. We have not formally costed out any options. It is unlikely, however, that the cost would exceed more than another \$3 to \$5 billion, depending upon the option chosen (especially the extent to which child benefits are restored for non-poor

families). The total cost of such a mature child benefit would range between \$11 and \$13 billion in today's dollars. This is a large amount but, if a government has the will to do so, it is not outlandish: Ottawa currently spends \$23 billion on cash benefits for low- and middle-income seniors (\$4.8 billion on the Guaranteed Income Supplement and \$386 million on the Spouse's Allowance programs for low-income seniors as well as \$17.7 billion on the now income-tested Old Age Security program which serves lower- and middle-income seniors).

To put the amount in yet another perspective, the Ontario government spent somewhere in the neighbourhood of \$6 billion annually just for that province alone in income tax cuts (benefitting mainly the wealthy), the equivalent to roughly \$15 billion nationally. Certainly if one were looking for a large income tax cut that would be progressive in its impact, do a great deal of social good, help tie the country more firmly together and be helpful to the vast majority of Canadian families, it would be hard to do better than an increase in the Canada Child Tax Benefit to the neighbourhood of \$4,000.

We should see the Canada Child Tax Benefit as building a platform that can be raised in future to build an adequate child benefit system that fully meets the essential needs of children in lower-income families. In so doing, a mature National Child Benefit would constitute a major missing pillar of the welfare state – the rationale for which is no different and no less pressing today than over half a century ago.

None of this is to say that the National Child Benefit is a panacea for the ills of the nation, or even for the poverty of far too many families in Canada. No child benefit alone – however well designed and funded – could or should be expected to meet all the diverse needs of lower-income families. That is why we titled this section “one structural solution”.

A child benefit cannot be expected to solve the problem of adult poverty. Governments also must strengthen other social and employment supports and services for parents and families, such as training and employment development services; child care, family support and early childhood development services; adequate minimum wages, Employment Insurance and welfare benefits for adults (or, hopefully, a replacement for adult welfare); higher thresholds for tax payments so that poor people do not have to pay income tax; and geared-to-income relief from regressive payroll taxes.

But a strong child benefit would enable such other programs to operate more effectively, since families would have better and to some extent more stable incomes and thus would be less vulnerable to the often unhealthy stress created by the daily struggle to make ends meet. Research shows that stress is a significant factor in low-income Canadians' above-average susceptibility to a wide range of physical and mental illnesses and social problems.

By ‘removing children from welfare,’ an unfortunate turn of phrase that may have clouded more than clarified matters, the National Child Benefit could advance the long-needed task of dismantling the welfare system as we have known it and replacing it with something better. Obviously children will not be ‘removed from welfare’ literally, unless (as governments hope) the National Child Benefit helps their parents move from welfare to work. However, replacing needs-tested welfare child benefits with income-tested child benefits substantially will reduce welfare caseloads (children make up more than one-third of all welfare recipients) and costs and thus take a big step forward to returning welfare to the residual, emergency, last-resort program it originally was intended and designed to be.

The vexing issue of differential child benefits

No discussion of the emerging National Child Benefit, for or against, can fail to deal with its harshest criticism from welfare rights groups and other social advocates. The critics contend that the reform discriminates against welfare families because they will see no net increase in their child benefits, whereas the working poor and other low-income families not on welfare (e.g., those on Employment Insurance) will enjoy an improvement.

Some critics have gone to far as to claim that the Canada Child Tax Benefit will be restricted to the working poor and will not go to welfare families. This allegation is false and stems from confusion between receipt of benefits and the impact of reform. The Canada Child Tax Benefit goes to all low-income families (including those on welfare) as well as modest-income, middle-income and upper-middle-income families. Overall, eight in ten families with children receive some benefits. Indeed, because the Canada Child Tax Benefit continues its predecessors’ (the Child Tax Benefit and refundable child tax credit) practice of basing benefits on net rather than gross family income, non-poor families receive substantially more benefits than their income otherwise would indicate and the program provides partial benefits high up the income scale [Battle and Mendelson 1997: 74-77].

As discussed above, families on welfare will receive the Canada Child Tax Benefit, but it will not increase their *net* child benefits. The federal and provincial governments justify this differential treatment as necessary to provide non-welfare families equivalent child benefits to those on welfare, so as to achieve the first objective of an integrated child benefit – ending the distinction between welfare children and other low-income children by treating welfare families the same for child benefit purposes as working poor and other low-income families through delivering their child benefits outside of welfare. In other words, an integrated child benefit must treat all low-income

families with children equally.

The criticisms from social advocates probably could have been avoided, and instead been converted to universal plaudits, if governments had instead undertaken a ‘big bang’ reform and replaced welfare child benefits with an income-tested system paying larger benefits to *all* low-income families, including those on social assistance, all at once. In this case, the National Child Benefit would have been seen as replacing provincial payments with federal payments for all children equally. Rightly or wrongly, the decision was made instead to phase in increased payments under the National Child Benefit over several years. The reasons for the multi-year phase-in were both financial and political.

On the financial side, cost considerations were a serious restraint. It is federal money that is driving the National Child Benefit, and the \$1.7 billion investment committed so far is no small change in the deficit-chilled atmosphere of Ottawa – which likely will thaw slower than hoped due to the cold winds swirling around the global economy.

The political factor involves the agreement (political, not legal) that underlies the National Child Benefit System. The provinces will redirect savings from welfare child benefits (resulting from increases in the federal Canada Child Tax Benefit) to other programs and services for low-income families with children. Trust between the two orders of government is a scarce commodity in the 1990s. By delivering its additional funding in installments (two so far, with a third required to complete the first stage of development and fully displace welfare child benefits), Ottawa not only sees itself as acting prudently in financial terms. Ottawa also wants proof that the provinces will fulfill their part of the bargain. The phased increases and reinvestment agreement constitute a sort of soft form of conditional federalism.

Given these financial and political realities, the result has been the current phased approach to the National Child Benefit. One of the consequences of this approach has been to open the governments to criticism for not ‘passing on’ the benefit to welfare recipients. Even then, some of these criticisms have not been fully valid.

First, is there any assurance that ‘passing through’ the increased federal benefit will in the long run really mean an increase for welfare recipients? Even if welfare families were allowed the full increase in federal child benefits with no immediate reduction in their welfare payments (as has been done in New Brunswick and Newfoundland), it is not at all certain that they will keep the money in the longer run. What is to stop the provinces from adjusting their welfare benefit structure over the next several years? Over time, provinces could capture some of the extra federal money through stealth by delaying or foregoing increases to welfare rates or, as is increasingly

the way these days, by reducing rates or making other belt-tightening changes to the welfare system (e.g., cutting special benefits and reclassifying recipients). Indeed, it is probably naive to think that governments will simply ignore the existence of federal money being paid to recipients when decisions are made about rate levels.

Second, it is not correct to portray the provinces as taking money away from children. So long as the provinces genuinely reinvest their savings from welfare expenditures on children into programs for all low-income families with children, the same amount of money will go into programs for poor families with children - regardless of whether the increased benefit is passed on to welfare recipients. The difference is how the extra money is spent: The new money can finance improved (non-welfare) income programs and services for low-income families with children if the child benefit increase is not passed through to welfare recipients and is instead fully reinvested in true incremental spending by provinces. Or the money would increase welfare benefits if the child benefit were passed through to welfare recipients. While some social groups still would prefer the latter, the point is that the former is *not* a reduction in spending on children.

Admittedly, the 'reinvestment agreement' by which the provincial governments are supposed to reallocate welfare savings to other programs for low-income families with children cannot prevent provinces from using the extra money to offset what they would have spent anyway. BC, for example, financed its pioneering Family Bonus a year before the National Child Benefit System came along and has chosen to use the increased federal benefits from the Canada Child Tax Benefit to recoup some of its costs. The boundaries of what constitutes acceptable provincial reinvestment are deliberately vague and loose. However, given a sound evaluative framework, publicly accessible and adequate data, and a substantive monitoring role for social groups, there is a better chance of preventing erosion in expenditures on reinvestments in programs for low-income families with children than on welfare. At least the provinces have agreed to keep their welfare savings within the expenditure envelope for low-income families with children.

Furthermore, although the National Child Benefit will not increase child benefits for welfare families during this stage, income is not the only measure of gain. We would argue that welfare families still stand to gain in other ways.

The loss of welfare child benefits is not the only barrier to employment but it can be a significant one, amounting to thousands of dollars in lost income. Parents on welfare who are able to find a job at least can count on continuing to receive the Canada Child Tax Benefit and provincial child benefits (in provinces that provide them). If they lose their job and have to apply for Employment Insurance or (in the increasingly likely event that they do not qualify for EI) welfare, at least their child benefits will remain unchanged and secure.

The Canada Child Tax Benefit and the new income-tested provincial child benefits carry none of the cardboard suitcase baggage of stigmatizing welfare. Income-tested social programs are delivered anonymously and impersonally, eligibility being determined on the basis of income as reported on the income tax return rather than assessed through the intrusive needs test used by welfare. The Canada Child Tax Benefit is a broad based social program serving the large majority (85 percent) of Canadian families with children, including middle-income and some upper-income families. Welfare families will be included in a program that crosses class lines, not excluded and marginalized.

In fact, the inclusiveness of the Canada Child Tax Benefit – treating all low-income families alike and not pigeon-holing some as the ‘deserving poor’ while others are by implication labelled the ‘undeserving poor’ – is one of the reform’s greatest advantages. If Canada had continued with the Working Income Supplement and enriched it as originally planned, the result likely have been to attract much of any future fiscal dividend for that working poor-targeted program, as has happened in the US, leaving families relying on welfare out of luck. The alternative to the National Child Benefit was not just the same Canada Child Tax Benefit though with benefits passed through to those on welfare: Rather, the alternative much more likely would have been expansion of the Working Income Supplement, which would have even more thoroughly excluded those on welfare.

Welfare families stand to fare better as a result of receiving their child benefits from income-tested as opposed to needs-tested programs. Income-tested benefits have proven to be the safest of all income security programs in Canada even during this cuts-happy era. In fact, income-tested child benefits have been increased for low-income families. Needs-tested welfare benefits have fallen in value for almost all recipients in recent years. Social insurances have been pared (especially Unemployment Insurance/Employment Insurance). Universal programs – supposedly the safest of all – are the dodo birds of Canadian social policy in the case of child and elderly benefits. The odds of increases to the income-tested National Child Benefit are very good; the odds of increases to welfare are poor or non-existent.

In short, advocates for the poor have been arguing for better rates for people on welfare. This strategy has not enjoyed resounding success! Perhaps a new strategy, arguing for an increase in the Canada Child Tax Benefit that goes to the majority of Canadian families, might turn out to be more productive.

Some critics say that the National Child Benefit will force welfare recipients into the low-paid workforce, displacing existing workers from their jobs. The provinces do not need the National Child Benefit if they want to reclassify single parents as employable or

squeeze recipients off welfare; this was done long before the new child benefit came along. Moreover, in the brave new world of the Canada Health and Social Transfer, provinces even can deny welfare to certain groups if they wish (and seem to be doing so in some cases)

Of course, all of this argument is premised on the provinces actually doing what they have said they would do, including ensuring that no welfare families lose net income as a result of the change. Hopefully, no province will be so unscrupulous as to take advantage of this restructuring of the social security system to scrape a few more dollars out of the pockets of welfare recipients, in contravention of the federal-provincial National Child Benefit agreement and common decency.

The wary attitude of social advocates toward the National Child Benefit and their anger at governments' decision to equalize child benefits rather than raise them for all poor families is understandable during this era of social program erosion through both stealth and in-your-face cuts. Welfare bashing is all too alive and well, as witnessed by its prominent place on the current Ontario government's election platform and subsequent legislative agenda. But social groups may change their mind over time – if the National Child Benefit matures as it should. We turn next to this crucial issue.

The future of the National Child Benefit

Throughout this paper, we have used the term “this first stage” of the National Child Benefit. So far, the federal and provincial/territorial governments have committed only to this first stage, which aims to replace welfare child benefits with income-tested child benefits. In turn, this first stage involves several phases – the first (1997 and 1998) and second (1999 and 2000) phases being the two \$850 million increments to federal funding and associated provincial reinvestment in other programs and services for low-income families with children. It will take a third phase to attain the \$2,500 maximum Canada Child Tax Benefit required to displace welfare child benefits, hopefully by 2001 at the latest: We urge the federal Finance Minister to advance the timetable by enriching the second \$850 million by another \$1 billion so that the \$2,500 target could be achieved by 2000. The latter would be a useful date politically in light of the famous, well intentioned though unattainable 1989 Commons Resolution “to work towards eliminating child poverty by the year 2000.”

But, as noted above, our vision of a mature National Child Benefit involves a second stage in which the system grows in three important ways. First, the maximum benefit should be raised until it reaches the target of \$4,000, a conservative estimate of the essential child-rearing costs for low-income families (note that this does not include child care expenses). The \$4,000 figure is by no means etched in stone: We have

recommended that governments undertake a study of child-rearing costs by family income level and type to provide up-to-date and complete information.

Reducing the depth of poverty is one of the stated objectives of the National Child Benefit. Current benefits from the first phase of the Canada Child Tax Benefit – a maximum of \$1,625 for one child and \$1,425 for the second and each additional child (plus an additional \$213 for each child under 7 for whom the child care expense deduction is not claimed) – cannot make a large dent in the depth of poverty, which at last count (1996) averaged \$9,634 for two-parent families and \$9,255 for single-parent families (using Statistics Canada's low income cut-offs) [Statistics Canada 1997:37]. Even achieving the \$2,500 target for the first stage would not be sufficient to fully bridge the poverty gap, though it would be an important step forward. But a \$4,000 per child maximum child benefit would pack a real punch, raising some low-income families above the poverty line and the rest much closer to it.

Second, Canada Child Tax Benefit increases gradually should be extended up the income range to help modest-income first and then middle-income families, which have suffered substantial losses in child benefits due to programmatic changes in the 1980s and the corrosive impact of more than a decade of partial deindexation of both benefits and the income threshold for maximum benefits [Battle and Mendelson 1997:9-11]. It is crucial that the Canada Child Tax Benefit remain a broadly based program serving the large majority of families with children. The long-overdue task of restoring child benefits for non-poor families will bolster the traditional horizontal equity objective of this social policy, which has suffered at the hands of cost-cutters.

Third, the child benefits system must be re-indexed – the sooner the better. Partial deindexation of the child benefits system, a public policy virus injected into the income tax system and federal child benefits by the Mulroney Conservatives in 1986, also infects the new Canada Child Tax Benefit. Provincial child benefits (whether needs-tested or income-tested) are not indexed at all. Partial deindexation gradually reduces the value of child benefits over time, lowers the income threshold for maximum benefits further below the poverty line each year, and reduces the income level where families no longer qualify for partial benefits (the 'disappearing point'). The result is annual compression of the entire child benefits system down the income spectrum, thereby narrowing the broad base that is so important a feature for both low-income and middle-income families. Partial deindexation has eaten into child benefit increases for low-income families and resulted in a steady decline in child benefits for non-poor families since they have received no offsetting increase in benefits. The increased benefits from the Canada Child Tax Benefit so far have been concentrated on families with net family income below \$25,921.

A \$4,000 per child maximum Canada Child Tax Benefit would not eliminate child

poverty in one fell swoop. But it would significantly reduce the depth of poverty and would lower the incidence of poverty. It would provide a powerful income supplement for poor and modest-income families that could reduce the stress of poverty and its resulting pathologies. And it would help fill the gap between below-average wages and families' income needs.

Conclusion

After years of overt and covert cuts to major social programs that embittered relations between the federal and provincial governments, the National Child Benefit has arisen in the ashes of the Canada Assistance Plan and the rocky soil of the Canada Health and Social Transfer. In an era when Ottawa appears to have retreated from providing leadership in social policy, it took a common front from the provinces to move the integrated child benefit from concept to reality. The National Child Benefit is the first truly national social policy – in the deeper sense of a joint federal-provincial/territorial endeavour – since the coming of medicare and the Canada Pension Plan in the 1960s.

It is far too early to judge the National Child Benefit an unalloyed success in terms of anti-poverty policy, welfare reform, social policy innovation and rejuvenation of Canada's worn social union. But it has the potential to create for all poor children what we already have achieved (however inadequately) for all poor seniors – a *de facto* guaranteed income that significantly reduces the risk and depth of poverty. A mature National Child Benefit would provide the necessary platform on which to mount effective social services, employment programs, community supports and the many other weapons needed to wage a real war on child (i.e., family) poverty.

Careful design, sustained joint effort by both levels of government, and rigorous evaluation with a role for monitoring by nongovernmental groups are important ingredients to successfully grow the National Child Benefit. But the most important requirement of all is cold hard federal cash to transform a good idea into a mature pillar of a strong social security system for the next century.

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Social Cohesion and Voluntary Activity: Making Connections

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Session 5 Sustainability III: Social Cohesion, Social Capital and Well-being
October 30 4:30 PM - 6:00 PM

Social Cohesion and Voluntary Activity: Making Connections

Paper prepared for Conference on the State of Living Standards and the Quality of Life in Canada: Perspectives and Prospective, Ottawa, October 30 and 31, 1998.

October, 1998

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Preliminary draft: Please do not cite or quote. I would like to thank David Long, Shelley Phipps and Lars Osberg for helpful comments and conversations, and to thank Paul Conroy and Ambrose Leung for very capable research assistance. The responsibility for any errors is my own.

Social Cohesion and Voluntary Activity: Making Connections

Summary

Rising inequality in earnings and labour market opportunities, globalization, the Internet, changes in Canadians' ethnic and cultural heritage, and separatism are all calling into question Canada's social cohesion. The voluntary sector holds out the promise of building greater cohesion through creating social norms of altruism, trust, and reciprocity. Furthermore, many have argued that trust, the social capital created through voluntary activities, promotes economic growth and technological development by lowering economic "transactions costs".

This paper is about making connections. First, it explores the connections between social cohesion and voluntary activity. Is there more voluntary activity in cohesive societies? Does a strong voluntary sector build social cohesion? Second, it is about people making connections with each other. If there is a relationship between social cohesion and voluntary activity, it may well be because both are based on, and in turn strengthen, the connections between people.

This paper has two parts. The first part develops a conceptual framework. It

- explores alternative understandings of social cohesion
- sets out what is meant by voluntary activity. When people are volunteering, what is it that they do?
- surveys economic theories of voluntary activity. Why do people volunteer? What is the conceptual connection between social cohesion and voluntary activity?
- discusses potential positive and negative impacts of the voluntary sector. Does the voluntary sector create cohesion or exclusion?

The second part of the paper surveys empirical evidence on the level of voluntary activity in Canada, and the relationship between social cohesion and voluntarism. In particular this section

- draws on the World Values Survey, the National Survey of Giving, Volunteering and Participating, and the General Social Survey to create a picture of voluntary activity in Canada
- explores the determinants of voluntary activity, in particular, it asks,
 - Is there a connection between voluntary activity and cohesion indicators such as "tolerance"?
 - In particular, does the voluntary sector reach out to people at risk of social exclusion?
 - Are differences in voluntary activity across provinces explained by differences in social cohesion?

Part I: Conceptual Framework

The aim of this part of the paper is to provide a conceptual analysis of social cohesion and voluntary activity. It begins with discussion of “what is social cohesion”. The purpose of this section is to identify indicators of social cohesion, such as the frequency of social interaction, or the prevalence of poverty. It goes on to discuss “what is voluntary activity”, and identifies three key types of voluntary activities, which may differ in their relationship with social cohesion. The third section discusses a number of ideas about why people participate in voluntary activity, and makes the connections between social cohesion and voluntary work. It sets up the framework for answering the big policy questions: Does voluntary activity foster social norms of trust and reciprocity? Do these social norms lead to greater economic growth, or to a better quality of life? Does voluntary activity lead to greater economic equality? Or can increasing reliance on the voluntary sector for provision of social services reinforce social exclusion, as the universalistic norms governing the public sector are replaced by more discriminating private charity?

1.1 What is social cohesion?

The term social exclusion “seems to have gained currency in part *because* it has no precise definition and means all things to all people” (Atkinson, 1998: 6).

Bowling in a league or having coffee with a friend embodies and creates social capital (Putnam, 1995: 665)

These two quotations indicate three major difficulties that arise in talking about social cohesion and voluntary activity. First, social cohesion has no precise definition. Second, social cohesion is often taken to be the same as voluntary activity: voluntary activity “embodies” social cohesion. This identification makes it hard to discover any causal relationships between cohesion and voluntarism. Third, there are three terms in common use -- social capital, social exclusion, and social cohesion -- which refer to similar, but different, social phenomena. For these three reasons, it is useful to thinking carefully about the question: “What is social cohesion?” In discussing social cohesion, one can differentiate *processes*, the way that social cohesion is created, and *outcomes*, that is, whether a particular society is cohesive or not. One can think of this as the difference between “How do we get there?” and “Where is ‘there’ anyway?”

Heritage Canada’s paper “Canadian Identity, Culture and Values: Building a Cohesive Society” (Strategic Research and Analysis Directorate, July 15th, 1997), describes social cohesion as both a process and an outcome:

- building shared values and communities of interpretation
- reducing disparities in wealth and income in a diverse society

- engaging in a common enterprise with shared values and communities of interpretation

In summary, *Social cohesion is the ongoing process of developing a community of shared values, shared challenges and equal opportunity within Canada, based on a sense of trust, hope and reciprocity among all Canadians* (Strategic Research and Analysis Directorate, July 15, 1997). This describes both a plan of action for creating cohesion in a divided society, for example by reducing disparities in wealth and income, and a description of what a cohesive society would look like, that is, a society based on a sense of trust, hope, and reciprocity.

For the purpose of an economic analysis, this definition is somewhat broad. Unfortunately, neo-classical economists are in a bad position to answer the "Where is 'there'?" -- what is social cohesion -- question. Social cohesion is a property of *societies*. It is "the act or condition of sticking together, a tendency to cohere" (Allen, R.E. 1990). Economic analysis, however, is about *individuals*. As Britton (1998: 26) writes "In economic theory there is...no such thing as society, and a term like 'social cohesion' has no real meaning at all." Even the best economists working in this area (for example Helliwell, 1998) do not measure social cohesion directly. Instead, social cohesion (or social capital) is proxied by individuals' attitudes, behaviour, socio-economic characteristics. In the remainder of this section I will take some very simple ideas about what social cohesion means for Canada, and attempt to identify factors and processes that create -- or hinder -- these outcomes. Describing these processes will prove useful in connecting social cohesion with economic theories of voluntary activity, and also in looking for an empirical relationship between cohesion and voluntarism.

First, for Canada as a whole to be a cohesive society, no one individual or group can be marginalized, or shut out of the common enterprise. Social cohesion may, therefore, be interpreted as absence of social exclusion. Viewing cohesion as non-exclusion focuses attention on the factors which break down cohesion. Atkinson (1998) identifies *unemployment*, *social security policy* and *social exclusion in consumption* as three key mechanisms of social exclusion. In an obvious sense unemployment creates social exclusion because the unemployed are excluded from the labour market and also face loss of income. However, as Atkinson (1998: 11) points out:

The link between employment and social inclusion is a complex one. Creating jobs can contribute to ending social exclusion, but success depends on the nature of these new jobs. Do they restore a sense of control? Do they provide an acceptable relative status? Do they offer prospects for the future?

Exclusion from social security occurs when, because of means testing or non-take-up of benefits, people are excluded from social security programs. On the other hand, to the extent that there is a stigma attached to the receipt of means tested benefits, people receiving benefits may be excluded from the respect of society at large. Social

exclusion in consumption occurs when people do not have the resources to participate in the customary consumption activities of the society in which they live. For example, not being able to afford a telephone may mean being cut out from social activities, disadvantaged in looking for jobs, and even becoming statistically and politically invisible, as increasing numbers of surveys are conducted through telephone interviews. Not being able to afford the required equipment means children being excluded from sports, and denied a certain pattern of social intercourse. Understanding social exclusion in consumption means recognizing the structures of constraints which are exogenous to each individual. These in turn reflect incomes relative to the cost of expenditures necessary to participate in society, and on firms' pricing and location decisions, which may mean more expensive, lower quality, or even no goods are available to people living in poor neighbourhoods.

Atkinson's work is important because it identifies individuals and groups who may be excluded from a cohesive society. When we test empirically the relationship between social cohesion and voluntary activity, we will use unemployment, social security, and other indicators to see if voluntary activity brings those in the center of society closer together, or if it reaches out to those in danger of marginalization. The promotion of cohesion through ending exclusion fits together with Heritage Canada's goals of reducing disparities in wealth and income in Canada. Reducing income and wealth inequalities, together with fighting poverty, is one way of preventing social exclusion in consumption. Cohesion as lack of exclusion is a positive goal for Canada.

A second way of describing what a cohesive society looks like is *cohesion as interaction*. Jon Elster argues that social cohesion can be measured by the frequency of social interaction: "There are no societies, only individuals who interact with each other" (Jon Elster, 1989: 248). Interaction is both a process and an outcome; it defines and creates social cohesion. It is both positive and negative: "the interaction that defines a society can be destructive — the war of all against all — as well as cooperative" (Elster, 1989: 248).

Cohesion as interaction is closely connected to Putnam's work on social capital. Putnam defines social capital as the "features of social life -- networks, norms, and trust -- that enable participants to act together more effectively to pursue shared objectives." Voluntary activities such as bowling in a league both "embodies and creates social capital" (Putnam, 1995, pp 665-665, 665). Putnam (1995) argues for causal relationships between voluntary activities and trust, "the more we connect with other people, the more we trust them, and vice versa" (p. 665). Putnam argues - not uncontroversially - that television, by keeping people indoors and decreasing membership in various associations, is a key reason for the decline in trust in the US over time. Because Putnam found such a strong relationship between voluntary activity and social capital, other writers have tended to treat the two as synonymous: if there is social cohesion there will be a strong voluntary sector, if there is a strong voluntary sector there must be social cohesion. The challenge-- which is one of the

key goals of this part of the paper -- is to untangle the causal relationship between voluntarism and, say, trust.

A third type of cohesive outcome is shared values and communities of interpretation. Values and interpretations are derived from language, religion, culture, literature, and tradition, and many other sources. Values evolve and, because they are not static, when people come together in -- to use that hackneyed metaphor -- a "melting pot", they can create a new common community. However, at any point in time, there may be *cohesion based on group identity*, that is, social groups that cohere on the basis of ethnic, race or class identity. Ethnic cohesion can provide positive benefits. For example, a study by Borjas (1995) argues that "people raised in advantageous ethnic environments will be exposed to social and economic factors that increase their productivity" (p. 365). Yet cohesion based on ethnic, race or class identity is negative when it becomes a source of social exclusion or social conflict. If "shared values and communities of interpretation" means, for example, shared religious beliefs, people of other religions are excluded from the community. A shared community of interpretation based on shared experiences at schools such as Upper Canada College is, arguably, how Canada's political and economic elite is created (Porter, 1965). Is Quebec separatism unrelated to the linguistic, religious and racial cohesion of Québécois society? Northern Ireland is an extreme example of the tragic effects of conflict between two very cohesive religious groups. It is important to distinguish between "bridging" (to use Putnam's 1995 term) cohesion, which spans underlying social cleavages, and "ghettoising" or "elitist" cohesion which reinforces marginalization, social division, or both.

The divisive potential of group identity has long been recognized. It can be seen as part of the motivation for Canadian policies of the '60s and '70s which attempted to foster a new and distinctly Canadian identity: the adoption of a Canadian flag, national anthem, official bilingualism, and so on. Canada, Australia, and other multicultural societies face an ongoing struggle to replace old nationalisms, for example the "White Australia" policy, with symbols which create a more positive, more inclusive, basis for social cohesion. While this is a valuable project it is also, in a sense, a nationalistic one. It is, for two reasons, not the subject of this paper. First, because this paper is concerned with cohesion and the voluntary sector, not (except in passing) cohesion and the state. Second, a number of factors, including "globalization", and the rise in supra-national organizations such as the EU, are decreasing the power of sovereign nation states. Writers in international relations theory describe this phenomenon as "cosmopolitanism". We are all members of a many communities, some global, some local.

If we do not identify "social cohesion" with "Canadian cohesion", we can picture other types of cohesive social arrangements. For example Goodin (1996) suggests model where the nation state is complemented by many other levels of organization:

The alternative which I have in view...can be conceived as a system of clubs....

On this alternative model, any given person can be a member of several clubs at once. There is no thought that we should (much less should have to) rely upon one club, alone, for all that we might need. There is no thought that we should give our full allegiance to one club alone. Instead, on this alternative model, we could be members of many different clubs, drawing on them and contributing to them in turn for many different purposes and many different kinds of support and assistance (Goodin, 1996: 364).

What I take from this is that, for example, ethnic and religious groups are one sort of “club”, providing people with support and assistance. However people may be members of several different and overlapping “clubs”, drawing support from and contributing to each. In Goodin’s world view, the state is not the first place to turn when a person needs support, but a safety net, a residual source of support, when other sources are not available.

the state, as presently conceived, is *too inclusive*. It is not necessarily itself the only source of social succour available to any given citizen. But it claims a monopoly on the power to legitimate any other sources of social succour (Goodin 1996: 363)

Instead, there should be many complements to the nation state:

..operating alongside and in conjunction with public assistance are various forms of assistance from family and friends, charities and churches, public and private insurance and pension schemes, and so on (Goodin, 1996: 365).

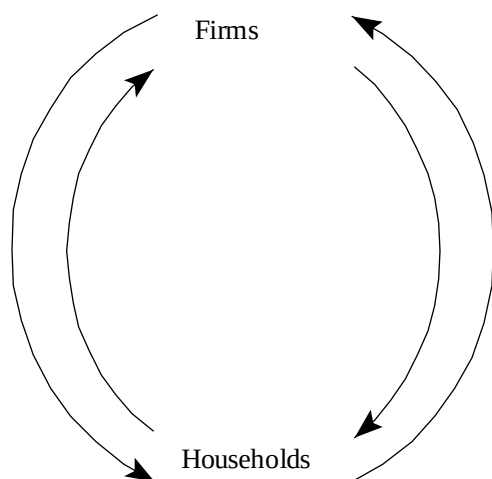
The cosmopolitan conception provides another way of linking social cohesion and the voluntary sector. We can examine the level of voluntary activity, the patterns of voluntary sector membership, and who is left out of the voluntary sector to see to what extent the voluntary sector creates an alternative network of overlapping clubs, if it complements or substitutes for the state, if voluntary and state reach the same or different people, etc. The “overlapping clubs” model also suggests that societies in general will not be uniformly cohesive. Family cohesiveness may substitute for the institutions of civil society in politically repressive or violent societies (Cuba is a good example). Rural outposts may be rich in social cohesion, while large urban centres are not. Some people participate in multiple, overlapping groups, others are excluded, marginalized. Possibly even seeking a single measure of “social cohesion” may be misguided.

The Heritage Canada document creates a positive image of social cohesion: cohesion as trust, shared values, reciprocity, and equality. Social cohesion, at best, means the creation of communities which include everyone regardless of their differences; where there is both commonality and acceptance of diversity. These alternative definitions, unlike the Heritage Canada definition, are not unambiguously positive: Social cohesion can be viewed in a positive, neutral, or even a negative, light.

1.2 What is voluntary activity?

Figure 1 shows a circular flow diagram of a classic market economy. The inner circle shows the flow of goods and services in the economy: households provide firms with labour and capital as inputs to the production process, firms provide households with goods and services from shoes to sofas. The outer circle shows the financial flows: households pay firms for the goods they produce; firms pay households wages, salaries, and dividends.

Figure 1



In this paper I define voluntary activity by the absence of direct, financial exchanges -- flows only move in one direction. I consider gifts of time, money or in-kind donations such as blood all to be "voluntary activities". For example, when people give time and money to organizations without a direct exchange of goods and services this is voluntary activity, even people likely receive other important benefits, such as a warm glow, or enjoyment of a public good, from their gift. Voluntary organizations provide goods and services, from food to spiritual support to

recreational opportunities, without directly charging the beneficiaries (although again, there may be a moral obligation to support the organization, for example, by selling Girl Guide cookies). This definition excludes some activities within what is usually known as the "voluntary sector" of the economy, for example, I will not be considering those working for pay in organizations funded through voluntary donations. On the other hand, it includes activities based in the public or private sector of the economy, for example, coordinating the office United Way campaign. I will not be considering non-profits or cooperatives, except in as much as they are places where people volunteer.

Many authors have developed typologies of voluntary activities. Here I distinguish what I consider to be three key types of voluntary activities: activities which provide public goods, charitable activities, and activities which provide personal goods.

Pure *public goods* have two features. First, they benefit several people simultaneously or are *non-rival*. Second, they are *non-excludable*, which means that people cannot be prevented from enjoying the good, even if they have not paid for it. When goods are non-rival and non-excludable, there is no necessary link between real

and financial flows. Firms find it difficult to charge for the use of a public good, because they cannot exclude those who do not pay. Even if firms could charge for the use of a public good, it would not be efficient to do so. Charging for a good always stops some people from using it, and because the non-rivalness property of public goods means that the marginal cost of an extra person using the good is close to zero, the benefits of additional users exceeds the costs. Many voluntary donations and activities go towards funding and providing public goods. For example, voluntary donations to medical research can potentially fund new discoveries that will benefit millions of people.

A second type of voluntary activity is “charity”. Charity is giving voluntarily to those in need. A large number of voluntary associations are charities, aiming to reach out to the excluded, for example, food banks and social welfare organizations such as the John Howard Society. Churches also do a great deal of charitable work.

A third category of voluntary activity revolves around what I call *personal goods*. Personal goods are goods for which personal characteristics of the person providing the good or service matter. Blood donation is one such a good. The health of the donor is extremely important. Caring work, for example child care and elder care, are another example. A personal bond between caregiver and child is essential to a child’s well-being. Once that bond is formed, one caregiver cannot simply be substituted for another. For goods such as these voluntary provision may be superior to other forms of provision for several reasons. In the case of blood there is an adverse selection/moral hazard problem -- if people are paid to donate blood, people may have an incentive to hide conditions such as hepatitis, and the quality of blood donated may fall. Commercializing a service may change the nature of the service provided -- we want people to care for children because they love children, not because they want the money. Finally, when a price is put on blood or care, it reduces the worth of something which would otherwise be “invaluable”. Caring for children or other family members is so wide-spread and enforced by such strong social norms that we do not even regard it as “voluntary” work -- caring for one’s children is a responsibility, a commitment, a moral and legal obligation. Social cohesion and the family is the subject of another contribution to this conference (Phipps, 1998); however I will refer to caring for family as a “limit case” of volunteer work.

The examples in this section provide a basic link between voluntary activity and social cohesion. Voluntary activity promotes social cohesion by making society work better through provision of public and personal goods, and by providing charity to the marginalized, thereby preventing social exclusion. Yet none of this gives a satisfactory explanation of why some people volunteer so much, others so little; why more blood is donated in Newfoundland than Toronto; or how to strengthen the voluntary sector. In the next section I describe economic theories as to why people volunteer.

1.3 Why do people volunteer?

Reading the social cohesion/capital/exclusion literature there is -- despite the key role attributed to volunteer activity in building social capital -- a striking absence of any theory as to why people choose to volunteer (see, for example, Putnam, 1995; Helliwell and Putnam, 1995). There is no connection to the huge economic literature on the private provision of public goods, clubs, and other explanations of voluntary behaviour.

This section is a first attempt to remedy this deficiency. I find that answering the basic question "why do people volunteer?" provides a rigorous explanation of *why* certain factors influence the level of voluntary activity in the economy. I begin with the economics of the private provision of public goods, then turn to commitment, reciprocity and clubs as explanations of voluntary activity.

1.3.1 Private provision of public goods

One common way of modelling voluntary activity -- charitable donations, volunteer time, and so on -- is that individuals volunteer so as to provide public goods. In the "private provision of public goods" models, people, by volunteering, essentially "buy" more public goods. For example, a person would donate \$100 to a breast cancer foundation in order to buy an extra \$100 worth of breast cancer research. In this view, what people are concerned about is the total amount of private consumption and the total amount of, say, breast cancer research, but do not care about the size of their own donation per se.

The simple model has, it turns out, a number of predictions, which suggest a number of possible links (or non-links) between social cohesion and voluntary activity. The first prediction is that government crowds out private provision. If what people care about is the total level of public goods, then if the government is providing public goods, people will spend money to provide the goods themselves. Whether this is in fact true has been the subject of much research and debate. Evidence against this can be found in Putnam (1995). Using the World Values Survey, he finds a positive correlation ($r=.48$) between public expenditure as a percentage of GDP and people's membership in voluntary organizations. However this finding is partially explained by the coincidence of high membership and high government spending in the Nordic countries. Economic studies generally find some degree of crowding out, but at levels of between 5 and 28 percent -- much less than the 100 percent crowding out suggested at the theoretical level (Ferris and West, 1998: 15). Whatever faith one puts in the crowding out story, it does provide some reason to be cautious about inferring too much about a society's level of social cohesion from observing the amount of voluntary activity in that society: voluntary activity may simply indicate the absence of government activity in a particular area. For example, as Canada becomes more religiously and ethnically diverse, there may be an increasing demand for, say, denominational Islamic or Chinese language education, as immigrants struggle to preserve their ethnic heritage in a predominately Christian and English or French society. However, without public funding for these services, minority groups may turn to privately funded voluntary or non-profit institutions. Diverse values and cultures,

combined with an absence of government funding, may lead to a plurality of voluntary sector institutions.

A second prediction of the model is that there may be a positive relationship between income inequality and private provision of public goods. Without a Nelson Rockefeller, would there be a Rockefeller Foundation? If Susie Smith spends all of her income on food and clothing, while Nelson Rockefeller gives his away to charity, wouldn't we expect the total amount of charitable donations to go up if Susie became a little poorer and Nelson became a little richer? Again, this is an empirically testable relationship. However it suggests a *negative* relationship between one aspect of social cohesion (reduced disparities in income and wealth) and voluntary activity. There is very little empirical evidence on the relationship between income inequality and voluntary activity. However Chan, Mestelman, Moir and Muller (1996), using laboratory experiments, do find that redistributing income from people who do not contribute to the public good towards people who do contribute does tend to increase the level of public goods provision. However at an individual level their findings do not confirm the private provision of public goods model – low income individuals contribute more than the model predicts, whereas high income individuals contribute less.

Finally, the model predicts that in large economies there will, in equilibrium, be very little public goods provided (Andreoni, 1988). It makes little difference to me whether the amount of money spent on breast cancer research in Canada \$10 million or \$10.0001 million, so why would I choose to spend \$100 to get that extra \$0.0001 million of research spending? This prediction is hard to reconcile with the large amount of voluntary activity that we observe in the Canadian or other economies. Therefore while this model generates some thought provoking predictions, it is at best a partial explanation of voluntary activity in Canada.

A way of refining this view is to suppose that people care, not only about the total amount of breast cancer research, but about the size of their own donation. People get a "warm glow" from making donations. People make a rational choice - they maximize utility, U , defined as

$$U=U(x_i, G, g_i)$$

where x_i is private consumption, G is the total amount of public good provided and g_i is the individual donation to the public good (see, for example, Andreoni, 1995). This model, unlike the simple private provision of public goods model, does not predict that government spending crowds out private dollar for dollar, it also explains why voluntary activity still exists, even in large economies. However there is no exploration of the origins of this utility function - it is given, fixed, unchanging - nor any psychological, philosophical or sociological explanation as to why utility is increased by donating to, say, charities. Simply by observing that people volunteer we have no way of knowing whether they are motivated by factors linked to social cohesion -- trust, reciprocity, etc. -- or factors unrelated to social cohesion -- a desire to control other's behaviour (as per Becker, 1974), a desire for social status, etc.

1.3.2 Cohesion and Commitment

Philosophically minded economists have challenged the idea that people's behaviour can be explained as a simple rational choice, and have developed richer theories of people's motivations. One of the deepest challenges to the simple rational choice model has come from Sen (1982). Sen suggests that people's behaviour can be seen as motivated by "commitment" - we do things because it is the right thing to do, rather than because it maximizes utility.

As noted earlier, much - if not most - unpaid work is not considered "voluntary" activity. Most parents do not regard picking their children up from school on time as voluntary work. Strong commitments supported by strong social, moral and legal sanctions are duties or responsibilities, not voluntary activity. Voluntary activities then fall in between duties, on the one hand, and purely self interested behaviour, on the other. Voluntary activity is a sign of both cohesion and disintegration: without some cohesion, some sense of shared values or commitments, people would not volunteer at all; on the other hand, in a truly cohesive society, there may not be much "volunteer" work, as obligations to others are seen as responsibilities which must be fulfilled, not something that is chosen. For example, we have volunteer services like "Meals on Wheels" in Canada in part because generally the elderly live on their own instead of in extended families, and many do not have family living close by.

Recognizing that voluntary activity is only one part of the social support network, one form of social interaction, is crucial to understanding the relationship between social cohesion and voluntary activity. Arguably, one reason for the weak relationship found in empirical research between the level of government intervention/activity and the level of voluntary activity is that these studies have failed to control for underlying social structures, which influence both government and voluntary sectors. For example, it is entirely possible, as Todd (1985) has argued, that societies with smaller, more fragmented family units tend to create strong non-family institutions, including both social democratic governments and the voluntary sector, which are unnecessarily in societies with other family structures. In section 2 below I examine how Canada's social and cultural diversity is reflected in substantial inter-provincial variations in the level of voluntary activity. At this point, what needs to be emphasized is that the voluntary sector is only one of many social institutions, and the strength of the voluntary sector may indicate either (a) a healthy society with many strong institutions or (b) instability and contradictions within other social institutions.

One way of thinking about whether the voluntary sector represents strength or weakness is to examine the commitments underlying involvement in the voluntary sector. Voluntary activity may be motivated by commitment to an abstract ideal of

doing the right thing (this abstract voluntarism runs through Titmuss's work on blood donation). It may be motivated by a commitment to a particular individual, for example, one might volunteer to coach the local soccer team because one's children were involved. Or it may be motivated by commitment to community. I am not aware of any existing economic research which has attempted to use information about people's motivations to distinguish between different theories of voluntary activity. However it is possible to use data from the World Values Survey to discover what commitments are important to people. This survey asked volunteers why they did voluntary work. The motivation with the highest average importance score was "compassion for those in need", followed by "an opportunity to repay something, give something back" and "to make a contribution to my local community". Abstract commitment "a sense of duty, moral obligation" ranked fourth, well ahead of self-interested reasons such as "to gain new skills and useful experience". This is evidence for the importance of commitment, as opposed to self-interest, but it suggests that commitments tend to be concrete – to other people, to the local community – rather than abstract moral imperatives. This raises a recurring question – what is the "society" that "coheres" through "social cohesion"? It does not seem to be Canadian society, but a more local, more personal community that is motivating voluntary activity.

One final question/observation related to the idea of commitment is the idea that participation in voluntary activity strengthens commitment, as well as the other way around. This is close to Putnam's idea that voluntary activity builds social capital, but not the same -- social capital is something that is supposed to lower the costs of economic transactions and thereby promote growth; commitment is about the motivations underlying people's choices. The idea that voluntarism strengthens some sort of altruistic/giving/commitment actually pre-dates Sen's work considerably. Titmuss, in his pioneering study of blood donation, *The Gift Relationship*, argues that a world of giving may actually increase efficiency in the operation of the economic system (Arrow, 1975). The idea is that altruistic action in, for example, blood donation, strengthens social relations and is "an expression of confidence by individuals in the workings of a society as a whole" (Arrow, 1975: 26).

1.3.3 Reciprocity

Commitment is about doing things because we are obliged, or have a duty to do them. Commitment is about the motivations of our moral self, rather than our utility maximizing self. Reciprocity involves a different and more explicit social contract. I do something for you; you do something for me. The contrast between the two terms can be found in their application to voluntary activity.

Robert Sugden (1984) develops the idea of "reciprocity" to explain voluntary contributions to the public good. Reciprocity is a norm which says that, if other people are contributing to the public good, you are obligated not to "free ride" on their

contributions. Sugden argues (I will not reproduce the technical details here) that, if such a norm exists, an equilibrium will exist. However - and this is important - public goods will be underprovided *except* in the case when everyone is identical in both incomes and taste for the public good. Sugden's work is interesting because it suggests that reciprocity - an important part of social cohesion - can be part of the support for a strong voluntary sector - but only in a homogeneous (in preferences) and equal (in incomes) society. A norm of reciprocity in a society where people greatly differ in their tastes for public goods, or where there is substantial income inequality, is not enough to create a strong voluntary sector. It also suggests that, to the extent that we do have a voluntary sector, it may be supported by a homogeneous community, rather than society at large.

1.3.4 Clubs

Amartya Sen's work on commitment can be described as a "social choice" theory - it is about the choices we as a society could and should make. In contrast is work in "public choice" theory, which attempts to explain public (government, voluntary) phenomena purely as the outcome of individual rational choices. In public choice theory, the epitome of voluntary activity is the "club". A club is "a voluntary association established to provide excludable public goods" (Mueller, 1989). Sports and recreational associations are the best examples of clubs, although professional associations, trade unions, cultural organizations such as local theatres, and perhaps even churches can also be seen as clubs. For the purpose of the analysis in this paper I am interested in clubs which share three key characteristics: (1) they provide a public good, e.g., sports facilities, professional accreditation, collective negotiating power, music. (2) There is not a direct "fee for service" -- even though a fee may be required for membership, the fee is not directly related to benefits received (members may use the club facilities frequently or infrequently) (3) the club is constituted as a volunteer organization, as opposed to a for-profit "club Med" or "Price Club". Firms and advertising agencies do not use the "club" terminology because, say, Price Club differs in some fundamental way from any other warehouse store. It is more likely that the word "club" is being used to appropriate a social norm, to try to capture some idea of reciprocity and, especially, create customer loyalty (Reichheld, 1996)

The club approach to volunteering has strong implications for the link between social cohesion and voluntary activity. First, there is no reason to expect any link between trust, care, concern or any other social value and club membership. If people join a swim club it will, in all probability, be because they enjoy swimming and are prepared to pay the membership fee, not because of any intrinsic concern for other swim club members. On the other hand, there will be interaction between club members, and club members are engaged in a common enterprise, and this is one element of social cohesion. However clubs will be more efficient when the membership is homogeneous, for example, when club members have similar incomes or similar demands for the public good (Mueller, 1989). This suggests that, while clubs

may build social cohesion through engagement in a common enterprise, it will be cohesion among a homogeneous subset of the population. It is true that there are many clubs, such as children's soccer leagues, which draw together people from diverse backgrounds, and create new social ties, rather than building upon those which already exist. Yet research by Kathleen Day and Rose Anne Devlin (1996) found that more educated Canadians and Canadians with household incomes above \$20,000 (in 1987) are more likely to volunteer. These observations suggest several research questions examining connection between social cohesion and voluntary activity: What is the pattern of club membership? What sort of ties are fostered through club membership? Even if clubs build cohesion, will they help prevent social exclusion?

1.3.4 Self-Interested Volunteering

Another way of thinking about voluntary activity is as just another form of labour or consumption, influenced by the same considerations as other types of labour supply or consumer demand. This is the approach taken by Menchik and Weisbrod (1987). Volunteering is seen as something that either gives immediate enjoyment, or something which has long term investment benefits. They find that voluntary activity increases with full income, also married people, people with children at home, especially people with older children, some women and people whose parents had more years of schooling were more likely to volunteer. People who were frequent churchgoers volunteered less hours, and the wage rate also had a negative effect on volunteer hours. Francois Vaillancourt (1994) found that Canadians whose family or career is likely to benefit are more likely to do volunteer work, suggesting that volunteer activity may, for some people, be a form of human capital investment - however these results, while statistically significant, were not empirically dominant.

2. Social Cohesion and Voluntary Activity: Looking for the Connections

The Data

There are three major sources of information about voluntary activity in Canada. Statistics Canada has carried out two major surveys of voluntary activity: the Survey of Volunteer Activity (VAS) in 1987 and the National Survey of Giving, Volunteering and Participating (NSGVP) in 1997. The VAS has been the subject of extensive analysis by Kathleen Day and Roseann Devlin (1996) and by Francois Vaillancourt (1994). Summary results from the NSGVP have recently been released (Statistics Canada, 1998); however at the time of writing the public use microdata file is not available. The World Values Survey was carried out in 1981 and again in 1991. Each time the survey

asked over 1600 Canadians about their participation in a wide range of voluntary activities. Because this data set remains relatively underexplored, and also because it provides rich information on people's motivations and values, it will form the core of our analysis of social cohesion and voluntary activity.

Who volunteers?

Table 2.1 summarizes the most recent information available on who volunteers in Canada. Who volunteers? It turns out that most Canadians do. In 1997, according to the National Survey of Giving, Volunteering and Participating, 78 percent of Canadians made a donation to a charitable or a non-profit organization, 31 percent of Canadians volunteered their time, and 51 percent were members or participated in civic organizations.

Demographic characteristics make a difference. Women are more likely to make donations than are men (81 percent of women donate, compared to 75 percent of men), and women are also more likely to volunteer (33 percent as opposed to 29 percent). Men, on the other hand, are more active as members and participants of organizations (53 percent as opposed to 49 percent).

People who are married are more involved in all dimensions of voluntary activity: they are more likely to make donations (85 percent), to volunteer their time (33 percent), and to participate (54 percent). People who are widowed are more likely than single or separated people to make donations, and their average level of donation is particularly high, however single and separated people are more likely to volunteer, and to participate in organizations.

Volunteer activity also rises with education. People with higher levels of education donate more, are more likely to volunteer (although they do not volunteer for longer hours), and are more likely to participate.

Putnam (1995) has argued that there is a long "civic generation" of people raised prior to the television era who have higher levels of community participation, and that civic participation is declining over time. This is not borne out by Canadian data. Volunteering peaks in the 35 to 44 age group, as does the frequency of donations. Volunteering has soared in the 15 to 24 age group from 18 percent in 1987 to 33 percent in 1997. Membership and participation in organizations peaks in the 45 to 54 age group.

The likelihood that a person is involved at some level with voluntary activity increases with household income – people in higher income households donate more often, volunteer more often and participate more often. However the total number of hours volunteered actually peaks in households with incomes between \$20,000 and \$39,999, and donations relative to gross household income falls as household income increases.

Moreover, household income is closely tied to marital status, age, education, and many other factors which influence engagement in voluntary activity. So without doing a multiple regression analysis, it is hard to isolate the effects of income *per se*.

The data necessary to do a multiple regression analysis using the NSGVP is not yet available. However there is an extensive body of research based on earlier surveys which provides information on the factors determining volunteer activity. Table 2.2 summarizes the results of these studies.

How does this compare with the predictions of the theoretical section? Most of the theories surveyed

What do volunteers do?

One of the key differences between the various theories surveyed in the theoretical section was the variation in how voluntary activity was perceived. Is voluntary activity essentially joining a club? Or is it altruistically providing a good that has benefits to everybody?

One way of answering these questions is to find out what sorts of organizations people belong to, donate to, and volunteer for. Analysis of the NSGVP, summarized in Table 2.3, points to a number of patterns. One pattern is the consistent importance of religion. While religion only dominates one category – religious organizations receive 51 percent of the total amount donated to charities according to the NSGVP – it is of lesser but persistent importance in all other types of voluntary activity, accounting for 15 percent of the total number of donations, 14 percent of the total volunteer events, 18 percent of volunteer hours and 13 percent of memberships. Moreover, people who were active in religious organizations in their youth are more likely to be volunteers (45 percent versus 31.4 percent for the overall population – Statistics Canada, 1998: 34), and people who are very religious or attend church weekly volunteer more often and for more hours.

The recurring role of religion in volunteer activity suggests two observations. First, to the extent that religion tells us to love our neighbours as ourselves, praises the virtue of charity, and restrains profit motives (for example through prohibitions on usury), religion may increase people's intrinsic motivation to give to others. This is tentative evidence in support of "intrinsic motivation" explanations of voluntary behaviour. Second, the importance of religion suggests that that measures of, say, membership may reflect more than anything else the strength of religious conviction in a given society. What Putnam (198x) uses as an indicator of "social capital" may simply measure religiosity. It is of course possible, as Becker (199x) has argued, that religion is a key source of social capital. The main point is to be fully aware that religion may be the link connecting social cohesion and voluntary activity, and is something we need

to control for before drawing any conclusions.

A second finding is that – with the exception of religious organizations – donating, volunteering and participation tend to be centered around quite different types of organizations. For example, sports, recreation and social club account for over a quarter of volunteer work and 18 percent of memberships, but a negligible portion (not reported in the NSGVP summaries) of donations. Unions and professional associations account for almost one in five memberships, but are unimportant in terms of *voluntary* donations and *volunteer* work. This confirms that it is difficult to define precisely what is voluntary – why should membership in a trade union be counted as part of civic participation, but dues paid to a trade union not counted as support of a voluntary organization? (one obvious answer – that union and professional dues are a deduction claimed on one part of the tax form, while charitable donations are recognized by a credit, and reported on another part of the income tax form – seems hardly satisfactory). It also suggests that it will be hard to find a theory which explains all forms of voluntary activity, when the types of organizations involved – and presumably people’s motivations for joining and supporting the organizations – are so different.

One possible hypothesis is that groups people are members in are more like “clubs”, while donations go more towards “pure public goods”. This is in a sense obvious. A key part of the definition of a club is that people can be excluded from enjoying the public good produced by the club – it is for “members only”. Membership is meaningless unless non-members are excluded. In contrast, organizations such as the Heart and Stroke Foundation collect donations rather than memberships. Any medical breakthrough made through Heart and Stroke Foundation funded research would be available – one hopes – to all Canadians, donors and non-donors. An analysis of the NSGVP does provide tentative support to this hypothesis. Membership is focused around activities which provide benefits to their members first and foremost: unions and professional associations (19 percent), sports and recreation (18 percent), religion (that cross cutting variable – 13 percent), and then community and school related (9 percent), cultural or educational (8 percent), service club/fraternal (4 percent), and political parties (3 percent) (the percentage figures here give percentage of Canadians who are members, not percentage of total memberships these organizations account for, in contrast to the volunteer activity and donation figures). Donations go, as shown in Table 2.3, much more towards pure public goods, such as health. If this is indeed true, it means that motivations for joining and for donating are likely to be very different, with joining being more self-interested, and donating motivated by altruism, etc. This in turn means that any social cohesion/membership connection will have an entirely basis from a social cohesion/donations connection.

Trends over time

Table 2.4 provides more detailed trends over time in voluntary activity, based on the

World Value Survey (WVS). The nice thing about this table is that it provides trends over time, and it also allows more direct comparisons of membership/unpaid work and men's/women's activity than does the summary information, all that is currently available from the NSGVP. Membership patterns changed significantly between 1981 and 1991. Membership of religious organizations fell dramatically, as did membership in social welfare organizations. At the same time, membership in most other types of organizations increased, particularly education and cultural organizations, community action groups, environmental organizations and professional associations. In 1991 religious organizations still had the broadest membership, with about one quarter of Canadians belonging, however sports and recreational organizations had almost as many members, with education and cultural organizations and professional associations being the next. Unfortunately the 1981 survey did not ask about membership in sports and recreation organizations, so it is hard to see how membership in this important type of voluntary group has changed over time.

There are also significant differences in men's and women's organizational membership. Men are more than twice as likely to belong to a trade union, and fifty percent more men than women reported belonging to a sports and recreational organization. For religious organizations, the situation was reversed: fifty percent more women than men reported membership of religious organizations. Membership of women's groups is, not surprisingly, mostly female, and women also account for the majority of the membership of social welfare organizations, education and cultural organizations, peace movement and animal rights groups, and health-voluntary organizations. Men account for more than half of the membership of political parties, professional associations, and other groups, while there is little significant difference between male and female membership of community action groups, third world development, environment and youth work groups.

Table 2.4, unlike the NSVGP data, provides a direct comparison between unpaid work and membership patterns for different types of organizations. The figures for voluntary work are uniformly lower than the figures for membership. The most common type of voluntary work is for religious organizations, but only 15 percent of Canadians surveyed reported doing such work. The contrast between membership and activity is particularly dramatic for trade unions and professional associations, which in 1991 had three times more members than voluntary workers. So, while the three dominant types of organizations are still religious organizations, sports/recreational organizations and educational/cultural organizations, fourth place is now a three-way tie between social welfare, youth work and health-voluntary organizations.

Interprovincial Variations in Volunteer Activity

So far I have been reporting Canadian data. This data hides substantial variations within provinces.

Table 2.5 shows different measures of voluntary activity by province. This table shows wide variations among the provinces. The first two columns are taken from charitable donations data compiled from income tax records (people claiming the charitable donations tax credit). Newfoundland has the lowest percentage of taxfilers (22 percent) donating, but the highest average donation (\$260); Quebec has the lowest average donation (\$100) and an only slightly higher percentage of taxfilers donating than does Newfoundland (25 percent). There are some remarkable consistencies in the pattern of inter-provincial variation. Whatever data source is used, and whatever measure of voluntary activity is taken, Quebec has lower levels of voluntary activity than the Canadian average and – with one or two exceptions – lower levels of voluntary activity than are found in any other province. At the other end of the scale Saskatchewan stands out as being a province of volunteers.

This is a major challenge to the idea that voluntary activity is in some way linked to social cohesion. Quebec is arguably one of the most cohesive provinces in Canada. Quebec social and economic policy, for example the progressive income tax system, reflects a public commitment to reducing disparities in income and wealth. Quebec has a distinctive linguistic and cultural heritage, expressed in the works of writers such as Michel Tremblay and Marie Claire Blais, providing a shared community of interpretation. Francois Vaillancourt (1994) may be overstating the case somewhat when he writes that “On the basis of language, ethnicity, or religion, Quebec is a much more homogeneous region of Canada than the other four, which in decreasing order are the Atlantic region, Ontario, British Columbia and the prairies region” (Vaillancourt, 1994: 818). However, compared to the other large provinces (BC, Alberta, and Ontario) it does have much lower levels of immigration (less than 10 percent of the Quebec population are immigrants, compared to about 20 percent for the other large provinces), and a smaller visible minority population.¹ To the extent that recent immigrants and members of visible minorities are likely to have different values and cultures from other Canadians, Quebec’s smaller immigrant and minority population would be expected to enhance the sense of shared values. Quebec is also remarkably religiously homogeneous. According to the 1991 census, 86 percent of the Quebec population is Catholic. The only other provinces which come close to this level of religious homogeneity are Newfoundland, with 61 percent Protestant, and Saskatchewan, with 54 percent Protestant (and this ignores the divergence among Protestant religions).

There are a number of possible explanations for the low level of voluntary activity in Quebec. Francois Vaillancourt (1994) has argued that perhaps we would expect to find *less* volunteer activity in homogeneous regions, because “voters in more homogeneous regions are more likely to agree on what goods and services they wish the public sector to provide and thus need less volunteer work” (Vaillancourt, 1994: 818).

A second explanation is that the people of Quebec have a strong identity, but do not merge/blend their identity with others. The people of Quebec are not hyphenated Canadians. In the 1996 census, 83 percent of the people in Quebec reported a single ethnic origin, the most common ones being “Canadian” at 2.6 million or “French” at 2.1 million. This is substantially higher than the level of non-hyphenated Canadians in any other province (Newfoundland is the next closest, with 73 percent), and well above the Canadian average of 64 percent. That Quebecois have a strong but divided sense of identity – some seeing themselves as French, others as Canadian – is supported by the intense debate over sovereignty in Quebec. Quebec may be in some sense a homogeneous society, but in other respects it is a deeply polarized society. Homogeneity is not the same thing as social cohesion. John Helliwell (1998) gives further support of this point with the finding that trust, his measure of social capital, is lower in Quebec than elsewhere in Canada.

A third possibility is that voluntary activity is a Protestant approach to solving problems, and Catholic countries use other institutions – church or government or family – to do what Protestants voluntarily. Regression analysis (reported in Table 2.2) does find that Protestants volunteer more than Catholics. Catholics make up a much greater percentage of the population in Quebec than of any other province in Canada. This underlines the point made in the theoretical section: lots of voluntary activity may be seen as a sign of strength in the voluntary sector or of weakness in other social and economic institutions. This connects with Vaillancourt’s observation on the effectiveness of collective action through voting in Quebec. One might ask why regressions such as Vaillancourt’s which control for religion still find a negative relationship between residence in Quebec and volunteering. I would answer that by arguing that when there is a strong Catholic majority – as in Quebec – collective action and the creation of social institutions is possible in a way that it is not when Catholics make up, say, one third of the population, as in Ontario.

Finally, the Quebec data on voluntary activity may simply mean that in this, as in other things, Quebec is a “distinct society”. This is in line with work by John Helliwell (1998) on social capital in Canada, which has suggested that European differences in voluntary activity (e.g. between France and Nordic countries) are mirrored in Canadian inter-provincial differences, reflecting the ethnic origins of Canadians across the country

The conclusion to draw from the puzzle of Quebec is that social cohesion is not a universal concept, and any relationship we might find between social cohesion indicators and voluntary activity may not cross cultural lines.

Are volunteers more tolerant?

Table 2.6 shows a measure of the relationship between membership of voluntary organizations and tolerance. Non-members are those who did not report belonging to any voluntary organizations, members are all those belonging to one or more voluntary organizations. The numbers in the columns give the percentage of non-members and members mentioning each of the named groups as someone that they "would not like to have as neighbours." What is striking about table 2.6 is the similarity in tolerance levels for members and non-members. Their attitudes towards living next to people of a different race, emotionally unstable people, Muslims, Jews and Hindus are almost identical. The greatest differences are in attitudes towards "left wing extremists" and "right wing extremists". Members are substantially more likely than non-members to report not wanting extremists as neighbours. Members are also less likely to want people with a criminal record, addicts or heavy drinkers as neighbours, though they are more tolerant to homosexuals and immigrants/foreign workers. What emerges from this is a picture of members of voluntary organizations as people who uphold social norms. They are the centrist "pillars of society", are relatively intolerant of extremists. However Canadians, as a whole, are tolerant, and when they are intolerant, it is of people's behaviour -- drug addicts, heavy drinkers -- and not of people themselves -- Jews, immigrants/foreign workers, people of a different race.

Table 2.6: Groups identified that "you would not like to have as neighbours"

	Non-members	Members
Criminals	41	43
Other Race	5	5
Left wing	23	29
Drinkers	52	56
Right wing	20	27
Large family	8	5
Unstable	29	30
Muslims	10	11
Foreigners	8	5
AIDS	20	21
Addicts	61	64
Homosexuals	31	29
Jews	6	5
Hindus	10	10

Canada, 1991. Source: Compiled from World Values Survey

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Table 2.1: Volunteering in Canada, 1997					
	Donating Rate (%)	Median Donation	Volunteer Participation Rate (%)	Average Hours Volunteered	Membership Rate
Age					
15-24	59	20	33	125	44
25-34	78	55	28	133	48
35-44	84	83	37	142	55
45-54	83	105	35	157	57
55-64	83	108	30	160	54
65 and over	80	140	23	202	45
Sex					
Male	75	73	29	160	53
Female	81	83	33	140	49
Marital Status					
Married or common law	85	92	33	151	54
Single, never married	63	35	31	133	46
Separated, Divorced	73	70	29	186	44
Widowed	76	121	20	157	39
Education					
Less than high school	68	50	21	126	40
High school diploma	76	75	29	159	45
Some postsecondary	78	60	36	153	53
Postsecondary diploma	84	82	34	149	53
University degree	90	168	48	159	74
Labour force status					
Employed	83	81	34	138	57
Full-time	84	65	32	138	57
Part-time	79	85	44	139	57
Unemployed	64	29	29	121	36
Not in the labour force	72	78	27	176	42
Household income					
Less than 20,000	63	40	22	148	34
20,000-39,999	77	60	29	163	45
40,000-59,999	81	80	33	150	54
60,000-79,999	86	91	36	144	60
80,000 or more	90	150	44	136	71

Source: National Survey of Giving, Volunteering and Participating, Statistics Canada (1998)

Table 2.2: Socio-demographic characteristics linked to volunteering						
Authors	Data used	Findings				
Day and Devlin (1996)	VAS, Canada, 1987	Number of volunteers negatively related to government expenditures on economy-related activities, positively related to government expenditures on health care. No effect on number of hours donated. Probability of volunteering greater for females, and for those who are married, more educated (esp. women), stronger religious beliefs, health. Probability of volunteering is less for those who speak a language other than English or French at home, also for women who speak French at home.				
Vaillancourt (1994)	VAS, Canada 1987	Probability of volunteering greater for females, and for those who are more educated, in higher status occupations, who work fewer hours (except men who do not work), who have children between 3 and 15, live in smaller cities, speak English at home. Single women (men) do more (less) work than their married counterparts. Catholics and people with no religion participate less in volunteer work than Protestants and people with "other religions". Volunteering is lowest in Quebec and highest in the Prairies.				
Menchik and Weisbrod (1987)	US, 1973	Volunteer hours increase in full income, and are higher for women, married people, those with children, those with more educated parents, and those who are <i>not</i> frequent church-goers. Volunteering increases with age until about 43, then decreases. Higher wage rates seem to decrease volunteering, local government expenditures seem to increase it. Single earner households only.				

Table 2.3: Distribution of volunteer activity in Canada, 1997.				
	Donations		Volunteer Work	
	Percent of total number of donations	Percent of total amount donated	Percent of total events	Percent of total hours
Health	38	17	13	10
Social services	21	11	21	21
Religion	15	51	14	18
Education and research	7	4	25	23
Philanthropy and voluntarism	5	6		
Culture and arts	4	3		
International	2	3		
Environment	2	2		
Sports	N/a	N/a	11	11
Other recreation and social clubs	N/a	N/a	16	17
Other	2	2		

Table 2.4: Trends in voluntary activity over time

	Membership (percentage reporting)		Unpaid work (percentage reporting)		Gender, 1991	
	1991	1981	1991	1981	Male	Female
Social Welfare	8.38	13.23	6.19	10.00	6.3	10.35
Religious organizations	24.99	32.90	15.52	15.81	19.66	30.05
Education/Cultural	17.59	9.50	9.22	5.56	15.65	19.44
Trade Unions	11.64	11.12	3.56	1.61	16.10	7.40
Political Parties	7.16	5.51	3.69	3.44	8.59	5.79
Community Action	5.15	1.38	4.06	1.24	4.53	5.73
Third World Development	4.57	3.13	2.71	1.66	4.7	4.39
Environment	7.47	4.81	3.53	1.87	8.83	6.19
Professional Association	15.91	12.25	5.24	4.15	17.41	14.48
Youth Work	9.55	9.64	6.97	7.86	8.63	10.42
Sports/Recreation	22.69		12.28		28.46	17.22
Women's Groups	6.72		4.54		1.13	12.03
Peace Movement	1.99		1.59		1.23	2.71
Animal Rights	2.57		1.43		1.88	3.22
Health-Voluntary	8.85		6.82		7.02	10.39
Others	12.73		8.74		13.53	11.98

Source: calculated by the author from the World Values Survey

Voluntary activity across provinces						
	Charitable donations (1996 Income tax statistics)		NSGVP			
	% of taxfilers donating	Median donation (\$)	Donor rate	Volunteer rate	Membersh ip rate	
Newfoundl and	22	260	84	33	49	
Prince Edward Island	30	230	83	36	50	
Nova Scotia	26	200	83	38	55	
New Brunswick	25	230	82	34	47	
Quebec	25	100	75	22	43	
Ontario	29	180	80	32	52	
Manitoba	30	190	81	40	58	
Saskatche wan	29	240	83	47	62	
Alberta	27	170	75	40	55	
British Columbia	24	180	73	32	54	

¹ than the other large provinces – around 6 percent, compared to 10 percent in Alberta, 15 percent in Ontario, and 18 percent in BC

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

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Social Cohesion and Macroeconomic Performance

Mike McCracken
Informetrica

Session 5 Sustainability III: Social Cohesion, Social Capital and Well-being
October 30 4:30 PM - 6:00 PM

Social Cohesion and Macroeconomic Performance

Conference on the State of Living Standards and the Quality of Life

Ottawa, Canada

October 30-31, 1998

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Preliminary Draft: Comments solicited.

Social Cohesion and Macroeconomic Performance

M.C. McCracken

Today we live in a complex society. Indeed, it is becoming more so with instant communication, globalization, powerful weapons, and large countries and companies. But how did we arrive here? And what were the drivers?

In a recent Pulitzer Prize selection, Jared Diamond lays out the causal factors that determined the relative success of various groups of people in different parts of the world. [Diamond, p.406-7]. Of particular interest here are the reasons that we have a complex society. Improved food production increased population size and allowed for the emergence of permanent settlements making complex societies possible. The inevitable reasons for that complexity were:

1. Conflicts between unrelated strangers increase dramatically as the population size increases, leading to revenges to any murder or other wrong-doing, destabilizing the society in the absence of law. This factor explains the development of a centralized authority to monopolize force and resolve conflict.
2. A society quickly runs into the impossibility of communal decision-making with increasing population size. A large society (more than a few thousand) must be structured and centralized to reach effective decisions.
3. Redistributive mechanisms evolve to overcome the difficulty of bilateral exchanges in a larger society with goods in excess of one individual's needs being transferred to a central authority which then redistributes the goods to individuals with deficits.
4. Increasing population densities also require the centralizing, complex societies to allow for living together, since the space for self-sufficiency in the area is not available.

"Considerations of conflict resolution, decision making, economics, and space thus converge in requiring large societies to be centralized." [Diamond, p.288]

1. The Concepts

Culture - a set of ethical habits and reciprocal moral obligations internalized by members of each community. [Fukuyama., p. 9]

Trust - dependability that members will follow the norms defined by the culture.

Social capital - a capability that arises from the prevalence of trust in a society or in certain parts of it. This can range from the family to a nation, and is reflected in the adoption of a set of common norms. (Fukuyama, p.26)

Social cohesion - Instead of the analogy to “capital” or a stock, this concept relates to the notion of “glue” or “linkages” between people, groups, etc. Trust and norms of civic cooperation are two elements, with membership in associations a third element.

The common starting point for economics is the **individual**, with his or her tastes taken as given, with given characteristics of age, education, skills, experiences, etc. which are often lumped together into the concept of human capital. The stock of **human capital** is augmented by education, informal and formal training, and experiences. Human capital is taken as the explanation for differential incomes among people, and as the standard nostrum for solving the problems of the economy - more human capital formation.

But clearly there is more than just individuals in **society**¹. Individuals in relation to others - the **social** dimension - are to be found as families, co-workers, unions, companies and other organizations, movements, friends, clubs, volunteer groups, cabals, etc. All of these involve two or more people in some form of social relationship.

1.1 Social Capital

[Durkheim -]

Social capital is defined as "trust in personal and economic relationships, dense networks of community organizations, wide participation by citizens" [OECD, March 1998, p.121]. Others focus this concept more closely, defining it as "a quality created between people" in contrast to "human capital is a quality of individuals" [Burt, p.1] Social capital theory would suggest that the return to the individual depends to some extent on their social position in a market or hierarchy, along with their human capital.

Of interest here is the notion that social capital so used is about **private** returns to the individuals involved, not to the broader notion of society. If we restrict social capital to "property-like" values accruing to the individual through "markers", position, or "inter-personal relationships", then we need another label for the externalities that flow from such social relations.

¹ All of the people of a particular time and place who have organized cultural and social patterns and institutions.

1.2 Social Cohesion

The term, **social cohesion** is often used to describe a positive characteristic of a society, dealing with the relationships among members of that society. It is synonymous with the "social fabric", implying a supporting structure for the groups in a society. "It is the bonding effect of that web of social relationships through which individuals are attached to each other in a society, and through which they help each other, knowingly or inadvertently, to achieve their full potential." [Stanley, p.2]

"If social cohesion defines a society where different groups and institutions bind together effectively despite differences, then social capital must be part of the glue which enables this outcome." [Blakeley] Major elements in his analysis include: individual opportunity, family well-being, strong communities, and national identity.

This notion of a "web" suggests that "networks" may be a way of describing these concepts.

1.3 Network Framework

Reference is often made to "networks" in the context of the discussion of social capital or social cohesion.

A simple social network - the family with two adults and one child is shown in figure 1.. (The dog has been left out for simplicity.) This network produces economies of scale that are captured within the family. Re-production, household production, and consumption take place here.

"Social capital" is a property of the arrows, or flows between "nodes" or members of the network.

Each person is also a member of an "older" family. As well, he or she, may be a member of an extended family network, as an uncle or aunt, grandparent, etc. Members of a family may also be members or "nodes" on other networks. Here for example are two parents each working at a different company, which itself is a network of people and relationships. (See Figure 2.) The child could also be a member of a number of networks - school, sports team, gang

Most people "belong" to many networks. Indeed, as a social entity a person is "defined" as a node on many different networks. (There may be other types of nodes than people.)

Typology of networks that people "belong" to:

- Inherited - family born into
- required - taxpayer
- necessary to earn income - worker, investor
- necessary to consume - "consumer" networks, linked with retailers, with two-way flows of goods for dollars.
- voluntary - political, social, caring
- earned or chosen by other members - current family, Order of Canada
- physical or technological - phone, Internet, TV/radio viewer/listener

The notion of a community or neighborhood can be seen as a collection of connected nodes, tied together because of geographical nearness or common interests/identities.

Networks are fundamentally different than an individual or single entity in that the outputs can be greater than the sum of the inputs. There are economies of scale or "externalities" from the view of any one node, that may be captured within the network or shared more broadly. Such economies arise because the "value" of the network is related to the number of linkages, $(N*(N-1))$, whereas the costs are tied to the number of nodes, N .

"Social cohesion" might be thought of as the net benefits accruing to people that are in addition to the private benefits that attracted them to join a network.

1.4 Social Cohesion and Social Exclusion

There are two related concepts - social exclusion and social cohesion.

In Figure 3 the horizontal axis represents the share of the total population (0,100). The vertical axis is some monetary or other measure of the net benefits of being part of the society's networks (social cohesion) or the net costs of being "outside" or excluded from some or all of the positive networks (social exclusion).

Social exclusion focuses on those outside of the society's structure, either because of discrimination, unemployment, or other reasons. It is interesting to note that Europeans seem to focus more on "social exclusion" and bringing groups who are "outside" into the system.

In North America, to the extent that there is any concern at all, the focus seems to be on improving "social cohesion", or the performance of existing networks to the benefit of their current "members", but without much attention to those outside.

If there are income transfers from the "insiders" to the "outsiders", then the costs of exclusion can be reduced, but the number of excluded remains unchanged. This may help to understand the point that the poor and the excluded are not necessarily one and the same. (Dotted line in Chart 3.)

Progress can be defined as shifting all or part of the curve to the northwest, (see Figure 4) thereby reducing social exclusion and improving the benefits of social cohesion. In Europe, shifting the curve to the left seems more important; In North America, shifting the right side of the curve up seems to be the objective.

1.5 Social Contract or Compact

One of the early descriptions was that of Jean-Jacques Rousseau in The Social Contract, in which a group of individuals enters into a voluntary agreement (or pact) to receive benefits from others, and with the surrendering of individual will, becomes a corporate entity with a single will. [xiv-xv]

When thinking about large groups within a society and the nature of the relationships between them, the notion of a "social contract" or "social compact" emerges, with a mix of explicit and implicit contracts **between** groups. Indeed, the social compact can define the society or culture.

In the Canadian context, some of the elements of the social contract as it existed into the 1970s and changes that occurred since then are arrayed in the table below.

Post-War Social Contract (50-75)	The New State (85 -??)
Companies would share benefits with Workers	Down-sizing, declining real wages, loss of benefits, anti-union activities
Security of employment	Contingent work increasing
Wage structure increased with productivity gains	Polarization of wages
Stakeholder involvement and benefit	Emphasis on shareholder only
Social Insurance	Government cutbacks of all parts of social insurance package
UI	EI, with lower % qualifying and receiving lower benefits
Social security	Increase in premiums, clawback of OAS
Social assistance	CHST, provincial cutbacks - workfare
Good health care system	CHST, provincial cutbacks - basic health care system
Access to a good education	Rising tuitions at tertiary institutions
Regional redistribution	Abandonment of regional development
Cooperation with provinces	Downloading on provinces
Nurturing voluntary associations	Offloading on voluntary associations

2. What Do We Know?

The Policy Research Committee has identified "social cohesion" as one of three over-arching challenges in the next decade, along with economic growth and human development [PRC, p.50].

There is growing awareness that something is not right with the world. Efforts to reduce social spending are leading to dissatisfaction with governments, loss of confidence in institutions, and the emergence of a "meaner" society. At the same time, economic performance is less than expected, as productivity gains are weak, investment intentions poor, and demand soft.

Could the problem be that we are in a downward spiral, with economic shocks destroying social cohesion, which, in turn, is reducing productivity and increasing social tensions with subsequent costs to the economy and governments?

Is it possible to reverse the spiral, and to turn it into a self-reinforcing positive virtuous circle, with rising incomes, improved social cohesion, and an improved longer-term dynamic in the society?

The breakdown in the "social compact" in the United States has been discussed by Robert Reich [Reich: 1998], with a strong urging for corrective actions.

The Dutch government's scientific advisory group has examined the concerns about a growing social dichotomy between those who are working and not working, and those with skills and those without [WRR, 1997].

In New Zealand, efforts are underway to examine the ways in which social cohesion can be improved through the Foresight Project. In their terms, "If social cohesion describes a society where different groups and institutions bind together effectively despite differences, then social capital must be part of the glue which enables this outcome." [Blakeley 1997].

When scenario planning is applied to the consideration of future outcomes for the economy it is quite common for two major driving forces to emerge - uncertainty about economic growth and uncertainty about social cohesion.

Several recent exercises concluded that uncertainty about social cohesion made it a major element in their scenario development. In the Changing Maps project [Rosell] the dimension was "new social consensus" versus "social fragmentation". In **The Futures for Women** [McCorduck and Ramsey] the polar states are "individual rights prevail" versus "group rights prevail". (Indeed this is a foreshadowing that social cohesion need not always be a positive force.) Finally, in a scenario around the future marketplace, the two extremes become a cohesive society versus a fragmented one, with the other dimension being the relative emphasis on the individual versus the group [Wilkinson].

At this point it is clear that something called social cohesion or a social compact is thought to be an important determinant in the future evolution of the economy and society. There is also a strong suspicion that we have somehow damaged that cohesion, with a set of actions and inactions over the last several decades. But we still are left with little clarity about the mechanisms at work and how to fix the damage. Have we pricked a balloon, that has burst? Or is the analogy more like a hot-air balloon with some small holes? Simple repairs can be made when we are next on the ground, and in the meantime, we keep blowing hot air!

3. Social Cohesion Links to Macroeconomic Performance

Better economic performance improves social cohesion, particularly as gains are shared among the economic partners and social programs help fill in the gaps by providing trampolines for those who need assistance to regain their place in the social structure. As well we have seen the corrosive effects on social cohesion as a result of cutbacks in social programs and reduced economic gains provided to employees by employers.

The view of social cohesion as a fringe benefit or "luxury" of a well-performing economy, but subject to cutbacks in tough economic times suggests there is no long-term consequences of sacrificing social cohesion [Stanley, p.5].

But there is growing evidence that there is a strong causal linkage **from** social cohesion **to** macroeconomic performance. The new view is that "... growth is affected by public goods, finance, demographic parameters, income distribution, and social norms, all of which are grist for the social cohesion mill." [Stanley, p.5]

Stephen Knack and Philip Keefer [1997, p. 1252 ff.] identify a number of possible channels through which an improvement in social cohesion (social capital) can impact macroeconomic performance, directly and indirectly. These include:

- **Reduced transaction costs** - trust between organizations and people allows transactions to take place with high confidence that payments will be made, goods shipped, etc. Without such trust, payments are made in advance, shipments only occur after cheques have cleared, contract and litigation costs are higher, bribes necessary, etc.
- **Higher investment ratio** - an increase in the investment ratio as a result of greater trust and more credible policies can influence the long-term growth prospects of the nation by raising the rate of productivity growth
- **Encouragement of innovation** - more entrepreneurial time available for innovation, less needed for close supervision of employees, partners, and suppliers.
- **Better performance of government institutions**, including education, provision of public goods, and better public policy; higher quality schools -

more investment in human capital; credibility of government allows more effective policy application

- **Lower social costs** - Lower health costs, lower police costs, and other social costs result in lower taxes or user fees, and fewer private resources to manage risks. Reductions in absenteeism and sickness improves productivity.
- **More informed citizenry** and accountable politicians and bureaucrats.

All of these channels (and more) represent an expanded view of the determinants of growth beyond the simple model of labour, capital, and exogenous technical progress. These influences can reduce the costs and risks of investing, a pro-growth outcome.

An increase of 0.5% per year in economic growth will mean 5.1% more GDP in 10 years, 10.5% more in 20 years, and 65% more in 100 years. But can we expect as much as 0.5% per year from improved social cohesion? Or has the decline in the past been that much or more?

An increase of 10 percentage point increase in TRUST increases the growth rate by 0.8%; a four-point rise in the 50-point CIVIC scale would raise growth by 1 percentage point. The TRUST and CIVIC measures for several countries in 1981 are tabulated below from Knack and Keefer [p.1285]

Country	TRUST	CIVIC
Norway	61.2	40.75
Sweden	57.1	41.57
Canada	49.6	39.74
US	45.4	40.55
UK	44.4	40.07
Germany	29.8	39.83
France	24.8	36.26

A movement in Canada from the 1981 levels of TRUST to those of Norway or Sweden would provide more than enough of a change to yield an increase of 0.5% in economic growth. How to make such a move? That is a more complicated process than first meets the eye.

3.1 Social Institutions

The notion of social cohesion includes the **institutions** through which society deals with the achievement of its social and economic objectives. In the 1960s, a number of institutions were developed that focused Canadians' attention on longer-term issues. These included the Economic Council of Canada, with its emphasis on economic goals and policy recommendations based on a consensus of major stakeholders. The Science Council of Canada also undertook to develop a strategy for science policy in a number of areas.

But these institutions came under increasing pressure in the 1980s, and were finally eliminated by the federal government in 1991. In the case of the Economic Council, this silenced potential criticism of the federal government's strategy of mass unemployment as an inflation control device. This program has been very costly in lost production, and created a negative feedback loop by lowering social cohesion, lowering productivity growth, resulting in an even worse inflation/unemployment menu.

Is it possible to re-create some of these institutions? Or how else might trust in governments be restored? We will return to this issue below when potential policy changes are discussed.

4. Measures of Canada's Social Cohesion

Although we talk about the decline in social cohesion or social capital, what evidence is there that there has been any such decline? When did it start? Has it been continuous? Where do we look for such evidence?

Since we are considering people's social activities, a first step is to consider how people spend their time each week, and which parts of that time use are "social" or "networking", particularly outside of the family.

Average Time Spent on Various Activities (hours per day, 7-day week)				
Activity	Male FT M 25-44	Female FT M 25-44	Male FT MP 25-44	Female FT MP 25-44
Paid Work (N)	7.1	6.8	6.6	5.3
HH Work	1.8	2.3	2.8	4.6
Civic/voluntary (N)	0.2	0.2	0.3	0.2
Education (N)	0.2	0.2	0.1	0.2
Sleep, Meals	9.8	10.5	9.7	10.1
Socializing (N)	1.7	1.5	1.3	1.5
TV, Reading	2.3	1.9	2.2	1.5
Sports, Movies	0.1	0.1	0.2	0.2
Active Leisure (N)	0.8	0.5	0.7	0.4
Judith A. Frederick, As Time Goes By - Time Use of Canadians (Statistics Canada, General Social Survey 1992, 89-544E:1995) MP - married parent, M - married, FT - full-time employed N - networking or social activity (outside family)				

Paid work (for those employed full-time) is the dominant networking or socializing activity outside the family. Informal socializing with friends is the second-most important form of networking (in terms of time spent). Civic or voluntary activities

are a small part of the total. This suggests that if social interactions play a major independent role in determining the macroeconomic outcomes, then the access to the labour networks is likely to be key. Other activities of people may be ancillary.

The interactions between **networks of organizations**, who in turn are made up of people networked together, may be the other fruitful area for exploration.

A closer look at the network "status" of various groups may be useful. One "simple" approach is to allocate people into the "included" or "excluded" categories, with a possible "purgatory" in between of people "in transit". The question would be whether people belong to effective networks or not. In practice, it means identifying people with secure jobs, adequate retirement incomes and the support of families or institutional settings. For young people, it is an issue of a supportive family network and school system.

As a starting point the two sides of the range can be filled in, avoiding double-counting, with those who are included on the "right" and those excluded on the "left", with a residual in the middle.

Excluded	"Limbo"	Included
long-term unemployed		employed full-time
discouraged workers	contingent workers part-time (residual)	part-time by choice
short-term unemployed not frictional	frictional unemployment	temporary layoff
In prison or remand		NILF, not on welfare
welfare	workfare?	school, part-time training
on-reserve, unemployed		school, full-time
pensioner (GIS)		nursing home pensioner
street people	mental institution	community house
client of "do-gooder" group	donate cash	member of volunteer group

We now turn to specifics about this allocation, as well as discussing other indicators.

4.1 Workplace Dimensions

One of the major collection of "networks" are the many firms employing from one to 10,000+ workers. If there are macroeconomic effects from networks, then one would expect that these would be a source. Indeed, one might think of the productivity of a firm as reflecting the network economies of the organization.

The first step is to look at those people who are clearly "included" in the major network - employment on an on-going , secure basis.

Look at young people (M&F), including both labour market and education participation (notion of engagement)

Look at men and women at 55-64.

In the workplace it might be useful to compare the number of managers/supervisors per 100 workers as an indicator of trust (reciprocal)

Absenteeism and Sickness info standardized for size (people and hours). (M&F)

See **Fat and Mean**

4.2 Social Exclusion

Stats for aboriginal youth and other age groups (issue of exclusion and discrimination)

Number of people incarcerated.

Long-term unemployed.

Not-so-long unemployed (but beyond "in transit")

Social assistance recipients

4.3 Income Distribution

Is this about social cohesion or a result?

Robison and Siles [1997] explain both the level and the disparity of incomes through changes in a set of social capital proxies.

4.4 Trust

% of people marrying for the first time (first time marriages), divorces a % of married families, number of births outside marriage [Pullinger, p.8]

World Values Survey

4.5 Association Membership

See Putnam, Helliwell, Olson

4.6 TV Viewing

Putnam's view is that this is an all-encompassing explanation for US demise in social capital measures.. [Putnam 1996]

4.7 Newspaper Circulation

Declining readership is taken as evidence of less interest in society. May be alternative "channels" for information, ads, social notices. Some magazines may substitute. TV is a substitute. If newspaper concentration leads to only one or two views - then this too may explain decline in readership.

4.8 Voting

% population voting in federal elections, provincial elections, local elections

parse if possible into [% eligible]* [% voting of eligible].

4.9 Diversity

% of largest ethnic group in "region" / province or national. View is that the more homogeneous, the more trust, networking, etc.

4.10 Number of Lawyers

% of enrolment in university in law school (leading edge, but failure rate may differ)

Number of lawyers (called to bar) as percent of population or GDP

View is that large number or rising number reflects growing conflict, or rewards for generating conflict. (Joke re one and two lawyers.)

In Eastern Europe social cohesion allowed agreements to be struck among entrepreneurs, clients, and creditors, in the absence of proper institutions to enforce contracts and to accumulate collateral for borrowing [Kolankiewicz, p.1] Thus social cohesion may be a substitute for lawyers, but it is not clear that following Shakespeare's advice would necessarily increase social cohesion.

5. Measures of Canada's Economic Performance

If there are linkages from social cohesion to macroeconomic performance, the question immediately arises as to which dimensions of economic performance are most affected, and in what direction?

5.1 Economic Growth

The pace has been slowing

5.2 Unemployment

rising level of unemployment at each cycle

lower prate, lower ERATIO

5.3 Investment Performance

An independent influence on investment effort, or investment as a share of Gross Domestic Product, is an interesting channel since this would raise factor productivity directly, at least in the model of Maurice F.G. Scott.

5.4 Real disposable income

per household measure, per capita, adult equivalents issue. Income continues to decline since 1989

5.5 Inflation

GDP deflator (factor cost), market prices, CPI. Inflation is low, but at high social cost.

Role of social cohesion here might be in improving the inflation-unemployment tradeoff. (See policy section below.)

5.6 Economic Well-being Index

Simply note that it has declined.

6. Policy Suggestions

"Social capital .. can be dissipated by the actions of governments much more readily than those governments can build it up again." [Fukuyama, p.362]

"The social compact is a promise we made to one another, and we are not keeping it when we can most afford to." (Robert Reich)

6.1 OECD work

The OECD has produced a number of studies on social programs, with a link to the fiscal difficulties of the member countries. They try to sell the view that fiscal restraint is a necessary condition for policies to promote social protection and well-

being [OECD 1997, p.10] They seem surprised, however, that the "...economic strategy of prudent macroeconomic policy, including fiscal consolidation, structural reform and market liberalization" has resulted in " .. witnessing in some OECD countries signs of social unrest and protest movements as well as popularity ratings for many governments and a "feel bad" factor which may reflect a lack of confidence in these policies." [p.9]

Although there are many good intentions spelled out, one is left with the feeling that the governments are not prepared to change their fiscal strategy at all, leaving little hope for much coordinated progress among the OECD countries.

This suggests that we had better focus our attention on what we can do in Canada, rather than waiting for the OECD to provide guidance. This is even more obvious if one takes the view that the OECD represents a lagged consensus of the member countries, with particularly strong influences from the Finance officials in each country.

6.2 Improved Institutions

At one time (1964-1975), Canada was well-served by an institution that brought together the various private sector interests (business, labour, associations, education, etc.) and defined the economic goals of the society and the medium-term policies to approach them. This served as a framework for the social compact and provided some coherence to governments in their programs. However, it began to fall apart when significant elements of labour withdrew as a protest against the introduction of mandatory wage-price controls (the Anti-Inflation Board of AIB). Nor did they return three years later when the AIB was folded. The Economic Council continued until 1991, operating primarily as a research institution, but with a greatly reduced role in forming a consensus.

The elimination of the Economic Council (and the Science Council) left no vehicle for discussion of economic goals, independent from the political documents of the government of the day. Nor are there as many objective economic studies to be referred to in the policy discussions among NGOs and governments. (For a fuller discussion of the demise of the Economic Council see [McCracken 1992].)

The decision to close the Economic Council had more to do with silencing public debate than showing some "fiscal prudence", particularly in light of the subsequent draconian fiscal and monetary policies that produced the longest recession in postwar experience (to date).

6.2.1. Economic and Social Council

A new institution should be developed along the lines of the Netherlands Economic and Social Council. It should be a consensus-forming organization with representatives from:

- labour
- large business
- small business
- provincial governments
- federal government - mandatory for Deputy Minister of Finance and Governor of Bank of Canada to attend meetings, along with social policy departments.
- NGOs (public interest)

Supporting staff to include sociologists, economists, and such other disciplines as necessary to ensure a broad-based, trans-disciplinary approach to the study of issues and policies.

6.2.2. Science and Environmental Council

Society is also concerned about science, technology, the environment, and regulation of technological change. This institution would be a useful “re-birth” of the Science Council of Canada. Its mandate should include an open approach to the discussion of science matters, including both an educational element and the promotion of expert discussion on the key issues of biotechnology, climate change, health, genetics, etc.

6.3 Improved Fiscal and Monetary Policy**6.3.1. Vigorous Pursuit of Full Employment**

output gap 5% less (cut in half)

6.3.2. Automatic Stabilizers

Improve automatic stabilizers by restoring unemployment insurance (UI) system to fuller coverage and better benefits and ensuring the social assistance system (SA) is adequately funded, particularly during cyclical downturns. More extremely, it may be appropriate for the federal government to take over the financing and delivery of both the UI and SA systems, perhaps in return for the provinces assuming full responsibility for health care. [McCracken 1998a]

6.3.3. Objectives of Monetary Policy

Lower real interest rates to 3% or less and keep them there.

And I thought you would want to emphasize the possibility of a better way of dealing with the potential for inflationary pressures. Even the Layard/Nickell line of macro reasoning finds that the Scandinavians have achieved a better inflation/unemployment relationship due to corporatist central bargaining on wage levels. The alternative strategy of mass unemployment as an inflation control device is both very costly in production terms, and creates a negative feedback loop in lower future social cohesion, lower productivity growth and an even worse inflation/unemployment menu.

6.4 Improved Structural Policies

Need for balance and recognition of costs of destroying social cohesion

[Bessis, 1995] 31 ff.

Some thoughts from the Roskilde Symposium:

- Changing ways of life
- Redefining the roles of the state - more pro-active, an integrative role on tackling exclusion and poverty
- mending the social fabric
- minimum income
- work-sharing
- implementation of vigorous employment policies, including social employment
- new meaning to democracy; involvement of social groups in decision-making and in responsibility for actions

6.5 Improved Governance

6.5.1. Federal-provincial Relations

Canada is "defined" as much by its struggles over federal-provincial matters as it is by its dual cultures, desire to be like the US, but with the appearance of difference, and its weather. Yet the increasingly bitter feuds between the federal and provincial governments is harming social cohesion by destroying the trust in both levels of government, while leading to poor policies - macro and micro.

At the same time, global corporations are embracing the concepts and operational advantages of federalism by organizing through the use of subsidiarity [Handy, p.133 ff.]. Where as citizens we seem to miss is in allowing ourselves to slip into a view that governments are competitive enterprises, rather than parts of an entity we

call government. If we insist on applying the corporate organization model, then it should be one of a large enterprise, with multiple branches.

6.5.2. Consultation Processes

Aside from the organizational structure needing work, there is a need for real consultation with the citizens of the country through a variety of devices. With rising education levels, citizens seem to want to participate more. The key is to develop ways for effective inputs, true listening by governments, and better communications with all citizens.

7. Why Bother?

What is the impact of increasing economic growth by 0.5% per year?

Although this sounds quite modest, over a ten-year period this would mean a five percent larger economy; over twenty years more than a ten percent gain.

Conveniently, this is enough to close the output gap that has opened up from the early 1970s, leaving us with much higher unemployment rates than necessary and wasting public and private resources in the process.

If routed to real disposable income then it provides a chance for a turnaround in the situation of declining real disposable income per household that has characterized the period from 1990 on and resulted in the 1997 level below the 1981 level by about six per cent.

What are the advantages in a society in which all of its members feel included, rather than having some people outside looking in?

For those outside the gain is obvious. But those currently "inside" have more security of person and property, the benefits of a larger functioning society, and less need for redistribution of income, given full access to all.

What is the importance of demonstrating to the world that there is a more sensible model of social and economic improvement?

By developing a society in which improvements in social cohesion and economic prosperity go hand in hand we can provide a working example for the rest of the world. This will help to create some sense of hope for the 5 billion who are not worried, unfortunately, about the niceties of improving social cohesion and improving economic growth, but rather must focus on the next meal and survival overnight. They have only despair and deprivation.

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Figures for Paper - Social Cohesion and Macroeconomic Performance

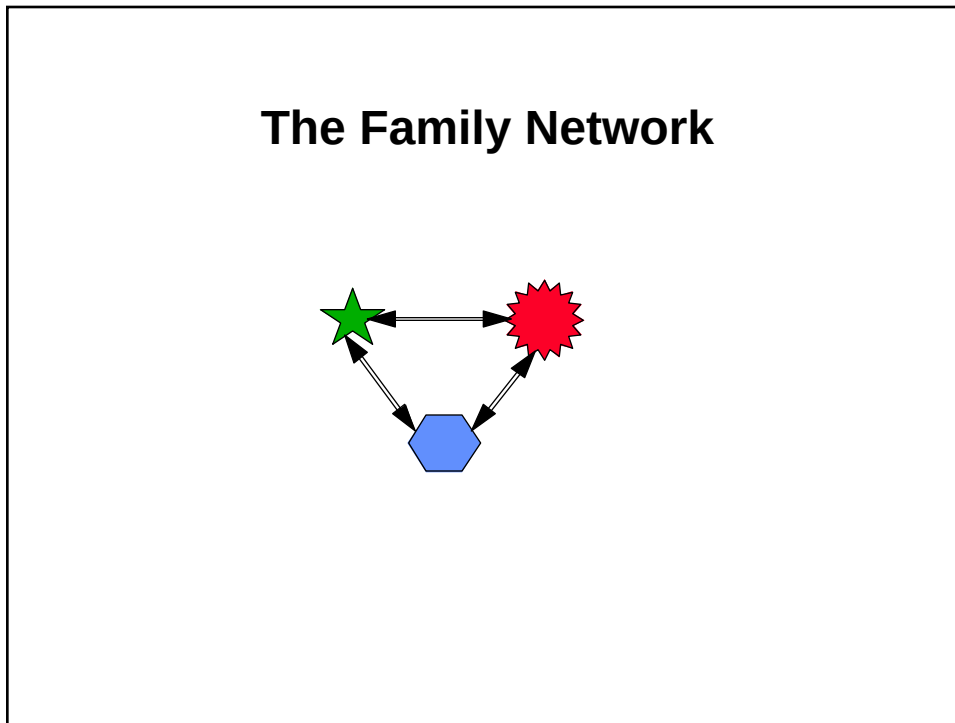


Figure 1. The Family as a Network

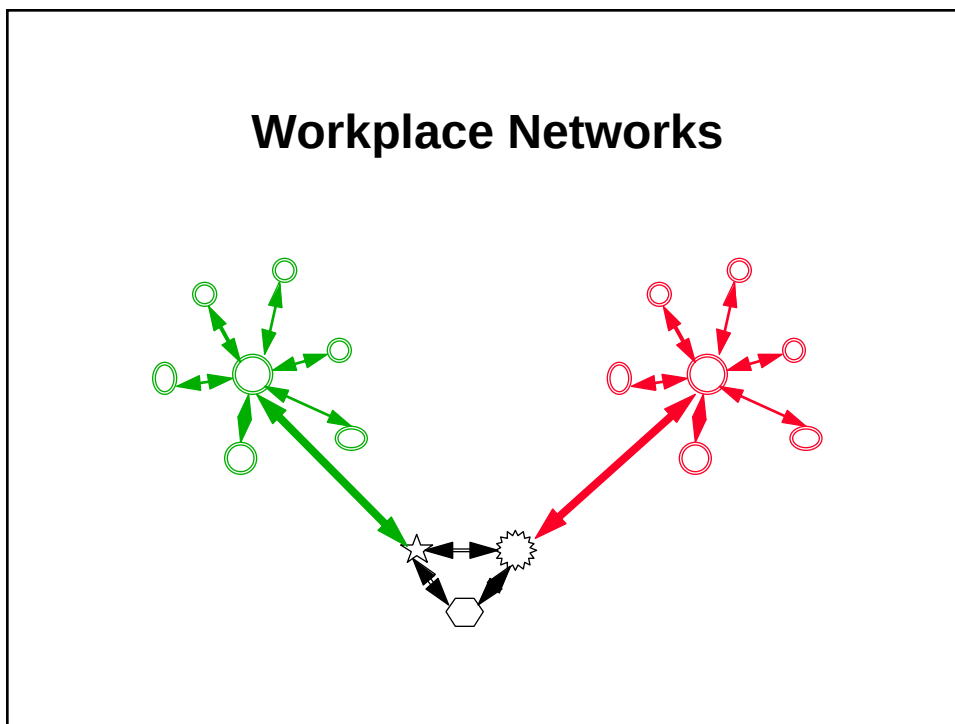


Figure 2. Employment Networks

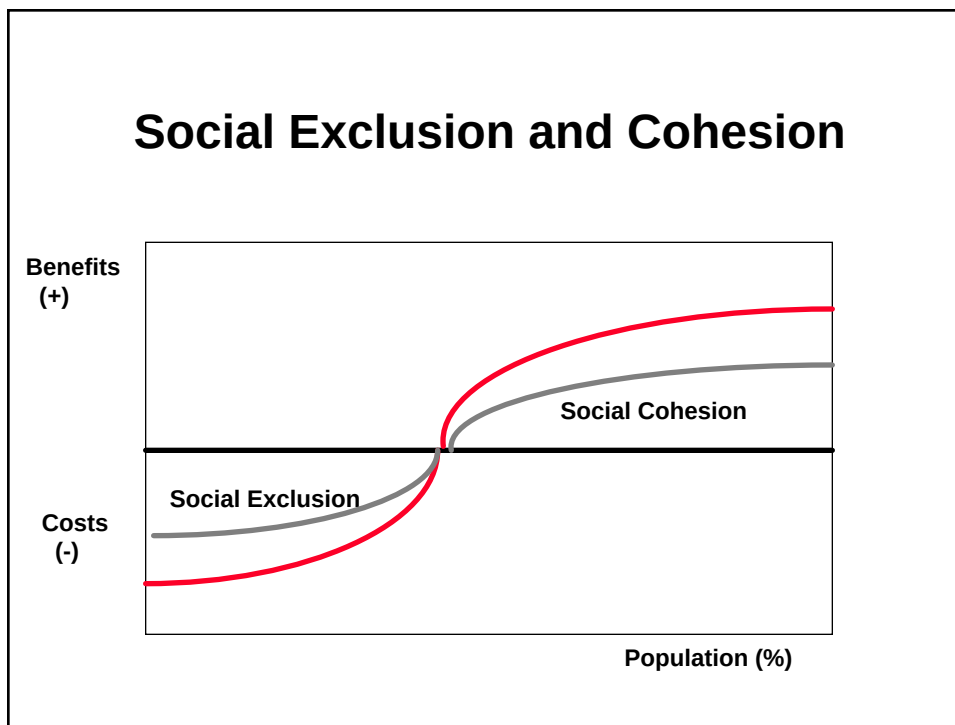


Figure 3. Social Exclusion and Cohesion

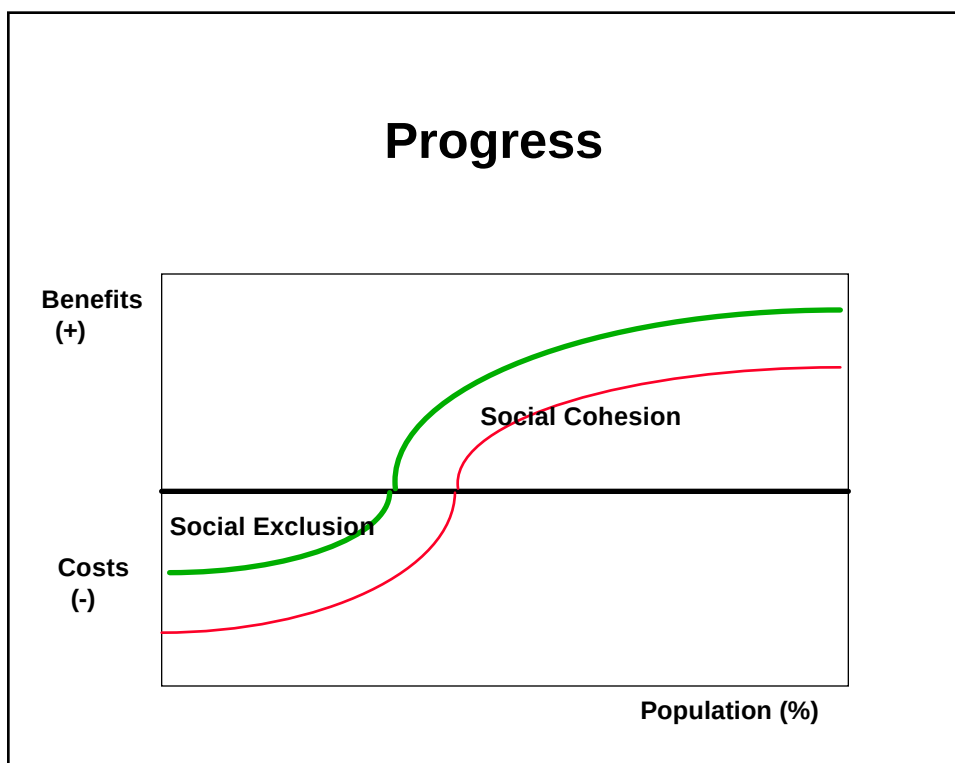


Figure 4. Definition of Progress

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
niveaux de vie*

Evaluating Measures of Well-Being

David Hay
The Information Partnership

Session 6A: Conceptual and Empirical Issues in the Measurement of Well-being
October 31 8:30 AM - 11:00 AM

EVALUATING MEASURES OF WELL-BEING

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For presentation to
The Centre for the Study of Living Standards Conference,
The State of Living Standards and the Quality of Life in Canada
October 30-31, 1998

DRAFT WORKING PAPER

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EVALUATING MEASURES OF WELL-BEING

◆ OVERVIEW

This paper is an analytical discussion of conceptual and methodological issues in the measurement of well-being. The paper argues that measuring well-being is much more than simply searching for the 'perfect measure'. The measurement of well-being is a dynamic and purposeful exercise that must acknowledge and incorporate social and political processes. The paper closes by applying the analytical discussion and introducing a set of guidelines for the assessment of well-being measures.

The paper was prepared in response to the call for papers from the Centre for the Study of Living Standards (CSLS) in support of their project on *The State of Living Standards and the Quality of Life in Canada*.¹ Specifically, this paper contributes to the CSLS project objective of "critically examining various aspects of the state of living standards and quality of life in Canada". The paper also provides an interpretation of some of the things necessary to "identify the various dimensions in economic and social well-being". As well, the paper discusses issues that can aid the task of creating "specific policies that will contribute to the betterment of the well-being of Canadians".

◆ UNDERSTANDING WELL-BEING MEASUREMENT

There is a great deal of interest, discussion, and activity across the country in developing new understandings and measures of well-being. This is happening among and between different sectors and segments of Canadian society. New approaches to understanding and measuring aspects of social and economic life can be seen by activities and reports on quality of life, indicators (social, economic, societal, local, community, etc.), population health, sustainability, accountability and performance, community well-being, and so on.²

There are many reasons for this interest in well-being measurement: in support of planning, policy-making, education and awareness, advocacy activities, and so on. Perhaps all the current initiatives share the goal of creating an improved, more comprehensive

understanding of life in Canada. Most of the initiatives also want these new understandings to be applied, i.e., for the information created to be used to improve, and make more accountable, public and private decisions that affect well-being.

At the same time, there is an abundance of available and accessible data for measuring the quality of Canadian life. One result of such an opportunity is that researchers and policy-makers have been spurred to action. As a result, there are an increasing number of new measures of well-being: the Index of Social Health, the Quality of Life Index, Local Indicators for Excellence, the Social Well-Being Index, the Human Development Index, the Genuine Progress Indicator, and so on.³

This abundance of activity also raises questions, for example: how will it be known which measures are 'good' measures, and which ones aren't so good?; what exactly should be considered when making such an assessment; and how, and why, should choices amongst measures be made?

Certainly abundant data are not sufficient to produce adequate measures of well-being. The task is more involved than picking and choosing amongst available indicators. This paper argues that a thorough understanding and consideration of conceptual and methodological issues in the measurement of well-being is a necessary starting point for creating valid, reliable, and transparent measures of well-being.⁴ Understanding, measuring, and achieving well-being is not a static exercise, it is dynamic and purposeful. The exercise is imbued with meaning and import, and its social and political aspects and consequences should be acknowledged.

It is first important to consider my interpretation of the context within which well-being measurement is best understood. An evaluative discussion of well-being measurement needs to be situated within an understanding of the relationships between well-being concepts (i.e., how well-being is defined, or what well-being means), well-being measures (i.e., well-being defined in measurable terms), and strategies for well-being (i.e., the ways and means of achieving well-being). As well, each of the three – well-being concepts, measures, and strategies – and the relationships between them, are best (only?) understood if discussed with acknowledgement of the social and political processes that surround their

development and application. These processes are important to understand as they illuminate how and why well-being becomes defined, measured, and achieved.⁵ Figure 1 attempts to graphically represent this understanding of well-being relationships.

► Measures, Concepts, and Strategies

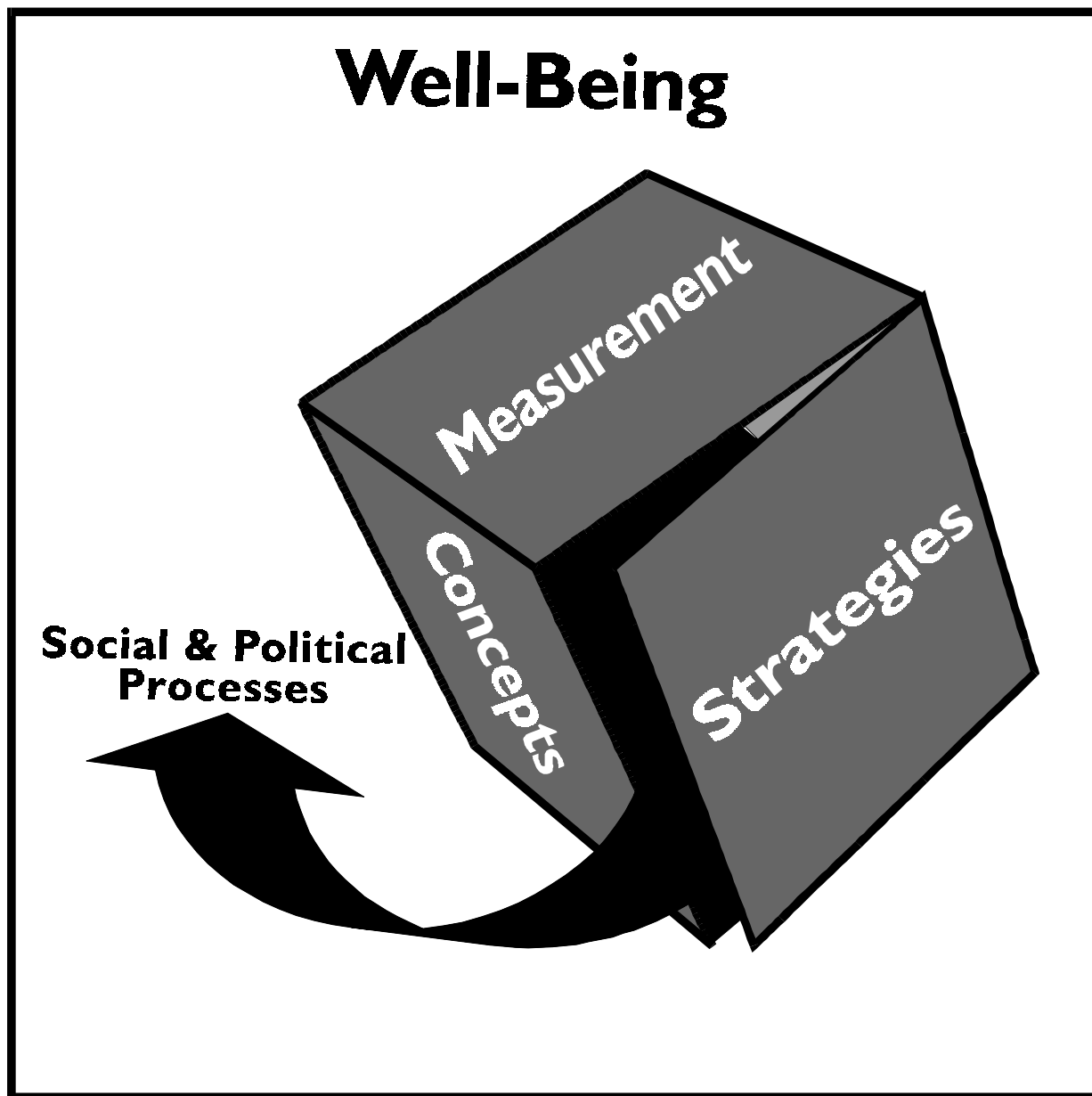
There are two things of primary importance to take from Figure 1. The first is that the measurement of well-being is inextricably bound up with well-being concepts and strategies – i.e., well-being is represented by the entire box in the diagram. What this means is that to completely understand well-being – however it is conceived – requires understanding the relationships between its definition, measurement, and application.

The measurement of well-being is simply a tool – a tool that comes between our understanding of what we want (i.e., what we define as well-being or our conception of ‘the good life’), and our understanding of how we will get what we want (i.e., what strategies we will use to achieve well-being). How we will know when we have achieved what we want is at least partially answered through the information that well-being measures are able to provide. Well-being measures produce the information that contributes to an assessment of the progress – or lack of it – that has been made towards our goal, i.e., well-being.

It would seem, therefore, that the task of understanding well-being measurement should begin by understanding well-being. That is, to measure well-being it would be wise to have some conception of what it is. On the one hand this is plainly good research practice, i.e., concepts should be defined before attempts are made to measure them. On the other hand, however, it is evident that well-being measures can be produced that do not acknowledge well-being concepts, strategies, or the interrelationships between the three.⁶

Many approaches to understanding well-being take defined sectors (such as health, education, housing, employment, and so on), outline measures and indicators for each of the sectors (e.g., mortality rates, number of students completing high school, housing starts, unemployment rates), and then examine levels of achievement on the measures and indicators for each sector.⁷ The sectors are seen to be self-evident. That is, there is no framework that makes plain the relationship between the sectors and a conception of

Figure 1: Understanding Well-Being Measurement



well-being, or any attempt to integrate the sectors and specify their inter-relationships. Moreover, these approaches do not explicitly appeal to, nor are they informed by, fundamental values, principles, or ideals.⁸ Neither a definition of well-being, nor the priorities and policy directions for achieving it, are explicit, they have to be inferred from the total set of measures or indicators that are used to gauge 'progress'.

► States and Processes

The second important insight from Figure 1 further specifies the first. Well-being – either, or all of, its definition, measurement, or application – is best understood as both a state of being, and as a process of seeking. Questions asked to understand states of being include: What is well-being? How is it defined? measured? What are our individual and collective priorities for well-being? Questions raised to understand processes of seeking include: Who defines well-being? i.e., who defines and sets priorities for what we seek? What processes, structures, and institutions support the achievement of well-being? incorporate our values and priorities? aid in the resolution of conflicts and tensions?

The importance of the state and process distinction is two-fold as it applies to measurement of well-being. One, well-being measures themselves should incorporate indicators of social and political processes. This is beginning to be recognized with the inclusion of indicators in some measures of such things as rates of voting, charitable giving, voluntary activity, and so on. Two, and more significant, is that to respect the effectiveness and accountability of any well-being measure requires a fairly high democratic standard. There should be greater access by more people to the decision-making forums where well-being definitions, measures, and strategies are developed and implemented. The Ekos research study of 1995, *Reinventing Government*, provided a clear picture of the different understandings of social and political priorities between 'elites' – public and private sector decision-makers – and the general population.⁹ It could be argued that each group chose priorities in their own interest, but the point is that the elites have the opportunity to make decisions in favour of their priorities in forums where the decisions may affect the population as a whole.

People are always engaging in actions to maintain or enhance their well-being, so an understanding of states of well-being has to encompass understandings of the social and

political processes integral to its achievement. “Definitions of well-being will inevitably be set politically, through the interaction of groups seeking, claiming”.¹⁰ States of being and processes of its seeking are not separable – they are both integral to a fully developed understanding of well-being.¹¹ This is a radical recognition of the respect required for what is essentially the ‘plurality of truth’. It is an understanding that definitions or conceptions of well-being can be – will be – ever changing, as the dynamics of human life and its participants are as well.

Universal conceptions of well-being applied to the ‘human condition’ would seem to be misguided, however, as the foregoing indicates that conceptions of well-being are best understood as particular to people, organizations, communities, culture, and so on. As well, this suggests that there can be no fixed set of measures of well-being when it is understood as a process that is shaped by the claims and identities of various actors.

Given the above, a review of existing well-being measures points to their relative value and limitations as a result.¹² For example, many measurement approaches are developed to be general or ‘one-size-fits-all’, and apply to different groups or places. For example, ‘human needs’ approaches to well-being – where a list of needs is presented (such as, food, shelter, control, autonomy, knowledge, and so forth) – depend on experts’ a priori understanding of the potential and priorities of human experience.¹³ Of course, human needs are not universal, they have to be grounded in human experience as they are particular to communities and cultures.¹⁴ Thus particular community indicators may be more effective and have more meaning.

► Other Issues

From the literature on well-being, there are three other issues for consideration, and they are discussed in turn.¹⁵

- *Quantitative and Economic Indicators*

There is an overwhelming reliance on quantitative (and predominantly economic) indicators in most measurement approaches. This can result in measures of well-being primarily

measuring the economy and economic performance. Hence, there is a tendency to neglect the measurement of social aspects of well-being, even in economic terms.¹⁶

There is also a tendency to ignore the measurement of some things simply because they are not easily quantifiable. This suggests that other types of information could be included in measurement approaches. For example, a critical literature review and/or other primary research (e.g., surveys, focus groups, in-depth interviews) could also be legitimately incorporated as information to understand well-being.

- *Social Control*

Indicators can be explicitly or implicitly used for purposes of social control. For example, if measures of well-being or quality of life in a province or nation are primarily economic based, our lives can be indirectly, or even directly, shaped by this focus. Pressure can be exerted on people to change or 'improve' themselves to meet the needs of the economy, rather than the economy being organized to meet the needs of the people.¹⁷ Thus the 'economic bias' of reporting introduced through the use of primarily economic indicators (noted above) can have troubling social consequences.

- *Means and Ends*

Measurement approaches can result in the objectification of social reality (i.e., where measurable standards become ends in themselves, rather than means to other ends). For example, things such as interest rates, Gross Domestic Product (GDP) growth rates, and inflation rates can become goals for well-being, in and of themselves. For example, it is often stated that we have a goal of a certain percentage rate of unemployment, and not a goal of, for example, meaningful and remunerative daily activity. Obviously what is overlooked is that measures should relate to and be viewed in conjunction with other important issues. That is, these measures should be viewed as means to achieve other ends.¹⁸

◆ **ASSESSING WELL-BEING MEASURES**

An acknowledgement of conceptual and methodological considerations in the measurement of well-being should not be regarded as a barrier to work in this area, but rather as a useful means for assessing the preparation and maintenance of well-being measures relative to conceptual and methodological standards, and in the context of social and political processes. The task is not to say yea or nay to any particular measure, rather it is to expose any weaknesses, and suggest ways to overcome them. In this way the attempt is to take a first step towards the creation of an accountability framework for well-being measurement. Based on the analytical discussion in this paper, the following list is proposed as a set of guidelines to assess well-being measures (see Table I).

Table 1: Evaluating Well-Being Measures

Guidelines for Well-Being Measures	
Purpose	Does a stated purpose for the measure exist?
Definition of Concepts	Is there a definition or conception of well-being to guide understanding of the measure?
Dynamic or Static?	
• process	How has the measure been defined, constructed, interpreted, and applied?
• content	Do the indicators, or the measure as a whole, represent a static or dynamic understanding of well-being?
Measuring Up?	
• types of indicators	What is the balance between quantitative / qualitative, economic / social, and other types of indicators?
• impact of indicators	Do the indicators, or the measure as a whole, contribute to social control in any way?
• flexibility	Are there opportunities to customize the indicators, or the measure as a whole, to reflect local priorities and interests?
• connected / integrated	Are the indicators, or the measure as a whole, explicitly connected to a conception or definition of well-being? Are the various indicators integrated in any way?

◆ CONCLUSION

This paper has discussed the importance of considering and addressing conceptual and methodological issues in the development, use, and assessment of the outcomes of well-being measurement activities.

Better measures of well-being are not a sufficient condition for enhancing well-being outcomes. This paper has argued that better well-being measures are only better if they are explicitly linked to well-being definitions and strategies, i.e., to what goals we want to achieve, and how we intend to go about achieving them, with well-being measures as one of the tools.

A list of guidelines to assess well-being measures was proposed. Future versions of this paper will assess particular measures using the guidelines. Measures that will be examined include the Genuine Progress Indicator, the Index for Social Health for Canada, and the Quality of Life Index.

◆ NOTES

1. See the *Project Overview: The State of Living Standards and the Quality of Life in Canada: Perspectives and Prospective* for more information. Available from the Centre for the Study of Living Standards, 111 Sparks Street, Suite 500, Ottawa, Ontario, K1P 5B5, tel: 613 233 8891, fax: 613 233 8250. Also available at the CSLS web site <http://www.csls.ca/slsqloverview.html>. The quotes in the following three sentences are from page 1 of the web version of the *Overview*.
2. For examples, see Lars Osberg and Andrew Sharpe, *An Index for Economic Well-Being for Canada*, 1998; Auditor General for British Columbia and Deputy Ministers' Council, *Enhancing Accountability for Performance*, Victoria: Office of the Auditor General, 1996; David I Hay and Andy Wachtel, *The Well-Being of BC's Children and Youth*, Vancouver: First Call Coalition, 1998; Canadian Policy Research Networks, *Societal Indicators*, 1998
http://www.cprn.com/f_corp/socdis_e.htm; Canadian Council on Social Development, *Measuring Well-Being: Proceedings from a Symposium on Social Indicators*, Ottawa, CCSD, November, 1996. As well, see the many contributions to the CSLS project, available from CSLS, and at <http://www.csls.ca/october.html>.
3. Satya Brink and Allen Zeesman, *Measuring Social Well-Being: An Index for Social Health for Canada*, Ottawa: Human Resources Development Canada, June 1997; Malcolm Shookner, *The Quality of Life in Ontario 1997*, Toronto: Ontario Social Development Council/Social Planning Network of Ontario, October 1997; Nicole Martel, *Edmonton LIFE: Local Indicators for Excellence*, Edmonton: Edmonton Social Planning Council, 1997; Mark Fraser, *Social Well-Being Index: Hamilton-Wentworth Region Spring Update - 1998*, Hamilton: Social Planning and Research Council of Hamilton-Wentworth, 1998; United Nations Development Programme, *Human Development Report 1998*, New York: Oxford, 1998; Clifford Cobb, Ted Halstead, and Jonathan Rowe, *The Genuine Progress Indicator: Summary of data and methodology*, San Francisco: Redefining Progress, 1995.
4. The following discussion is an extension and further development of work undertaken through the Social Development Research Program, a joint program of research conducted from 1991-1995 by the Social Planning and Research Council (SPARC) of BC and the Faculty of Human and Social Development at the University of Victoria. The Program was funded by National Welfare Grants, Health and Welfare Canada (now Social Development Partnerships, Human Resources Development Canada). There were two senior researchers for the duration of the program – Deborah Rutman at UVic and myself at SPARC. For more information on publications and products from the research program, contact SPARC, <http://www.vcn.bc.ca/sparc>.
5. These issues are discussed – in part, in various ways, and from different analytical perspectives – in the following: Marcia Rioux and David I Hay (eds), *Well-Being: A Conceptual Framework*; Patrick Kerans and Glenn Drover, *Well-Being & Social Movements*; David I Hay and Deborah Rutman, *Well-Being, Community & Measurement*; Michael Bach, Leon Muszynski and Marcia Rioux, *Well-*

Being, Society & Institutional Development. These four papers were published together in *Well-Being: A Conceptual Framework and Three Literature Reviews*, Vancouver: Social Planning and Research Council of BC, 1993. See also, David I Hay, *Well-Being: A literature review and annotated bibliography*, Vancouver: SPARC-UVic Social Development Research Program, Working Paper WP2(2), 1992; Glenn Drover and Patrick Kerans, *New Approaches to Social Welfare Theory*, Aldershot, England: Edward Elgar, 1993; The Roeher Institute, *Social Well-Being: A paradigm for reform*, Toronto: The Roeher Institute, 1993.

6. See Hay, *op.cit.*; Hay and Rutman, *op.cit.*
7. For examples see J.E. Stiff and D.L. Silver, *Quality of Life Index for Pasadena*, Pasadena, CA: Pasadena Public Health Department, 1991; Index for Social Health, *Monitoring the Social Well-Being of the Nation*, Tarrytown, NY: Fordham Institute for Innovation in Social Policy, 1995; Brink and Zeesman, *op.cit.*; Fraser, *op.cit.*
8. For example, the Index for Social Health for Canada assesses indicators "against past performance rather than an ideal standard" (Brink and Zeesman, *op.cit.*, p.11).
9. See Ekos Research Associates, *Reinventing Government*, Ottawa: Ekos, 1995.
10. Kerans and Drover, *op.cit.*, p.52.
11. For theoretical and philosophical arguments on this point, see Kerans and Drover, *op.cit.*; and, Drover and Kerans, *op.cit.* For a restatement and elaboration of this point as it applies to measurement and community, see Hay, *op.cit.*; Hay and Rutman, *op.cit.* For a discussion related to social and institutional development, see Bach, Muszynski, and Rioux, *op.cit.* See also Rioux and Hay, *op.cit.*, for an integration of these perspectives.
12. Hay and Rutman, *op.cit.*
13. An application of a basic needs approach to defining well-being is the establishment of conceptions and measures of poverty. Obviously a definition of poverty will depend on the range of needs defined as basic. Chris Sarlo defines basic needs very narrowly and estimates that less than one million Canadians are living in poverty (Chris Sarlo, *Poverty in Canada*, Vancouver: The Fraser Institute, 1992). Other definitions of poverty put estimates to five times that amount (David P. Ross and Richard Shillington, *The Canadian Fact Book on Poverty 1989*, Ottawa: Canadian Council on Social Development). The question is which definition of basic needs more closely approximates an acceptable normative criterion?
14. See Patrick Kerans, *Welfare and Need*, Paper presented to the Fifth National Conference on Social Welfare Policy, Lennoxville, Quebec, 1991; Peter Penz, *Normative Issues in Social Needs Assessment: A Theoretical Overview*, York University, Faculty of Environmental Studies, 1986; Elizabeth Whitmore and Patrick Kerans, "Participation, Empowerment, and Welfare", *Canadian Review of Social Policy*, 22:51-60, 1988; Sharon Manson Willms and Leslie Gilbert, *Healthy*

Community Indicators: Lessons from the Social Indicator Movement, University of British Columbia, Centre for Human Settlements, 1991; Michael Hayes and Sharon Manson Willms, *Healthy Community Indicators: The Perils of the Search and the Paucity of the Find*, University of British Columbia, Health Policy Research, 1990.

15. See Hay and Rutman, *op.cit.*
16. See Hazel Henderson, *Paradigms in Progress: Life Beyond Economics*, Indianapolis, IN: Knowledge Systems, 1991; T.M. Power, *The Economic Value of the Quality of Life*, Boulder, CO: Westview, 1980; T.M. Power, *The Economic Pursuit of Quality*, Armonk, NY: M.E. Sharpe, 1988.
17. F. Nectoux, "Social indicators: for individual well-being or for social control?" *International Journal of Health Services*, 10:89-113, 1980.
18. Joel Lawson, *The Use of Indexes in Achieving Sustainable and Healthy Communities*, Task Force on Planning Healthy and Sustainable Communities. Vancouver: University of British Columbia. 1991.

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
niveaux de vie*

A Quality of Life Index for Ontario

Malcolm Shookner
Ontario Social Development Council

Session 6A: Conceptual and Empirical Issues in the Measurement of Well-being
October 31 8:30 AM - 11:00 AM

A Quality of Life Index for Ontario

Written by:

*Malcolm Shookner
Ontario Social Development Council*

For presentation at:

*Conference on the State of
Living Standards and the
Quality of Life in Canada*

October, 1998

QUALITY OF LIFE INDEX

REPORT SUMMARY

Major changes are taking place in Ontario which are having dramatic effects on the health and well-being of residents. They include:

- economic re-structuring and high unemployment
- government cuts in social programs
- devolution of responsibilities to the provinces and municipalities
- reduced roles of governments in economic and social development
- increasing poverty, especially for young families

The Quality of Life Index was conceived in this environment as a community development strategy to monitor the living and working conditions of Ontarians.

Quality of life is defined as:

“The product of the interplay among social, health, economic and environmental conditions which affect human and social development.”

The purpose of the Quality of Life Index (QLI) is to provide a tool for community development which can be used to monitor key indicators that encompass the social, health, environmental and economic dimensions of the quality of life. The QLI can be used to comment frequently on key issues that affect people and contribute to the public debate about how to improve the quality of life in our communities and our province.

The following indicators are included in the Quality of Life Index:

SOCIAL: Children in care of Children’s Aid Societies; social assistance recipients; public housing waiting lists.

HEALTH: Low birth weight babies; elderly waiting for placement in long term care facilities; suicide rates.

ECONOMIC: Number of people unemployed; number of people working; bankruptcies.

ENVIRONMENTAL: Hours of poor air quality; environmental spills; tonnes diverted from landfill to blue boxes.

The Quality of Life Index has been calculated for 1997 and was updated in the Spring of 1998. Based on these calculations, the quality of life has declined in Ontario since 1990. A closer look at the twelve indicators reveals progress in some areas and setbacks in others. Access to information has raised a number of problems and issues which are discussed.

For more information, visit our website:

www.qli-ont.org

A QUALITY OF LIFE INDEX FOR ONTARIO

INTRODUCTION

Major changes are taking place in Ontario which are having dramatic effects on the health and well-being of residents. They include:

- economic re-structuring and high unemployment
- government cuts in social programs
- devolution of responsibilities to the provinces and municipalities
- reduced roles of governments in economic and social development
- increasing poverty, especially for young families

The impacts of these changes are felt primarily by vulnerable people: women, children, people with disabilities, and people living in poverty. These population groups are also at higher risk for poor health.

Social development councils (i.e. Social Planning Councils, Community Development Councils) across Ontario have documented the impact of cutbacks on communities. Yet while the damage reports were being compiled, the count of jobs lost and the closure of social programs, there was also the determination to rebuild the capacity of their communities to cope with problems and care for their people in these turbulent times. The Quality of Life Index was conceived in this environment as a community development strategy to monitor the living and working conditions of Ontarians.

DEFINING QUALITY OF LIFE

Quality of life can be defined as:

“The product of the interplay among social, health, economic and environmental conditions which affect human and social development.”

Establishing consensus on how best to manage growth and change is the purpose of defining and measuring local quality of life. Each community that seeks to define and measure quality of life will have to build consensus on what is considered important and worth preserving, enhancing or striving for. It should become a regular component of community planning processes.

QUALITY OF LIFE INDEX



Ontario Social Development Council and Social Planning Network of Ontario, 1997

QUALITY OF LIFE AND COMMUNITY DEVELOPMENT

As social development organizations, our goal is to improve the quality of life in our communities by promoting optimal conditions for human and social development and sustaining them for future generations. The purpose of the Quality of Life Index (QLI) is to provide a tool for community development which can be used to monitor key indicators that encompass the social, health, environmental and economic dimensions of the quality of life in our communities. The QLI can be used to comment frequently on key issues that affect people and contribute to the public debate about how to improve the quality of life in our communities and our province. It is intended to monitor conditions which affect the living and working conditions of people and focus community action on ways to improve health.

QUALITY OF LIFE AND DETERMINANTS OF HEALTH

The Quality of Life framework we are using is consistent with the determinants of health framework being used by Health Canada to guide its Population Health Program. The following key determinants of health have been identified:

- Income and social status
- Social support networks
- Employment and working conditions
- Social environments
- Physical environments
- Healthy child development

These conditions have a measurable impact on the health status of people. It follows that many factors which affect health fall outside of the health care system. It is these social, economic and environmental factors which play a critical role in determining the health of the population.

These determinants are consistent with the social development model in their attention to income and social status, employment and working conditions, and physical environment, while adding new dimensions to our understanding of human health. Indicators selected for inclusion in the QLI will provide a way of monitoring the improvement or deterioration of conditions in the community which are known to have an impact on health status.

DEVELOPING THE QUALITY OF LIFE INDEX

This project has been developed by the Ontario Social Development Council (OSDC), working in partnership with the Social Planning Network of Ontario (SPNO) and in association with the Centre for Health Promotion at the University of Toronto (HP/UT), the Ontario Healthy Communities Coalition, and the Centre for Applied Sustainability at York University. (See Appendix 1: Partners and Associates)

As social development organizations across Ontario, we have worked with these models, tested them against our own mandates, and found them to be compatible. It is in this spirit that the QLI was conceived and designed to include social, health, environmental and economic indicators in a cross-sectoral framework. We chose to call it the Quality of Life Index as an integrating concept that could be readily understood by the public. We also decided to use a composite index to focus attention on a single, all-inclusive issue - our community quality of life.

A preliminary set of indicators was identified by a working group of Social Planning Councils and the Ontario Social Development Council, organizations with experience and expertise in social research. These indicators, reflecting the social, health, environmental and economic dimensions of the quality of life in our communities, form the composite index that is the QLI.

The following criteria were used for choosing the indicators to be tested:

- ◆ relevant to quality of life
- ◆ time sensitive
- ◆ available on a regular basis (monthly or quarterly)
- ◆ from credible sources

Following field trials to collect data for each of these indicators, twelve were ultimately selected for inclusion in the Quality of Life Index. The partners in this project are all using the same set of “core indicators” to calculate the Quality of Life Index provincially and in local communities. In this way, we can compare our progress at the provincial and local levels across Ontario.

QUALITY OF LIFE INDICATORS

SOCIAL

Social assistance
Children in care
Social housing

HEALTH

Low birth weight babies
Elderly long term care
Suicides

ECONOMY

Unemployed
Working
Bankruptcies

ENVIRONMENT

Air quality
Environmental spills
Blue box recycling

Ontario Social Development Council & Social Planning Network of Ontario, September, 1997

LITERATURE REVIEW

An extensive literature review was conducted to learn from the knowledge and experience of others. The Quality of Life Index (QLI) is using a cross-sectoral model encompassing social, health, economic and environmental measures. Consequently, our review of the literature has spanned quality of life, human and social development, social indicators, health promotion, determinants of health, population health, and sustainable development. We have integrated these concepts into our own model, the Quality of Life Index.

Lessons learned from the literature:

- * The overall level of health attained by Canadians is an important measure of the success of our society. Good health enables individuals to lead productive and fulfilling lives. For the country as a whole, a high level of health contributes to increased prosperity and overall social stability.
- * Our overall high standard of health is not shared equally by all sectors in Canadian society. There are differences in health status by age, sex, level of income, education, and geographic area. The rich are healthier than the middle class, who are in turn healthier than the poor. The well-educated are healthier than the less educated, and the employed are healthier than the unemployed (Health Canada, 1996).
- * Quality of life provides a conceptual framework, consistent with sustainable human development and determinants of health, for the interdependence of social, health, economic and environmental conditions in communities.
- * A composite index including key indicators of social, health, economic and environmental conditions can contribute to progress toward improving our quality of life and becoming a more sustainable society.
- * The QLI should have the capability to be future oriented and predict the direction of trends.
- * Local development allows us to create the conditions that will enable citizens to gain more control over their quality of life.
- * If the QLI is to have broad public credibility, it must be careful to include both positive and negative measures to provide a balanced perspective on quality of life.
- * By creating a summary "quality of life" index, some type of standardization would emerge that would enable people to compare local outcomes across the country.
- * A core set of indicators is needed for comparative reporting by municipalities.
- * Criteria for selecting a final set of indicators must be clearly stated.

- * Communities must be involved in the selection and analysis of indicators.
- * A quality of life/sustainability report should evaluate whether the indicator results are showing progress towards or away from desirable goals. It should also suggest how or whether the indicators could be improved, and may contain recommendations about the kinds of policies or programs that are needed to make progress towards the community's goals.
- * Assessment of indicator performance should be carried out periodically.

The complete literature review is contained in a companion document, “Quality of Life Index Project: Literature Review” available from the Ontario Social Development Council.

CALCULATING THE QUALITY OF LIFE INDEX

The following indicators are included in the Quality of Life Index:

<u>SOCIAL:</u>	Children in care of Children's Aid Societies Social assistance recipients Public housing waiting lists
<u>HEALTH:</u>	Low birth weight babies Elderly waiting for placement in long term care facilities Suicide rates
<u>ECONOMIC:</u>	Number of people unemployed Number of people working Bankruptcies (individual and business)
<u>ENVIRONMENTAL:</u>	Hours of poor air quality Environmental spills Tonnes diverted from landfill to blue boxes

We have collected data from provincial sources for each of these indicators, using the base year of 1990 and the most currently available statistics, though there are variations for some indicators in the availability of data for these years. The Summary of QLI Indicators report provides more details.

Calculating the Index

In order to calculate one number - the Quality of Life Index - out of a number of indicators, we developed a method of calculation which is described here and illustrated in the following table:

- The QLI is pegged at 100 in the base year.
- Twelve indicators are included in the Index, each assigned a value of 8.33 for the base year.
- Each indicator is considered of equal value in the QLI. No weighting factors are used at this time.
- We took into account the growth in population since 1990 by converting the data for each indicator into a rate per 10,000 population.
- Changes in indicators are calculated based on % increase or decrease from the rate in the base year.
- The impact of changes has either a positive or negative impact on the quality of life. This is factored into the calculation of the index.

The value of the QLI is calculated for 1990 (base year), September, 1997 and May, 1998.

CALCULATING THE QUALITY OF LIFE INDEX

INDICATORS	BASE RATE/10,000	BASE QLI VALUE	CURRENT RATE/10,000	% CHANGE	QLI IMPACT	SEPT. '97 QLI VALUE	CURRENT QLI VALUE
<i>Social Indicators:</i>							
1: Social Assistance Beneficiaries	780	8.3	951	22%+	Neg.	5.8	6.5
2: Child Welfare Admissions To Care	8.4	8.3	9.6	14.3%+	Neg.	7.8	7.1
3: Public Housing Waiting Lists	40	8.3	64	60%+	Neg.	4.8	3.3
<i>Economic Indicators:</i>							
4: Labour Force-# Working	5,053	8.3	4840	4.2%+	Neg.	7.8	8
5: Labour Force-# Unemployed	339	8.3	375	10.6%+	Neg.	5.5	7.4
6: # of Bankruptcies Reported	19	8.3	326	71.6%+	Neg.	3.1	2.4
<i>Health Indicators:</i>							
7: # Suicide Deaths	0.95	8.3	0.92	3.2%+	Pos.	8.6	8.6
8: Elderly Long Term Care Waiting List	13	8.3	16	23%+	Neg.	7.7	6.4
9: # Low Birth Weight Babies	7.4	8.3	8.8	18.9%+	Neg.	6.7	6.7
<i>Environmental Indicators:</i>							
10: # Hours Moderate/Poor Air Quality	162	8.3	10.5	35.2%+	Pos.	10	11.2
11: # Spills	5.5	8.3	3.8	30.9%+	Pos.	9.1	10.9
12: Tonnes Diverted to Blue Boxes	340	8.3	476	40%+	Pos.	10.3	11.6
QLI COMPOSITE INDEX		100				87.2	90.1

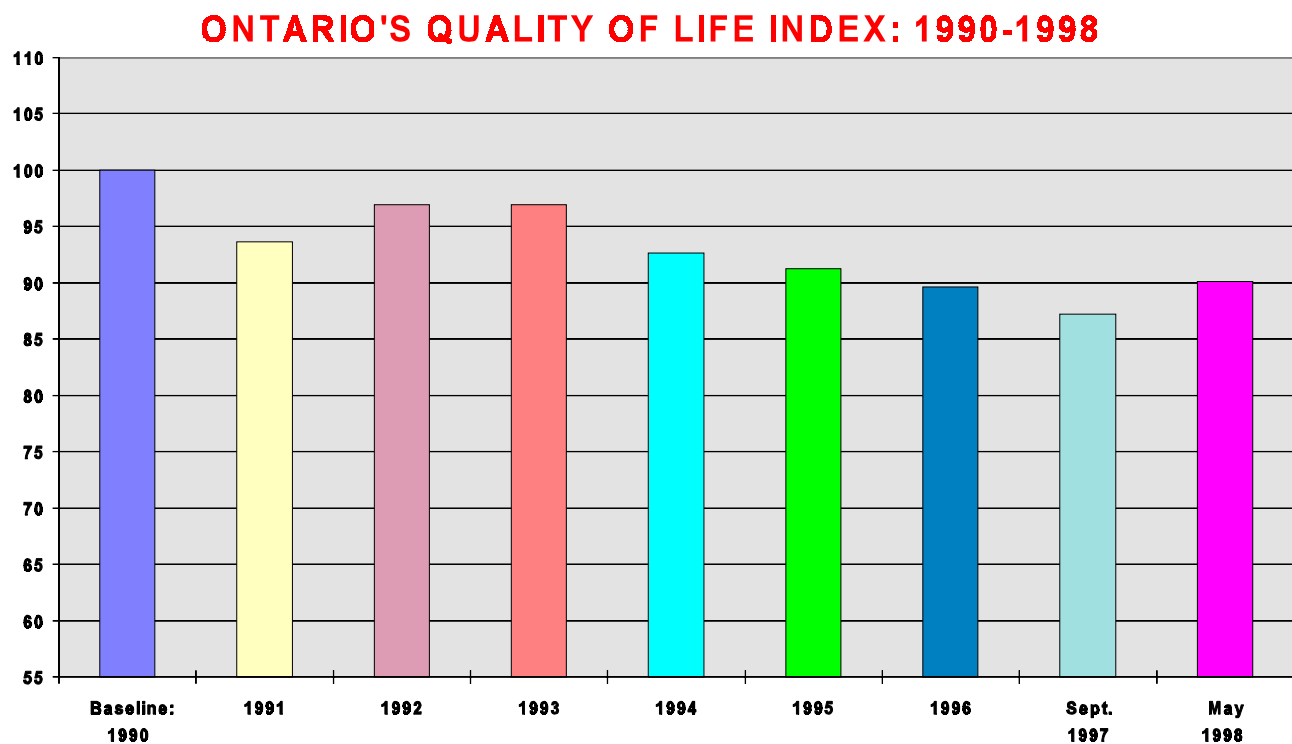
Establishing the Base Year

We've chosen 100 as the value of the QLI in the base year because it would be easy for the public to understand. The data for each indicator was collected for 1990. Where data was not available for that year, the first year in which data was collected becomes the base year. Changes in indicators are calculated based on the percentage increase or decrease from this base.

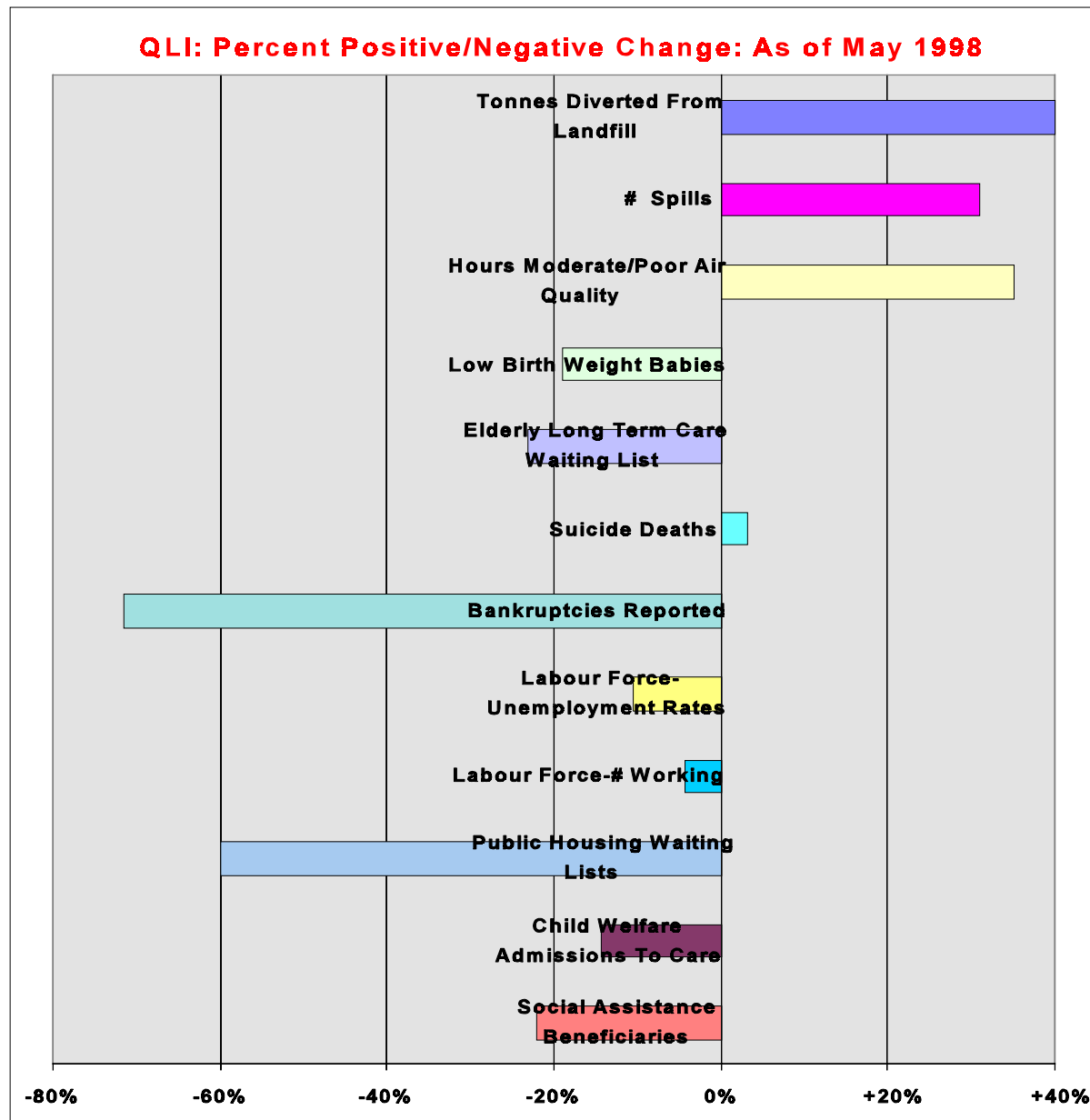
THE QUALITY OF LIFE IN ONTARIO

Using data we have collected for each indicator from 1990 to the most current year available, we have calculated the Quality of Life Index from 1990 to Spring, 1998. Based on these calculations, the quality of life has declined steadily in Ontario since 1990, as illustrated in the following chart. The economic and social indicators have led the decline, with the economic recession/depression in 1991-92, rising social problems, and a badly frayed social safety net.

The recent upturn in the QLI since 1997 is driven by a strong showing by the environmental indicators and improvements in labour force participation. More people are working and fewer are unemployed. However, the social indicators bring mixed messages. We have fewer social assistance beneficiaries, but longer waiting lists for public housing and long term care, as well as children admitted to care by child welfare authorities.



It is also important to consider how each indicator has changed since 1990. In order to look at the trends for each indicator in the QLI, we take the % change from the chart and put it onto a graph for easy reading. This allows us to make more detailed comparisons about the performance of each indicator. This will shed more light on areas where we are making progress and highlight those where we are experiencing setbacks. The following chart illustrates the percentage of change for each indicator. Closer examination of these changes indicates progress in some areas but setbacks in others. The Summary of Indicators Report discusses the limitations of each indicator and identifies some of the complex issues involved.



PROGRESS AND SETBACKS

Social Assistance Beneficiaries - The data shows recent improvements, since the number of social assistance beneficiaries is declining. This is partly the result of major changes in social assistance, including restrictions in eligibility which have forced many off of welfare. Some have found low-wage jobs in an improved economic climate. Others have been forced into shelters or onto the street. Though fewer people living in poverty are collecting social assistance benefits, there are a growing number of working poor.

Child Welfare Admissions to Care - More children are being admitted to the care of child welfare authorities, often due in part to economic hardship endured by their families. During the same period, funds for children's aid societies have been cut by millions of dollars over the past several years.

Public Housing Waiting Lists - More and more people are on waiting lists for public housing. They are driven by rising market rents, stagnant pay cheques and lower welfare cheques. Social housing stock has been frozen since the election of the Harris government in 1995. Much of the stock of public housing is in need of improvement. With the downloading of responsibility for public housing to municipalities, and a sizable cut in grants from the province, the further decline in public housing stock is anticipated. There is no new public housing being built to cope with rising demand.

Labour Force # Working - There is some good news on the economic front. Ontario's economy is growing at a healthy rate of 3.8%, which is "booming" by media standards. There are more people entering the labour force, after a major drop in 1992, and a slow recovery. While there are more jobs, many are low-wage, with no benefits, and often part-time. This is the labour force which people are entering from the social assistance system.

Labour Force # Unemployed - The number of unemployed people is on the decline, after peaking in March, 1997. This is good news for people who have been looking for work. Some will find low wage jobs which offer little hope of elevating them out of poverty.

Bankruptcies - The number of personal and business bankruptcies has receded from record levels in 1996. But there has been a steep rise compared with the pre-recession year 1990. This is a volatile indicator which reflects the economic conditions in the 1990s.

Elderly Waiting for Long Term Care - There are more elderly people waiting for placements in long term care facilities than there were in 1997. This is a growing problem, driven by cuts to health care and social housing. The commitment of the Ontario government for this sector in its new budget is a recognition of the problem. But the amount of money committed, and the 8 year timespan, are not likely to keep up with rising demand.

Hours of Moderate to Poor Air Quality - There has been significant improvement in air quality since, 1990, a trend which continues to 1996. The 1997 data has not yet been released by the Ministry of Environment and Energy. Recent reports from the Ontario Medical Associations express concerns about a crisis in air quality.

Spills - There has been a steady decline in the number of spills reported to the provincial government from 1990 to 1997. This is a good news story. There is concern that cutbacks in the public sector may weaken the capacity of the government to monitor and regulate environmental spills.

Tonnes Diverted to Blue Box Recycling - There has been a steady increase in the diversion of materials to the Blue Box recycling program during the 1990s. This is reflected in a positive impact on the Quality of Life Index. However, there have been major changes in the roles of municipal governments, with the downloading of responsibilities for recycling and the loss of provincial grants. The future of the Blue Box program is currently being debated by municipalities looking at major budget pressures while facing a broader range of responsibilities for our living conditions.

Observations

We make several observations about the trends revealed by the Quality of Life Index:

- > There are powerful links between economic and social conditions which must be recognized and addressed together. Will recent improvement in the economy in 1997 transfer to social gains?
- > The number of people working has increased marginally over the period, after a steep drop in the early '90s. But the growth in the labour market has not kept pace with population growth. Many of the new jobs created are part-time, low wage jobs with no benefits, which have replaced better jobs lost due to the economic recession and government downsizing.
- > Health and social indicators provide warning signs that there are problems of both an immediate and long term nature which are worsening and require attention.
- > Though we can celebrate some progress on environmental issues, we cannot be complacent that these gains will be sustained. How will the current economic cycle affect the environment?

ISSUES ARISING FROM THE QLI

** Problems with data access and availability, resulting in lack of information about key indicators.*

Low birth weight babies - The data for low birth weight babies which we reported in 1997 was not accurate due to problems with the information system used by the Bureau of Vital Statistics in the Ontario Government. The result was that the number of low birth weight babies was over-reported. The data that was available was only as recent as 1995. We are now involved in a process to get the corrected data. But it is not available for this report. We also explored alternative sources of the data, such as the Canadian Institute for Health Information, which has

current and accurate information reported directly from hospitals. However, a hefty fee is required to access the data. Because low birth weight babies are a concern as a matter of public health, the absence of current and accurate data is hard to understand.

Air quality - The number of sites for monitoring air quality has been reduced from over 34 to only 27 in 1997, due to cuts in public sector funding. This leaves many communities out of range of a monitoring site and without information about their local air quality. The trend in the sector to deregulation and voluntary compliance with environmental standards leaves the door open for declining air quality and inadequate tools to measure it. Since there is no local data for some communities, it raises the question of finding an alternative environmental indicator, such as water quality for use in the QLI.

Labour force participation - Statistics Canada conducts a monthly survey of labour force participation using a small sample of respondents in 25 Census Metropolitan Areas (CMAs) across Canada. The results are assumed to represent the most current data for the number of people who are employed and unemployed. The widely reported unemployment rate is based on this survey. The problem arises when local groups want to know about employment in their communities. There is no local data from these surveys. CMAs are defined by StatCan in a way which lumps together many cities and regions, without provision for breaking out the data for municipalities. The size of the local survey samples would be too small to be useable. Even large cities like Toronto are lumped into an even larger CMA. Suburban regions like Peel and Halton are included with neighbouring cities in CMAs. Consequently, there are serious limitations in the availability of local data about labour force participation. Municipalities concerned with economic development, do not know how many people are working and unemployed within their jurisdictions. Unemployment is a critical indicator for which data is inadequate as the basis for making social and economic policies at all levels of government.

Suicides - Data is not current - latest year available is 1995. The trend in suicides from 1990-95 is very stable, with no significant fluctuations. This is surprising, considering the economic upheavals of the early 1990s. Local data is small, or even non-existent, making it an unsatisfactory indicator for the QLI. There are problems with reporting that lead to speculation that the unofficial rate of suicide deaths is higher than the reported rate. We plan to replace this indicator in our next report in the Fall of 1998.

Child Welfare Admissions to Care - Data from the Ministry of Community and Social Services (MCSS) is suspect because of inadequate reporting from local agencies through area offices. Significant discrepancies have emerged in data collected directly from the local CASs by the Ontario Association of Children's Aid Societies (OACAS). Problems with information systems for children's services are long standing. New initiatives have been announced to develop an information system for child welfare which will produce accurate and timely information. Recent announcements in the Ontario budget of an infusion of money into the sector is good news. It is hoped that these funds will be used for new staff to cope with rising caseloads.

Public Housing Waiting Lists - The most current data available is for 1997. The downloading of responsibility for all forms of social housing to municipalities has created major changes in this field. It is expected that waiting lists for all forms of social housing (public, non-profit,

municipal, co-ops, rent-geared-to-income) will be integrated by next year. This will mean that more comprehensive information will be available about the need for social housing in many communities.

** Quarterly updates have been very difficult.*

We had planned quarterly updates, but have been unable to keep to this schedule. Data for some indicators is not current. There is also a serious time lag before data is released. We'll have to report twice a year.

** Costs of data*

Fees for reports on air quality, low birth weight, blue box, and suicide could become barriers to access as governments intent on cost recovery neglect public access to information. Information systems are not designed to provide basic information in response to public requests. Electronic access to information would make a big difference in access to information, by e-mail and websites. It would eliminate the costs of printing, photocopying and mailing, traditional barriers to access. The tools of the information age should increase access to public information.

** Methodological problems affecting local access to data have arisen.*

Labour force sample sizes and CMA boundaries are not coterminous or comprehensive. Air quality monitoring has been reduced, leaving many areas of the province uncovered. Long term care placement boundaries are based on "catchment areas" which do not correspond with real geo-political boundaries, i.e. municipalities. This raises a major obstacle to coordination of community-based health services involving two levels of government. Suicide data is too small to be meaningful; problems with not reporting sudden deaths as suicides results in unreliable data.

** Downloading is affecting indicators and reporting.*

The downloading of responsibilities to the municipalities from the province affects several QLI indicators, including Blue Box recycling, social housing, and social assistance. This raises serious questions about who will be collecting the data and what capacity municipalities will have to maintain information systems for these purposes.

**Urban and rural variations*

Differences in the availability of data have emerged in air quality and labour force participation, raising questions about how flexible the QLI should be in adapting to local situations without compromising the comparability of a common data set used by all communities.

** Context for QLI*

While the QLI seems to be generally accurate in assessing overall quality of life, there are

limitations in describing the plight of disadvantaged people in our society. Reports of Ontario's "booming economy" masks growing disparities, and people left out of the economic recovery. Other indicators, such as real income, poverty rates, and income disparities provide important information about our quality of life, but are reported much less frequently. We are planning to add a section on the current context for our report in the Fall of 1998.

Access to Information

One of the findings of this project relates to the difficulty experienced in obtaining information about QLI indicators from public institutions, governments and government-funded non-profit organizations with provincial responsibilities for major program areas in health, social services, the environment, the economy and housing. In a number of cases, there was perceived resistance to providing the requested information.

In other instances, it is clear that the information is either not collected, is not collected uniformly across the province, or is not coordinated or gathered together from local communities by anyone. Lack of current data from health units, for example, in spite of their legislative mandates to protect and promote health, suggests the erosion of the capacity of public institutions to fulfill their roles and functions. Frequently, non-profit organizations are being asked to pay fees to provincial ministries to provide required data.

It may be speculated that there are fewer resources and staff available in these organizations to collect, organize, and distribute this information as a result of the significant reductions in Ontario's public spending in the 1990s. The bottom line is that many publicly funded organizations do not have the information technology or information systems necessary to give them the capability of answering basic questions about the number of people served or the range of services provided. This raises serious questions.

How can public institutions manage programs for which they are responsible and conduct the essential planning and evaluation activities necessary to meet a minimal standard of public accountability?

How can they conform to the Ontario government's oft-stated commitment to increase efficiency and effectiveness through better business practices without the capability to answer these most basic of questions about their activities?

How can policy makers, planners and involved citizens get information they need to participate in democratic exercises such as monitoring the well-being of people and communities and taking action to address social inequities?

Governments don't have current and accurate information about important public issues on which to base policies or actions. As a result, they are always reacting to hot issues, rather than looking ahead. Cutbacks in the public service have also reduced the capacity of governments to measure and monitor key indicators. Where non-government organizations, such as provincial associations, are collecting the data, cuts to social programs have also reduced their capacity to

collect key information. This also results in a reduced capacity to coordinate services, based on current and accurate information.

HOW TO USE THE QLI IN LOCAL COMMUNITIES

The data which we have collected for the Quality of Life Index have come from provincial sources. Our community partners are also collecting the same data from local sources in their communities to calculate their own QLI. Any community can participate in this exercise by calculating the QLI based on data from local sources. The Methodology Report provides additional background information.

The provincial QLI provides a benchmark of comparison. As more and more communities become involved in calculating and monitoring their own quality of life, we will build up a province wide database based on a common set of indicators which we can all use to monitor our quality of life.

REGULAR UPDATES

We intend to update the data for each indicator on a semi-annual basis and recalculate the QLI. In this way we will be able to identify trends and maintain a current perspective on how our quality of life continues to change in a very dynamic and uncertain environment. These updates will be distributed to groups involved in the Quality of Life Index Project, as well as being posted on the Internet for public access:

www.qli-ont.org

COMMUNICATIONS STRATEGIES

The key to the success of this project lies in the communications strategy. The research needed to develop the QLI will only be as useful as the ability of OSDC and its partners to communicate to the public about progress toward improving the quality of life for all people in Ontario. We believe that quality of life is a unifying theme that will bring people from diverse backgrounds and interests together into a united effort to improve the quality of life in their communities. It will also contribute to the discourse about public policies to improve the quality of life for Canadians.

The communications strategy will include distribution of the QLI report and its key messages through the print, broadcast and electronic media. It will include community as well as mainstream media. It will create the anticipation to receive updates and future reports which will spur communities into action to address local problems as well as working toward desirable goals.

CONCLUSION

The quality of community life is changing dramatically as we approach the 21st century and governments at all levels make major changes in public policies. The Quality of Life Index has been developed and tested by social development organizations in Ontario with decades of experience in social research and reporting. It is now being used to monitor and measure changes in key aspects of our quality of life through the publication of a series of reports:

The Quality of Life in Ontario - 1997 (October, 1997)

The Quality of Life in Ontario - Spring 1998 (May, 1998)

The Quality of Life in Ontario - Fall 1998 (to be released in November, 1998)

The Quality of Life Index provides a good picture of changes in living conditions which affect our health and well-being as a society. The value of the QLI as a tool for community development will be increased with more involvement of different sectors in taking action on the results. One of the challenges for OSDC and the SPNO will be to promote the involvement of people from the social, health, economic and environmental sectors to work together to improve the quality of life in our communities.

Report by:

Malcolm Shookner
Ontario Social Development Council
October, 1998

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APPENDIX 2 - *Quality of Life Index - Papers and Website*

The Quality of Life in Ontario - Spring 1998

The Quality of Life in Ontario - 1997 (disponible en français)

Methodology Report (disponible en français)

Summary of Indicators

Literature Review

Reference List

Annotated Bibliography

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CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Chateau Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
niveaux de vie*

Composite Indices of Quality of Life in Canada: Estimating Weights from Voters' Decisions

Michael R. Hagerty
University of California, Davis

Session 6A: Conceptual and Empirical Issues in the Measurement of Well-being
October 31 8:30 AM - 11:00 AM

COMPOSITE INDICES OF QUALITY OF LIFE IN CANADA: ESTIMATING WEIGHTS FROM VOTERS DECISIONS

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October 1998

Abstract

This paper studies Canadian citizens' behavioral response to changes in Quality Of Life (QOL). Specifically, we examine whether changes in QOL, as measured by the Centre for Study of Living Standards (CSLS) indicators of well-being, affect the outcome of Canadian federal elections. We test the hypothesis that voters hold the governing party responsible for declines or improvements in QOL, which reduces or increases their share of votes in the next election. Objective measures of QOL included all indicators proposed by the CSLS model, such as personal consumption, government expenditures, unpaid work, unemployment, poverty, and inequality. We also tested additional indicators of QOL, including crime rates, divorce rate, and air pollution. For each election since 1960, we compute change in objective measures of QOL since the previous year to estimate the voting consequences. The estimated "voting function" is the best predictor of voters' behavior as a function of the changes in QOL

The results show that changes in the CSLS indicators do influence national elections in the predicted way, with changes in personal consumption, unpaid work, wealth, and violent crime being most important. The results are fairly robust to changes in specification, and retain the same signs when used to "backcast" election results from the 1960s.

1. INTRODUCTION

An important goal of this conference is to develop broader measures of Quality of Life (QOL) for a country's citizens. Developing measures of QOL entails first, computing *indices* to reflect changes in each of the individual QOL domains (such as wealth, personal consumption, crime, etc.), and second, forming *composites* of the various indices to reflect how citizens combine the domains. Many of the papers in this conference deal with the first task (e.g., Osberg and Sharpe 1998) by selecting broader measures of QOL and developing indices for each. However, they devote little attention to selecting appropriate weights to form composites. This paper deals with this second task – identifying the weights that reflect how citizens combine domains into perceived QOL.

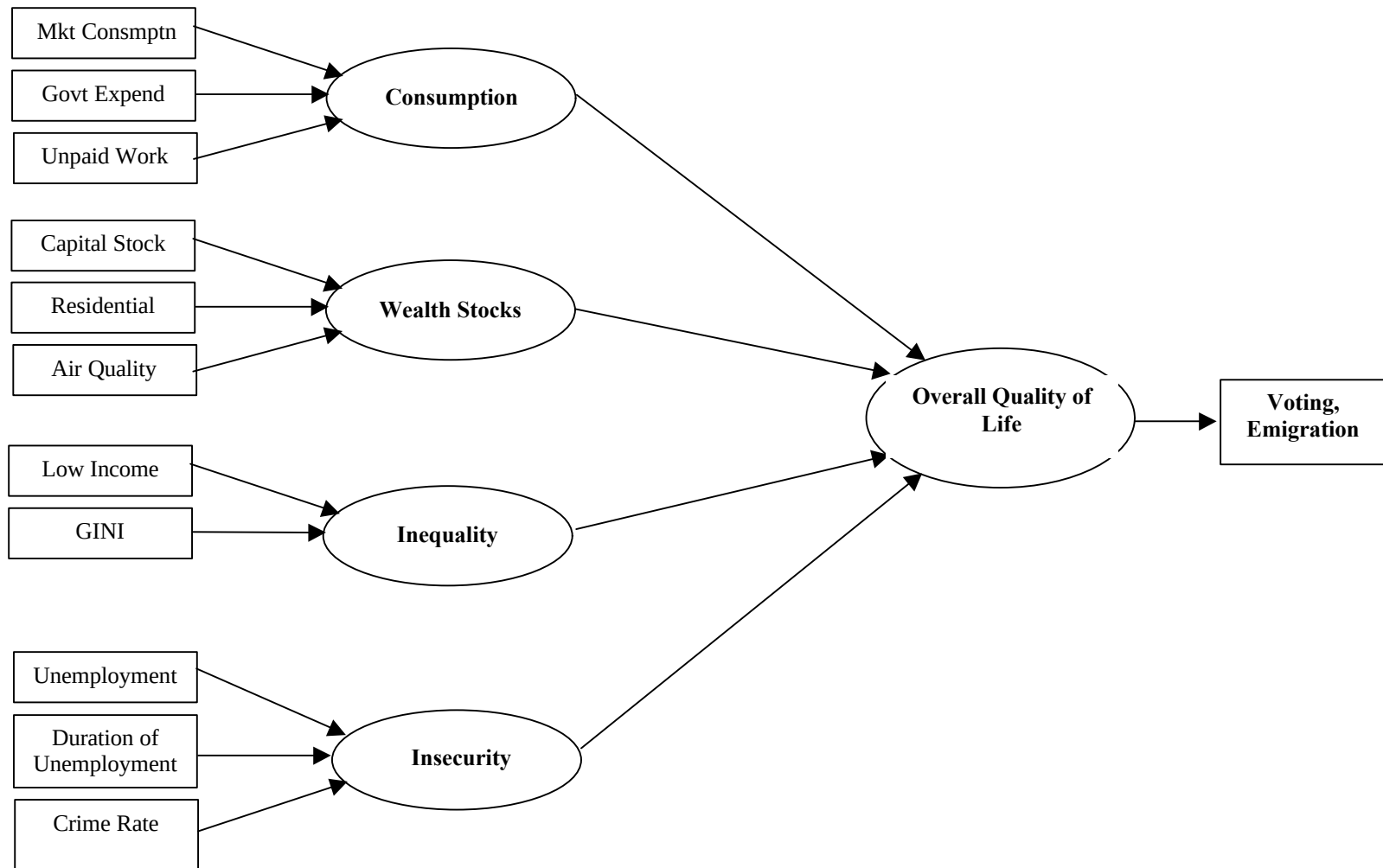
Such weights have been assigned in the past by several methods. First, moral philosophers such as Plato and Kant have assigned a-priori weights to define the “good life”. Second, many sociologists have asked people directly how important each domain is to them (Bradburn 1969). Third, economists have preferred to *infer* importances from behavior using hedonic pricing studies, or revealed preference studies. In this case, the importance that consumers attach to a domain would be reflected by price consumers pay(conditional on costs and supply). These inferential techniques have been successful *only when* all domains are freely traded in competitive markets. However, many domains in QOL studies are *not* freely traded (clear air, safety from crime, safety from unemployment). Therefore other methods are required to provide weights. This paper explores the information provided from *national elections* to estimate weights for domains of QOL, using the method of revealed preferences. The basic idea is that voters

must tradeoff the various domains of QOL to come to an overall decision on how to vote. By observing their votes contingent on objective circumstances for each domain of QOL, we can infer the weights used by voters themselves.

Figure 1 shows a block diagram of this framework. We use the QOL indices of Osberg and Sharpe (1998), hereafter called the CSLS model (Centre for the Study of Living Standards) to demonstrate. The first column of Fig. 1 represents various objective indicators (rectangles), such as personal consumption and poverty rates, which may affect QOL. The second column shows clusters of these objective indicators, gathered together to form perceived domains (Bradburn 1969; Andrews and Withey 1976, p. 127). The four domains included in the CSLS model are termed consumption flows, wealth stocks, inequality, and insecurity. These domains are then integrated in the third column into overall QOL. Finally, the last column shows how overall QOL leads to the behavioral consequences. In Figure 1, we identify two behavioral consequences of QOL: voting and emigration. Citizens experiencing a low QOL in a country might try to influence the country's policies, by writing letters or organizing political groups, with the goal of voting the incumbent government out of office and electing a new government that will improve their QOL. Alternatively, they might immigrate to another country that can provide a higher QOL to them.

This paper focuses on the voting behavior of Canadian citizens since 1971 as a function of the changes in QOL. Section 2 describes a theory of how voting behavior depends on national QOL. Section 3 outlines the data used, and Section 4 describes the results for the voting function.

Figure 1: Effects of Quality of Life on voting and emigration.



2. VOTING BEHAVIOR

We employ the model of voting commonly used in political science (see Paldam, 1991; Beck, 1991). It assumes that voters hold the current government (or the incumbent party) responsible for their “general welfare.” Indeed, the preamble of the US Constitution, says that its purpose is to “promote the general welfare” of its citizens. To ensure this, citizens can follow a deceptively simple decision rule: *if the quality of life declines during an incumbent's administration, then the incumbent should be voted out.* This decision rule follows from either of two arguments. The first is put forward by Kramer (1971) and by Fair (1978), who assume that voters try to predict how each party will affect their QOL, then vote for the party that will most improve their QOL. The model assumes that the best prediction of a party's future performance is the party's past performance while in office. Hence the party with the best recent record is voted in.

At first glance this model appears far too simplistic, since voters could potentially take into account additional information such as the party platforms, or unexpected events beyond the incumbent's control (such as an oil embargo caused by external circumstances). But Downs and Rocke (1995) argue that voters are better off by ignoring this other information, and by focusing exclusively on the changes in QOL provided by the last government. They model a voter as a player (principal) in a strategic game, who must determine the optimal compensation policy for the government (agent). They show that the rational voter would distrust party platforms and promises because the elected party often ignores party platforms and cannot be compelled to keep promises afterwards. Hence, the electorate trusts only *prior actions* of the incumbent, and punishes with only

one action: voting the incumbent out. If the electorate were to give “the benefit of the doubt” and re-elect a party after QOL declines, then this action would serve as a signal to later incumbents that they need not strive for promoting the general welfare.

All of this implies that voters implicitly ask a simple question, “Are we better off since the last election?” This simple model of voters’ behavior is testable, and evidence from several countries (Paldam, 1991; Fair, 1978) confirms that voters do seem to follow this model, at least for economic indicators: as objective economic circumstances improve, voters are more likely to vote for the incumbent party.

However, previous literature has considered only a few indicators of QOL – primarily growth in GDP and inflation. In this paper, we test for the effects of more and broader indicators of QOL, such as crime rate, divorce, and air quality, on national election outcomes.

We model the percentage of votes received by the incumbent party, V , as a function of changes in the four domains specified by the CSLS model of Fig. 1, and then add other indicators as well. Specifically, our model is expressed as

$$(1) \quad V = f(\Delta \text{Consumption}, \Delta \text{Wealth}, \Delta \text{Inequality}, \Delta \text{Insecurity}, \Delta \text{Other QOL}, \epsilon),$$

where $f(\cdot)$ is a linear function, Δ denotes the *percentage change* during the last government, and ϵ is the normal error term.

3. DATA

Voting data for federal elections were taken from Feigert (1989), updated by Elections Canada (1998). Percent of votes received for the party forming the federal government prior to each election was recorded for each province for each election. This resulted in 7 elections since 1971, by 10 provinces. In addition the 4 elections from

1960-1971 were collected as validation data. The two territories Yukon and Northwest Territory were not included because of missing data.

Per capita real consumption, unemployment and crime rates were originally obtained from Statistics Canada (1998). Fixed non-residential capital stock, residential capital stock, LICO (percent below low-income cutoff), and GINI were collected by Osberg and Sharpe (1998). Air pollution data were obtained from Environment Canada's National Air Pollution Surveillance Database (1998), which contains measurements of air quality from all provinces and territories using 373 monitoring sites (usually located in large cities). Measures of particulates suspended in the air (smoke, soot and dust) go furthest back, and were used for this study. Provinces with few sites (Newfoundland, PEI) sometimes had missing data. In these cases, air quality was interpolated from nearest years with complete data.

Some data was missing. Inflation was not included because Statistics Canada did not estimate separate price indices for the provinces until 1979. Unemployment, LICO, and GINI were not collected for the separate provinces until 1971. Air pollution was not collected prior to 1975. Therefore some analyses could be done only on elections since 1971. Because of this limited sample size, care was taken to ensure reliability of results by validation.

4. RESULTS

Table 1 presents the simple correlations between the incumbent's vote share and percent change in QOL indicators from one year prior to the election. The correlations are computed on all elections available since 1960. The middle column shows that simple correlations were significant and in the expected direction (positive for

consumption and wealth, negative for inequality and insecurity). Personal consumption, government consumption, non-residential capital, and housing stock per capita were all positive and significant. In contrast, correlations with raw QOL variables (not shown) were all negative. Simple correlations with percent change in LICO, duration of unemployment, and crime rates were negative and significant, consistent with theory. Correlations for other indicators were not significant.

Table 1: Simple correlations between the incumbent's vote share and percent change in QOL indicators from previous year.

Percent change in QOL indicators from previous year	Correlation with incumbent s vote share	Number of Observations
Consumption		
Personal per cap.	.303***	110
Government per cap.	.226*	70
Unpaid Labor per cap.	-.068	110
Wealth		
Non-residential capital per cap.	.417***	99
Housing stock per cap.	.336***	99
Inequality		
LICO	-.281**	70
GINI	-.014	70
Insecurity		
Unemployment rate	.073	80
Duration of unemployment	-.466***	70
Additional QOL		
Property crime rate	-.474***	110
Violent crime rate	-.490***	110
Air pollution: total particulates	.036	50
Divorce rate per 1,000 pop.	.266**	70

***p<.01

** p<.05

* p<.1

Table 1 gives some encouragement because the zero-order correlations are in predicted direction. But many models are still consistent with Table 1. For example, a single factor may be causing all of the observed correlations. If the economic business

cycle causes all consumption and wealth to increase in that year, and causes all inequality and insecurity to decrease, then only one factor could explain all of the correlations in Table 1.

Table 2 presents tests of some of these models by examining joint effects of the indicators. In the first column, all nine indices of the CSLS model are entered into multiple regression. Seven of the nine coefficients retain the expected sign. However, only 5 of the 9 coefficients attain significance, and one of these (unemployment rate) has an incorrect sign. To explore the pattern of collinearity, backward-elimination regression was used to delete the most redundant variables. The second column presents a backward-stepwise regression on these same 9 indicators. The deleted variables were: Government expenditures, Housing stock, and GINI, which together degraded variance explained by only .9%. The remaining coefficients now suffer less from collinearity, and all but one are significant. All have expected sign, except for unemployment rate.

Table 2: Multiple regressions predicting voter support from various QOL indicators.
(Standard errors of coefficients are in parentheses).

Percent change in QOL indicator from previous year	CSLS Model	Backward Stepwise Regression on CSLS Model	Backward Stepwise Regression On All Indicators
Consumption			
Personal per cap.	103 (48.6)**	115 (40.8)***	240 (69.5)***
Government per cap.	31.6 (33.5)	---	---
Unpaid Labor per cap.	26. (144)*	285 (135)**	466 (154)**
Wealth			
Non-residential capital per cap.	188 (63.1)***	173 (57.6)***	175 (70.9)**
Housing stock per cap.	8.7 (86.8)	---	---
Inequality			
LICO	-11.4 (12.9)	-18.1 (11.0)	-18.6 (10.7)*
GINI	-34.9 (70.9)	---	---
Insecurity			
Unemployment rate	35.0 (13.0)***	32.8 (11.7)***	---
Duration of unemployment	-68.9 (20.3)***	-71.7 (18.5)***	-28.5 (19.3)*
Additional QOL	----	---	
Property crime rate			---
Violent crime rate			-1105 (475)**
Air pollution: total particulates			---
Divorce rate per 1,000 pop.			---
R^2	51.4%	50.5%	61.4%

* $p < .1$

** $p < .05$

*** $p < .01$

The last column of Table 2 presents the final backward-stepwise regression, in which all indicators (including crime rates, air pollution, and divorce rates, as well as the CSLS indicators) were entered to find the best overall predictors of voting behavior. Only one of the additional variables attained significance (violent crime rate), whereas all but one (unemployment rate) of the CSLS indicators retained the same signs and significance levels as in the previous column. It appears that adding violent crime rate both increases R^2 to 61.4%, and forces unemployment rate (which had the wrong sign) to

drop out of the equation. Both of these facts suggest that violent crime rate should be added to the CSLS model to better predict perceived QOL.

Further, examining the signs and significance levels of the coefficients across all columns reveals considerable stability – regardless of which variables are entered, all indicators show stable relationships with voting behavior. To examine the reliability of the coefficients further, we attempt to validate the coefficients against earlier elections – those of the 1960's.

Validation:

The above analysis uses only elections since 1971 because data on some QOL measures were not collected prior to that time. Nevertheless, we can fit a reduced model to all elections since 1960, using only indicators that were available then, to test whether parameters change prior to 1971. The indicators available since 1960 are personal consumption, unpaid work, capital stock, and violent crime rate. Table 3 presents this validation test. It shows that all variables retain the correct sign. However, unpaid labor is now not significant. Three of the four interactions are not significant, implying that coefficients were stable (given the power limitations of the data) between the validation period of 1960-1970 and the calibration period of 1971- 1995. Only one interaction (wealth) attained significance. Since it is negative, it implies that the coefficient of wealth was smaller during the 1960's when predicting voter support.

Table 3: Validation of reduced model for 1960-1996.

Percent change in QOL indicator from previous year	Coefficient (S.E.)
Consumption	
Personal per cap.	82.4 (43.4)*
Interaction prior to 1971	7.3 (102)
Unpaid Labor per cap.	66.0 (139)
Interaction prior to 1971	-139 (347)
Wealth	
Non-residential capital per cap.	182 (57.8)***
Interaction prior to 1971	-189 (77.7)
Additional QOL	
Violent crime rate	-1745 (394)***
Interaction prior to 1971	550 (923)
R^2	36.9%

5. DISCUSSION

We have proposed a general method for estimating weights for composite indices of QOL. It uses a “revealed preference” approach applied to citizens’ voting behavior. Voting support for the governing party can be interpreted as a referendum on how much the government has increased perceived QOL. We applied this model to Canadian federal elections since 1971, and found supportive and interpretable results. Using the CSLS indicators, 51% of the variance in voting support for the governing party was explained. A further 10% of the variance was explained by adding violent crime rate to the CSLS indicators. Validation to elections between 1960 and 1970 was successful, with signs of most coefficients stable across the two time periods.

Table 4 contains our best estimate of the influence of QOL indicators on voting support for the governing party. They are drawn from the standardized regression coefficients in the backwards regression on all indicators from Table 2. These can be interpreted as importance weights for the indicators, given the actual variances and

covariances in elections since 1971. It shows that increases in personal consumption per capita are most important in determining voting support, followed by unpaid labor and non-residential capital, while decreases in violent crime rate, duration of unemployment, and LICO are of descending importance. Of course, one should use caution in applying these results to future elections – these coefficients are based only on the last 7 elections in Canada. However, the estimates are fairly robust to deleting or adding some variables, and show some validity when extended to earlier elections.

Table 4: Importance of QOL indicators in predicting voter support, measured by standardized beta coefficients.

QOL Indicators	Standardized β
Personal Consumption per capita	.401
Unpaid Labor per capita	.313
Non-residential capital per capita	.290
LICO	-.171
Duration of unemployment	-.187
Violent crime rate	-.250

Relations to previous results:

These results agree fairly well with a growing body of research in other countries. In analysis of U.S. elections, Peltzman (1990) and Fair (1978) both concluded that disposable income had the largest effect on voter support for the incumbent party. In analysis of 13 developed countries, Hagerty, Naik and Tsai (1998) also concluded that economic effects were most influential, followed by homicide rate.

In the future, more elections can be added to the database, or the existing data might be analyzed at a disaggregated level (voting results are available at the level of individual ridings). Further, important local issues might be included in the model. The best example of these is the separatist issue in Quebec, which might explain even more of the variance in voting behavior.

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CSLS Conference on the State of Living Standards and the Quality of Life in Canada

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niveaux de vie*

A New Multidimensional Index of Poverty Richness (MIPR) for Canada: A Comparison with LICO

Simon Langlois
Université Laval

François Gardes
Université de Paris

Session 6A: Conceptual and Empirical Issues in the Measurement of Well-being
October 31 8:30 AM - 11:00 AM

A new Multidimensional Index of Poverty Richness for Canada: A Comparison with LICO

**Un nouvel indice multidimensionnel de pauvreté richesse:une comparaison avec le SFR de
Statistique Canada**

François Gardes (Université de Paris I, Lamia et Crédoc)

Simon Langlois (Université Laval)

Octobre 1998

Texte présenté au colloque State of Living Standards & Quality of Life in Canada, 30-31 Octobre
1998, Ottawa, Ontario

Résumé

Cinq groupes socioéconomiques de ménages sont définis à l'aide d'un indice multidimensionnel nouveau (IMPR) construit à partir de trois dimensions: satisfaction des besoins de base, marginalisation par rapport à une population de référence et revenu total du ménage, indice qui permet de caractériser la pauvreté mais aussi la richesse des ménages. La proportion de ménages pauvres est stable au Canada, mais la quasi pauvreté augmente depuis 1978, de même que la gravité de la situation des pauvres. L'article analyse la convergence des structures de la consommations entre les cinq groupes de ménages de 1969 à 1992, sur les plans transversal et longitudinal. L'évolution de la structure de la consommation va dans le même sens sur ces deux plans. Quand leurs revenus augmentent, les classes socioéconomiques qui occupent des positions inférieures n'ont cependant pas les mêmes comportements de consommation que les classes supérieures, toutes choses égales par ailleurs. La différenciation sociale des consommations dépasse la vitesse d'évolution temporelle pour les biens de luxe, ce qui implique que la croissance des revenus des ménages les moins riches au cours de leur cycle de vie ne leur permet donc pas de rattraper les positions acquises par les ménages plus riches.

Introduction

La structure de la consommation marchande des ménages change de façon marquée dans le temps et au cours du cycle de vie des familles et des individus. Sur longue période, les ménages s'enrichissent en moyenne, les besoins de leurs membres varient et les prix réels des biens et services se modifient. Mais ces changements se produisent-ils au même rythme dans tous les groupes sociaux? Peut-on alors parler d'une homogénéisation des structures de consommation entre différents groupes sociaux et en particulier entre les ménages riches et les ménages pauvres? Comment sont liés les changements sur le plan transversal et sur le plan longitudinal? Cet article vise à répondre à ces questions qui soulèvent par ailleurs d'importantes difficultés sur le plan méthodologique que nous proposons de surmonter en proposant des solutions nouvelles, notamment pour l'examen des évolutions temporelles.

L'analyse de l'évolution de la structure de la consommation dans une perspective dynamique pose trois types différents de problèmes. Le premier met l'accent sur les distances qui séparent les classes socioéconomiques à diverses périodes : les pauvres d'aujourd'hui sont-ils davantage différents des autres classes socioéconomiques lorsqu'on les compare aux pauvres d'hier? Les riches ont-ils tendance à se distancer des autres groupes? Le deuxième problème soulève la question de la convergence des structures de consommation au cours du cycle de vie: la consommation des ménages homogènes à la fois quant à la scolarité et au milieu de vie et faisant partie d'une même cohorte est-elle moins différente à la fin du cycle de vie qu'au début? En d'autres termes, les conditions socioéconomiques communes entraînent-elles une convergence au cours du cycle de vie vers un optimum de consommation identique? Le troisième problème concerne l'effet de période et en particulier l'influence des crises économiques sur la convergence intranationale des modes de vie: les crises tendent-elles à différencier les consommations des différents groupes socioéconomiques, qui convergeraient durant les périodes de croissance régulière?

Cette étude constitue à notre connaissance une première analyse sociologique des *dynamiques* de

la consommation par sous-populations homogènes sur le plan socioéconomique et non simplement caractérisées par leur niveau de revenu ou leur classe d'âge. Afin de construire de tels groupes homogènes, nous proposons de caractériser les ménages à l'aide d'un nouvel indice synthétique de pauvreté-richesse (IMPR), indice multidimensionnel construit à partir de trois dimensions: revenus, dépenses et privation. Après avoir dégagé l'évolution du taux de pauvreté et après avoir cerné les changements observés dans la gravité de cette dernière, nous analyserons les comportements de consommation dans les cinq types de ménages qui auront été dégagés, en scrutant trois aspects différents: l'évolution de la structure de la consommation, les distances entre classes socioéconomiques, de même que la différenciation sociale et la diffusion temporelle des besoins, afin de répondre aux questions précédemment posées.

Mesure de la pauvreté et de la richesse des ménages

Analyser la convergence ou la divergence entre ménages pauvres et ménages riches exige d'abord que l'on précise comment sera mesuré le niveau de vie, dans une perspective dynamique, en tenant compte notamment des effets de cohorte et des changements dans la structure démographique de la population.

Les définitions de la pauvreté sont nombreuses et elles sont l'objet de débats entre chercheurs qui ne s'entendent pas sur la meilleure façon de mesurer ce phénomène (Hagenaars 1987; Ringen 1987; Langlois 1987; Foster et Shorrocks 1991; Callan, Nolan et Whelan 1993; Alcock 1993). La plupart des mesures visent à estimer la proportion d'une population qui tombe sous un seuil donné de revenu. Trois critères sont principalement utilisés pour construire ces dernières. Le *revenu disponible par unité de consommation* est celui qui est le plus souvent retenu: seront pauvres, les ménages qui ont moins que la moitié de la moyenne nationale ou encore moins que la moitié de la médiane. Le seuil de pauvreté Eurostat est construit de cette façon. D'autres mesures de la pauvreté sont élaborées à partir d'un ensemble d'indicateurs de *conditions de vie ou de privations*: absence d'une salle de bain ou de l'équipement de base du logement, conditions de salubrité, d'environnement, nombre de pièces par personnes, etc., indicateurs qui sont agrégés dans un indice additif. Seront

pauvres les ménages qui se situent aux échelons inférieurs sur cet indice (Townsend 1979). Enfin, on a aussi estimé des *seuils subjectifs* de pauvreté à partir de questions d'enquêtes diversement formulées sur le revenu minimum jugé nécessaire par le ménage pour vivre à l'aise ou pour arriver dans son budget quotidien. Ces trois critères sont cependant le plus souvent considérés isolément, ce qui rend la majorité des mesures proposées incapables de rendre compte du caractère pluridimensionnel du phénomène de la pauvreté.

Au Canada, les deux mesures les plus connues et les plus utilisées par les chercheurs sont le Seuil de faible revenu (SFR) et la Mesure de faible revenu (MFR) de Statistique Canada. Le SFR est déterminé à partir des dépenses moyennes des ménages observées pour trois postes fondamentaux: l'alimentation, le logement et l'habillement. L'organisme statistique considère comme pauvres les ménages qui consacrent à ces trois fonctions une part de budget supérieure de 20% à la moyenne nationale. En 1969, étaient pauvres les ménages qui consacraient plus de 62% de leurs dépenses totales à ces trois fonctions de consommation. Les proportions ont diminué à 58,5% en 1978, 56,2% en 1986 et 54,7% en 1992. Des seuils différents sont estimés selon la taille du ménage et le milieu de résidence rural-urbain. Le SFR est un seuil mixte, à la fois absolu et relatif. Ce seuil tient compte de l'enrichissement moyen de la population, mais il mesure moins bien le caractère absolu de la pauvreté ou de la faiblesse du revenu, notamment parce que le panier de base pris en considération est incomplet. Le MFR définit la pauvreté comme étant la moitié de la médiane du revenu total par unité, ce qui le rend comparable à d'autres mesures identiques dans un grand ensemble de pays développés.

Il n'y a pas de seuil *officiel* de pauvreté au Canada et Statistique Canada met en garde *de ne pas considérer* les deux mesures qu'il propose comme des seuils de pauvreté parce qu'elles ne sont pas construites à cet effet (voir Statistique Canada 1995; Wolfson et Evans 1990). Cette mise en garde n'est cependant pas respectée par nombre d'organismes (le Conseil national du bien-être social, par exemple) et des chercheurs n'hésitent pas à utiliser ces seuils pour estimer l'incidence de la pauvreté. Une remarque s'avère importante: le choix des ménages de référence pose problème, car les moyennes sont calculées pour l'ensemble du Canada, alors qu'il existe des variations régionales. Tel

qu'ils sont construits, les seuils SFR et MFR nous paraissent sous-estimer la pauvreté dans les provinces riches (l'Ontario) et la sur-estimer dans les autres provinces qui sont les moins riches (les Maritimes, par exemple). Peut-on alors considérer comme pauvres une fraction des ménages de l'Est du Canada qui tombent en deça d'un seuil affecté par le poids de l'Ontario? Pour cette raison, les seuils de faibles revenus ne sont pas vraiment décomposables, ce qui rend nécessaire d'estimer des proportions par régions selon une autre approche.

Par ailleurs, les estimations de la faiblesse du revenu faites par Statistique Canada rendent problématique l'étude des évolutions temporelles, qui est l'objet de cet article. Il serait peu fiable d'analyser les évolutions temporelles de la faiblesse des revenus avec les deux mesures SFR et MFR d'abord parce qu'elles sont avant tout des mesures transversales; les changements dans la structure d'âge ne sont pas pris en compte lorsque l'on compare les seuils ou les taux estimés chaque année par l'organisme canadien. La comparaison des seuils de Statistique Canada sur longue période ne peut pas vraiment mesurer l'évolution de la pauvreté nette des effets dus au changements démographiques.

Les critères de mesure de pauvreté en termes de privations et de conditions de vie ont été également critiqués du fait des problèmes posés par la définition des dimensions des conditions de vie (qui changent dans le temps et selon les populations de référence) et par l'agrégation selon une hypothèse de séparabilité additive des différentes privations. La définition de la pauvreté par un seuil subjectif selon la méthode de van Praag pose enfin des problèmes d'estimation économétrique généralement négligés qui entraînent une sous-estimation de l'élasticité-revenu de ce seuil de pauvreté et une surestimation du nombre de pauvres (Combris et Gardes 1995).

L'indice multidimensionnel de pauvreté-richesse (IMPR)

Afin de contourner ces difficultés, un nouvel indice multidimensionnel de pauvreté-richesse (IMPR) est proposé. Les spécificités de cet indice ont été présentées dans Cardoso et Gardes (1995) et Gardes et Langlois (1996). Cet indice multidimensionnel s'appuie sur une définition opératoire qui

privilégie la prise en compte de trois dimensions différentes de la pauvreté: (a) la *privation ou la non-satisfaction des besoins de base*, (b) la *marginalisation* par rapport à une population de référence du ménage et (c) *l'insuffisance des ressources monétaires* relativement à l'ensemble de la société. L'indice tient compte du fait que la notion de pauvreté change avec la modification générale des conditions de vie: seront pauvres des ménages incapables de satisfaire leurs besoins fondamentaux, mais aussi ceux qui sont exclus d'une pleine participation à la vie en société. La notion de pauvreté telle que définie ici correspond à une situation du ménage qui l'amène à des comportements spécifiques entraînant des conséquences négatives qui peuvent rendre plus difficile une sortie de l'état de pauvreté. Les trois dimensions citées sont des déterminants de tels comportements spécifiques des ménages et par ailleurs les seuls que l'on puisse repérer dans la plupart des enquêtes socioéconomiques qui ne contiennent généralement pas d'information sur les handicaps physiques ni les représentations sociales, par exemple. Enfin, le choix d'un groupe de référence se justifie parce que l'on est pauvre par rapport aux normes acceptées dans l'ensemble de la société, mais également par rapport aux normes du groupe social auquel on s'identifie. Voici comment l'indice IMPR a été construit en prenant en considération ces différents aspects.

(a) Privation ou non satisfaction des besoins de base.

Les ménages pauvres ont des dépenses relatives de subsistance plus élevées que celles de la population en général. Selon Townsend (1987), les ménages pauvres souffrent de privations parce qu'ils sont incapables de satisfaire leurs besoins de base. Depuis les travaux pionniers de Engel (1895) et de Halbwachs (1913), la part des dépenses totales consacrée à l'alimentation est un indicateur classique de subsistance et de privation. Nous proposons de définir comme pauvres selon ce premier critère *les ménages qui consacrent, pour la proportion de leur budget qui va à l'alimentation au foyer, au moins un tiers de plus que les ménages de référence* qu'on définira plus loin. Seront considérés comme riches les ménages qui affectent à se nourrir un tiers de leur budget de moins que la même population de référence.

(b) Marginalisation

Les seules dépenses de subsistance ne suffisent pas à définir la pauvreté dans les sociétés développées caractérisées par une extension considérable de la consommation marchande à toutes les sphères d'activités des ménages. Il faut aussi prendre en compte la non-satisfaction des besoins sociaux qui vont bien au-delà de la subsistance définie au sens strict. Serge Paugam (1994) propose l'expression pauvreté disqualifiante pour caractériser en fait une forme d'exclusion sociale. Du point de vue sociologique, les ménages pauvres ne sont pas seulement incapables de subvenir adéquatement à leurs besoins de base, mais ce sont aussi des ménages marginalisés ou exclus qui ne parviennent pas à combler les besoins minimum susceptibles de leur assurer une pleine participation à la vie en société. Ces besoins sont maintenant très variés et, pour les satisfaire, les ménages doivent effectuer des dépenses aussi bien pour les communications ou les transports que pour les loisirs ou la santé, par exemple. De ce point de vue, la pauvreté se mesure plutôt en termes de conditions de vie. Il serait sans doute possible de définir un panier de base de biens et services nécessaires au bon fonctionnement en société, comme ont proposé de le faire Fugère et Lanctôt (1985) pour le Québec, par exemple. L'entreprise est cependant complexe et relativement arbitraire, sans oublier qu'elle repose sur le jugement porté par des experts.

Plutôt que d'identifier un panier de base, nous proposons de considérer comme pauvres *les ménages qui dépensent moins de 67 % du total des dépenses observées dans la population de référence et comme riches, ceux qui dépensent plus de 50%*. Les dépenses totales sont pondérées par le nombre de membres dans l'unité de consommation. Considérer les comportements de consommation -- et non seulement le revenu, comme c'est le cas dans plusieurs indices de pauvreté -- présente l'avantage de caractériser le niveau de vie réel des ménages en tenant compte des ressources obtenues par le travail au noir ou encore par les transferts privés en argent qui sont non négligeables dans bien des cas. La prise en compte de cette dimension permet d'éviter ainsi de considérer comme pauvres des ménages ayant des ressources cachées ou peu de revenus déclarés. Une étude récente de Blair (1994) a montré que, aux États-Unis, le portrait de la pauvreté, dans les années 1980 était différent (moins grave, en fait) lorsqu'on mesurait cette dernière à partir des dépenses plutôt qu'à partir des seuls revenus. Ceci est dû probablement au fait que la dépense totale intègre des revenus de transfert, en particulier les transferts intergénérationnels, mais également sans doute au fait que

la dépense totale est lissée par rapport au revenu courant et qu'elle constitue donc un bon indicateur du revenu permanent des ménages.

(c) Insuffisance des ressources monétaires

Par ailleurs, l'insuffisance du revenu est une source importante de pauvreté. Aussi, considérer le revenu par unité de consommation comme troisième critère -- et non seulement les dépenses totales par unité -- s'avère-t-il essentiel parce que certains ménages peuvent avoir une consommation nettement inférieure à celle de leur groupe de référence, pour diverses raisons. On aurait tort de définir ces ménages comme pauvres, alors qu'en réalité ils consomment moins tout en ayant des revenus suffisants pour leur assurer éventuellement un niveau de vie décent. En conséquence, il faudrait caractériser les populations pauvres par une insuffisance de leur revenu permanent, mais cela consisterait à supposer que les pauvres ne sont pas soumis à des contraintes de liquidités et qu'ils ont la possibilité d'effectuer des transferts intertemporels de leur richesse permanente, hypothèse assez discutable. À cette raison s'ajoute le fait qu'il est difficile de mesurer le revenu permanent dans les enquêtes, ce qui justifie d'utiliser l'insuffisance du revenu courant comme troisième critère de pauvreté. D'après ce dernier, seront pauvres *les ménages qui se trouvent dans le quartile inférieur sur l'échelle des revenus disponibles par unité de consommation*. Ce critère se distingue des deux précédents parce qu'il situe cette fois les pauvres par rapport à toute la population dans la société. Le critère du revenu disponible par unité tient compte du caractère progressif de l'impôt sur le revenu, de l'ensemble des ressources monétaires courantes des ménages et de leur taille.

La pauvreté ne peut pas être mesurée seulement de manière absolue, puisqu'elle est aussi relative. Mais relative à quoi? Ici deux pôles de référence s'imposent. Le premier est constitué par l'ensemble de la société. Nous posons que les ménages évalueront leur situation par rapport aux ressources qui sont disponibles à un moment donné dans leur société. Aussi, le revenu des pauvres et des riches sera-t-il mesuré par référence à la distribution caractérisant l'ensemble de tous les ménages. Mais il existe un second pôle de référence qui est probablement à l'oeuvre en même temps: la pauvreté est aussi relative à un groupe, comme l'ont bien montré le sociologue allemand Georg Simmel (1906) dans un article souvent cité et avant lui Alexis de Tocqueville dans son **Mémoire sur le paupérisme**

(1835). On est pauvre par rapport aux normes acceptées dans l'ensemble de la société à un moment donné, certes, mais également par rapport aux normes du groupe social auquel on appartient ou auquel on s'identifie. Les membres d'un ménage vont s'estimer pauvres par rapport à d'autres qui partagent les mêmes caractéristiques. Les pêcheurs de Terre-Neuve ne se comparent pas nécessairement aux ouvriers de Toronto et les besoins subjectivement définis ne sont sans doute pas les mêmes dans les deux communautés. Il en va de même pour les jeunes -- qui se comparent aux autres jeunes plutôt qu'aux adultes d'âge mûr --, de même que les retraités évalueront leur situation par rapport à d'autres retraités et non seulement en référence à l'ensemble de la société. En conséquence, les dépenses totales et la part du budget consacrée à l'alimentation par chaque ménage seront analysées par rapport à un sous-groupe de référence et non pas par rapport à l'ensemble de la population comme c'est le cas pour le revenu disponible. Cette approche, on le voit, vise à situer les ménages dans leur environnement, soit, mais sans oublier qu'ils se réfèrent aussi à l'ensemble de la société pour évaluer leur position en terme de niveau de vie.

Le sous-groupe de référence sera construit à partir de trois critères: le milieu de vie -- ici la province ou la région au Canada --, la cohorte et le niveau de scolarité. Ces trois critères de référence sont quasiment invariants dans le temps: seul le critère d'appartenance à une cohorte d'âge est totalement invariant, mais les deux autres se modifient relativement peu sur le cycle de vie de la plupart des ménages. Lorsqu'un ménage change de région, on peut considérer que son adaptation aux conditions de vie de cette région est relativement rapide et que cette dernière constituera rapidement sa nouvelle référence. Le groupement des ménages par cohorte d'âge permet de neutraliser la déformation de la structure démographique d'une génération à l'autre. Les sous-populations que ces trois critères définissent sont donc assez stables et de tailles assez importantes pour pouvoir être considérées, sur le plan statistique, comme référence du ménage.

Doit-on prendre la moyenne ou la médiane? Il est courant d'utiliser la médiane pour situer la position relative des ménages dans leur population de référence afin d'éviter en particulier l'erreur de mesure de la moyenne. Néanmoins, les très bas et très hauts revenus constituent une information importante des ménages dans leur positionnement relatif, ce qui nous a amenés à les classer plutôt par rapport

à la moyenne de leur population de référence. Pour tenir compte de l'erreur de mesure, on a défini un intervalle de confiance autour de la moyenne de classe μ à l'aide de l'écart-type σ et de l'effectif n de cette classe, selon l'expression

$$\mu_C \pm t_\alpha \frac{\sigma_C}{\sqrt{n_C}}$$

dans laquelle le t de Student est au seuil de risque α de 5%. Les seuils de pauvreté et de richesse sur les deux premiers critères -- le coefficient budgétaire pour l'alimentation au foyer et les dépenses totales par unité de consommation -- seront mesurés par rapport aux deux bornes (inférieure et supérieure) de cet intervalle et non pas par rapport à la seule moyenne.

En résumé, seront caractérisés comme pauvres les ménages qui consacrent une partie de leur budget pour la fonction alimentation au foyer qui est au moins un tiers plus élevée que celle observée dans les ménages de référence, dépensent moins de 67% du total observé dans ce groupe et se situent dans le quartile inférieur sur l'échelle de distribution des revenus disponibles par unité cette fois dans l'ensemble de la société. Les ménages riches seront ceux qui ont une part de leur budget consacrée à l'alimentation à domicile inférieure ou égale à 67% de celle observée dans leur groupe de référence, qui dépensent plus de 50% du total des dépenses pondérées par unité observées dans leur groupe de référence et qui se situent dans le quartile supérieur de l'échelle des revenus disponibles par unité. Nous noterons 1 le fait d'avoir un critère qui définit la pauvreté et 3 le fait d'avoir un critère de richesse, le résidu étant noté 2. En d'autres termes, les ménages classés comme pauvres satisfont aux trois critères et les ménages quasi-pauvres, à deux critères sur trois. Les ménages riches auront quant à eux trois critères de richesse et les ménages quasi-riches, deux critères. Au total, la classification comprend 27 classes, qui ont été regroupées en cinq pour les fins de l'analyse: pauvres (111), quasi-pauvres (112, 121, 211), quasi-riches (332, 323, 233) et riches (333), alors que la classe médiane comprend tous les autres types. Nous ne distinguerons pas ces derniers en sous-groupes, puisque nous nous intéressons aux classes socioéconomiques extrêmes dans cette étude sur la convergence des structures de la consommation. Les classes agrégées étant ordonnées, on parlera d'un indice multidimensionnel de pauvreté-richesse (IMPR) ayant cinq modalités.

Une dernière précision s'impose. Atkinson (1987) a montré la grande variabilité du nombre de pauvres estimé à partir de diverses définitions des dépenses totales ou des revenus, résultats confirmés par l'analyse d'indicateurs subjectifs de pauvreté (Combris et Gardes 1995). On peut donc avancer qu'aucun de ces indicateurs classiques, pas plus que l'IMPR, ne permet un comptage robuste du nombre de pauvres. L'indice IMPR ne vise pas prioritairement à estimer un taux de pauvreté, mais plutôt à obtenir une définition objective et opératoire de sous-populations sur lesquelles seront entreprises des analyses microsociologiques des phénomènes de pauvreté et de richesse, telle que la présente étude sur la convergence. Cet indice permet de mesurer le degré d'appartenance des ménages à une classe socioéconomique, mais il ne définit pas directement un seuil de pauvreté en terme de revenu.

Par ailleurs, l'intérêt de cet indice est de permettre d'effectuer des analyses longitudinales de sous-populations distinguées selon plusieurs critères et définis de la même manière dans des enquêtes répétées. Il est possible d'analyser les tendances en évitant les biais systématiques, qui apparaissent lorsqu'on utilise des critères de pauvreté qui ne tiennent pas compte des déformations sociodémographiques structurelles. Enfin, cet indice IMPR propose une approche qui permet des analyses comparatives à partir d'enquêtes de pays différents. Le fait de pouvoir répliquer une mesure fiable dans d'autres contextes nationaux à partir d'enquêtes faites selon des méthodologies proches présente un avantage non négligeable.

Les données

Les données qui seront analysées proviennent des *Enquêtes sur les dépenses des familles* de Statistique Canada administrées en 1969, 1978, 1982, 1986 et 1992. Nous avons effectué un certain filtrage des ménages interrogés en éliminant ceux qui avaient une dépense totale négative et ceux qui avaient une dépense négative pour le poste automobile, de même que les dossiers voilés pour des raisons d'anonymat sur la variable province de résidence dans les trois dernières enquêtes. Il s'agit en fait d'un nombre minime de cas qui n'entache pas la représentativité des échantillons. Au total, 15 107 ménages ont été retenus dans l'échantillon de 1969, 9 351 en 1978, 10 936 en 1982, 10 327

en 1986 et 9 292 en 1992.

Le tableau 1 présente l'évolution de la moyenne des principaux indicateurs utilisés dans la construction de l'IMPR. On voit l'importance de considérer séparément les revenus bruts et les revenus disponibles par unité de consommation, de même que les dépenses par unité, qui augmentent dans des proportions inégales. Par ailleurs, la taille moyenne des ménages diminue fortement; la proportion des ménages dont la personne de référence est âgée de plus de 65 ans s'accroît alors que régresse celle des jeunes. Ces changements structuraux non négligeables nécessitent qu'on en tienne compte dans l'analyse des évolutions temporelles. Enfin, la proportion des ménages plus scolarisés a augmenté de façon importante entre 1969 et 1992.

[Tableau 1 ici]

Les données des cinq enquêtes transversales recueillies par Statistique Canada sont-elles fiables pour analyser la convergence dans les structures de la consommation entre ménages pauvres et riches? Dans un autre travail, nous avons montré que les évolutions des coefficients budgétaires calculées à partir de ces enquêtes et celles évaluées à partir de séries temporelles agrégées de la comptabilité nationales étaient convergentes, malgré quelques différences observables au plan transversal probablement dues à la détermination des dépenses dans chaque fonction de consommation (Gardes et Langlois 1995). On sait que les modèles statiques estimés sur données d'enquête sont biaisés par l'endogénéité des effets fixes individuels, ce qui nécessite l'estimation de modèles dynamiques pour juger de la différenciation sociale des comportements de consommation (Cardoso et Gardes 1997). Cette estimation ne peut se faire elle-même qu'à l'aide de données individuelles temporelles. En l'absence de données de panel de consommation, on effectuera une pseudo panelisation des enquêtes regroupant les données individuelles en cellules homogènes comparables d'une période à l'autre (voir Gardes, Langlois et Richaudeau 1996 pour une explication de la méthode suivie ici).

Évolution de la pauvreté et de la richesse des ménages

Le tableau 2 présente l'évolution de la proportion des ménages pauvres et riches définis par l'indice

IMPR. Rappelons que l'intérêt de cet indice n'est pas de compter les ménages pauvres ou riches, mais bien de mesurer l'évolution de leur proportion dans le temps à partir d'une mesure fiable. Les tendances d'évolution sont les suivantes. Il y a d'abord une augmentation de la proportion des ménages pauvres durant les années 1980, suivie d'une réduction après 1986. Ces variations sont cependant faibles en intensité, ce qui signifie qu'il y a un noyau assez stable de ménages pauvres au cours des deux dernières décennies. Il en va autrement pour la proportion des ménages qui sont quasi-pauvres, ménages qui possèdent deux critères de pauvreté sur trois. Celle-ci a régressé de façon importante au cours des années 1970, passant de 14,5% à 8,9%, à la suite de l'adoption de plusieurs mesures fiscales favorisant une meilleure redistribution des revenus, sans oublier la mise en place de plusieurs programmes de protection des revenus touchant notamment les personnes inaptes au travail et les personnes âgées. Par la suite, la proportion des ménages quasi-pauvres a augmenté de façon continue durant les années 1980 et 1990. La hausse de la pauvreté au Canada est donc d'abord le fait de l'accroissement du nombre des ménages ayant certains attributs seulement de la pauvreté.

[Insérez ici tableau 2]

La classe moyenne a connu un gonflement important au cours des années 1970, suivi d'un léger déclin au début des années 1980, déclin qui est cependant beaucoup moins prononcé que celui qui est mesuré par un indice de polarisation des revenus individuels (Wolfson 1995; Morissette, Myles et Wannell 1994). Il n'apparaît pas possible de soutenir que la classe moyenne est en déclin d'après l'indice IMPR ni d'après l'analyse du revenu familial disponible par unité de consommation, comme l'a montré une étude du Mouvement Desjardins sur les inégalités au Québec (Bégin 1996) et une étude du C.D. Howe Institute (Beach et Slotsve 1996). En fait, c'est sans doute la participation accrue au marché du travail des femmes mariées avec enfants, sans oublier la diminution importante de la fécondité des couples, qui ont freiné ce déclin, qui autrement aurait été marqué compte tenu de l'évolution des revenus individuels (Langlois 1994). On retiendra cependant que le fort mouvement de croissance de la proportion des ménages se retrouvant au centre, qui avait été observé durant les années 1970, s'est brusquement arrêté, alors que s'amorce une certaine décroissance de

la classe moyenne, encore faible mais perceptible. Dans ce contexte, il devient très pertinent de s'interroger sur la convergence dans les structures de la consommation observable entre les classes socioéconomiques, afin de voir si les distances se modifient parallèlement à l'arrêt de la l'expansion de la classe moyenne. Nous pourrions alors poser un diagnostic plus précis et mieux fondé empiriquement sur la question du déclin du centre. La proportion des ménages quasi-riches a diminué au cours des années 1970, alors que celle des riches augmentait quelque peu, mais les évolutions observables par la suite dans ces deux classes ont été moins marquées que celles qui caractérisent les ménages pauvres.

L'analyse par groupe d'âges, plus précise grâce au contrôle du cycle de vie des ménages, montre que les évolutions dégagées plus haut sont divergentes. (Tableau 3). Les tendances marquantes sont les suivantes. Tout d'abord, on note un résultat qui confirme ce que plusieurs recherches ont observé en comparant des données recueillies de manière transversale sans correction de la structure d'âge (MMSR 1990; Langlois 1992): la pauvreté est en régression chez les personnes les plus âgées et en nette augmentation chez les jeunes ménages depuis 1969. La hausse de la pauvreté chez les ménages au milieu du cycle de vie s'est faite au détriment de la classe moyenne. La proportion des ménages riches et quasi-riches est à peu près constante sur toute la période étudiée dans le groupe des ménages formés de personnes âgées de 65 ans ou plus; elle n'a pas augmenté, mais elle n'a pas non plus diminué dans ce groupe d'âge. Par contre, elle a diminué chez les ménages les plus jeunes durant les années 1980.

[Insérez ici tableau 3]

Sur le plan transversal, la pauvreté régresse à mesure que s'élève le niveau d'éducation. La réduction de la pauvreté entre les diplômés du primaire et du secondaire est plus faible qu'entre les diplômés du secondaire et du post-secondaire alors que l'inverse s'observe pour les classes riches après 1978. Le fait de poursuivre des études post-secondaires est une sorte d'assurance contre la pauvreté, mais il n'est pas une garantie d'accès à la richesse. Sur le plan temporel, la proportion de ménages pauvres diminue entre 1978 et 1992 chez les diplômés du primaire, mais non chez ceux du secondaire et du post-secondaire, deux catégories dans lesquelles on note une même augmentation

de la proportion des ménages pauvres. Il y a donc un effet différencié des programmes sociaux, dont l'extension semble avoir profité aux ménages faiblement scolarisés jusqu'à récemment.

Comment se compare la pauvreté dans les diverses régions du Canada? Le tableau 4 présente les seuils SFR et MFR de Statistique Canada qui ont été décrits plus haut et l'indice multidimensionnel IMPR pour cinq grandes régions: les Provinces de l'Atlantique, le Québec, l'Ontario, les Prairies et la Colombie-britannique. L'indice SFR -- et surtout l'indice MFR -- donnent des écarts très marqués entre les grandes régions du Canada. On peut faire deux lectures de ces écarts du point de vue de la validité des mesures. D'une part, ces différences peuvent correspondre à la réalité -- et en ce cas il y aurait effectivement plus de pauvres dans les régions périphériques et au Québec -- mais il est aussi possible que les mesures actuelles sous-estiment la pauvreté dans les provinces riches et la surestiment dans les autres provinces, ce qui accentuerait les écarts, et en ce cas la mesure serait biaisée. Nous estimons que la façon de calculer les seuils chez Statistique Canada contribue à accentuer les écarts entre provinces riches et pauvres, car l'organisme fédéral prend en compte les différences entre milieux rural et urbain, mais non celles qui existent entre les provinces. Les écarts plus prononcés entre les seuils MFR d'une région à l'autre révèlent bien qu'il existent des différences importants de revenus entre elles. L'indice IMPR clarifie les choses en précisant la référence des ménages, référence double qui est la communauté d'appartenance (province et groupe d'âge) mais aussi la société dans son ensemble qui détermine une norme nationale. Que donne la comparaison des indices IMPR? C'est dans les Prairies que le taux de pauvreté est le plus faible en 1992, suivi par les Provinces de l'Atlantique. Par ailleurs, l'écart entre l'Ontario et les autres provinces est fortement réduit, les taux de pauvreté étant presque identiques en Ontario et au Québec (6,4% et 6,5%) en 1992, la Colombie-britannique suivant derrière avec 6%. Ces résultats sont assez différents de ceux obtenus avec les deux mesures de Statistique Canada. D'après l'IMPR, il y aurait moins de pauvres dans les Provinces de l'Atlantique et dans les Prairies, et davantage dans les deux provinces les plus riches, l'Ontario et la Colombie-britannique, de même qu'au Québec. Sur le plan longitudinal, le taux de pauvreté est en régression dans les Provinces de l'Atlantique, il est relativement stable dans les Prairies (avec un sommet en 1982) et au Québec (avec un sommet en 1996), alors qu'il augmente en Ontario et en Colombie-britannique.

Si nous additionnons les deux taux (de pauvreté et de quasi-pauvreté), on obtient des estimations généralement un peu plus élevées que les mesures de Statistique Canada pour caractériser la pauvreté dans son ensemble. Globalement, celle-ci progresse depuis 1978 dans les trois provinces les plus peuplées, soit au Québec, en Ontario et en Colombie-britannique, elle est relativement stable dans les Provinces de l'Atlantique et elle régresse dans les Prairies. Il faut souligner que l'écart avec les données fédérales est plus marqué dans le cas de l'Ontario, la province la plus riche. C'est au Québec que la proportion de pauvres et de quasi-pauvres est la plus élevée: 17% en 1992, suivi de l'Ontario avec 16,1%. Le diagnostic pessimiste fréquemment posé sur le Québec -- province marquée par un haut taux de pauvreté -- n'est pas modifié, mais ce qui change, c'est l'écart qui sépare le Québec des autres provinces, écart qui se rétrécit de façon marquée, notamment l'écart avec l'Ontario, point de comparaison souvent privilégié. Enfin, la situation de la pauvreté dans les Maritimes ne paraît pas plus alarmante qu'ailleurs.

[ici tableau 4]

Gravité de la pauvreté et pertes de bien-être

Outre l'estimation de la proportion d'une population qui est pauvre selon des critères donnés, il paraît nécessaire de caractériser la gravité du phénomène lui-même. Le taux de pauvreté ne renseigne pas sur l'ampleur de cette dernière, car même si le nombre de pauvres reste constant, l'état de ces derniers peut se détériorer par rapport à l'ensemble de la population non-pauvre comme l'a montré Phipps (1991) pour le Canada. Aussi calculerons-nous deux indicateurs de bien-être mesurant la gravité de l'exclusion due à la pauvreté au-delà du simple comptage du nombre de pauvres: les indices de Watts et de Sen (1976), dont les propriétés sont discutées dans Foster et Shorrocks (1991), Zheng (1993) et Ravallion (1994).

L'indice de Watts sera calculé sur la dépense totale et sur le revenu d'après la formule suivante

$$P = \frac{2}{(q+1)nz} \sum_{i=1}^q (z - y_i)(q+1-i)$$

dans laquelle q représente le nombre de pauvres et n l'effectif total de l'échantillon. Dans notre analyse, les pauvres n'étant pas définis par un seuil de revenu, le seuil de pauvreté z a été déterminé comme le dernier vingtile des classes pauvres et quasi-pauvres et le premier vingtile des classes riches et quasi-riches. Cet indice mesure le *montant absolu de la perte de bien-être* due à la pauvreté. Le second indice, proposé par Sen, mesure la *distance relative moyenne* en termes monétaires du revenu des pauvres au seuil de pauvreté: si le revenu de tous les ménages pauvres diminuait de 10% pour un seuil de pauvreté invariable, l'indice augmenterait de 10% fois le taux de pauvreté. La formule de l'indice est la suivante

$$P = \frac{1}{n} \sum_{i=1}^q [\log z - \log y_i]$$

avec z représentant le seuil de pauvreté défini en terme de revenu comme dans l'indice de Watts, n la taille de l'échantillon, et y le revenu observé de chaque ménage pauvre.

Les résultats, qui apparaissent dans les tableaux 5 et 6, mettent en évidence des évolutions assez différentes selon les périodes. La gravité de la pauvreté évolue dans la même direction que la proportion des pauvres et des quasi-pauvres, mais non avec la même amplitude. Tout d'abord, la gravité des situations de pauvreté a nettement diminué entre 1969 et 1978, et plus faiblement par la suite entre 1986 et 1992. La gravité de la quasi-pauvreté a connu elle-aussi une diminution entre 1969 et 1978, mais l'évolution fût par la suite différente de celle qui a caractérisé la pauvreté. Il semble que la perte de bien-être des ménages quasi-pauvres ait eu tendance à s'accroître à partir de la fin des années 1970, alors que la situation des pauvres s'améliorait quelque peu, comme le montrent les indicateurs de Sen et de Watts. L'analyse met en évidence une nette aggravation de la quasi-pauvreté, comme l'indique notamment l'indicateur de Sen dans le tableau 6. Si cela est juste, on peut avancer que les quasi-pauvres auraient été les plus touchés par la crise du début des années 1980. Ce résultat est important, car il donne à penser qu'est en train d'apparaître une forme de déclassement d'une fraction inférieure de la classe moyenne, devenue incapable de maintenir sa place dans le contexte de l'importante mutation sociale qui caractérise la société actuelle. Nous reviendrons sur cette hypothèse après avoir analysé la convergence de la consommation. Pour les quasi-riches, la situation a changé en 1978, avec une forte réduction de l'avantage relatif qu'ils

avaient en 1969. Par la suite, on ne peut pas dire qu'ils aient gagné ou perdu du terrain. Enfin, la proportion des ménages riches a augmenté de 1969 à 1982, comme on l'a vu dans le tableau 2, par le passage de ménages quasi-riches à une situation de richesse, mais la distance au premier riche est restée stable à partir de 1978. Ce résultat s'explique sans doute par l'augmentation des impôts directs, dont la forte progressivité a davantage touché les ménages les plus riches.

[Ici tableaux 5 et 6]

Comportements de consommation dans les classes socioéconomiques

Y-a-t-il rapprochement des modes de vie et convergence des comportements de consommation entre les classes socioéconomiques au cours de la période étudiée, marquée par un enrichissement collectif important, et au cours du cycle de vie des ménages, généralement lui aussi marqué par une augmentation réelle du niveau de vie? Dans le contexte d'une marchandisation croissante de la vie quotidienne, peut-on parler d'une convergence entre ménages pauvres et ménages riches? La hausse du niveau de vie réel entraîne-t-elle une évolution vers des patrons communs de consommation sur longue période et au cours du cycle de vie? Pour répondre à ces questions, nous proposons trois types d'analyse. Tout d'abord, un examen de la convergence observable dans les structures de la consommation entre ménages répartis dans les cinq classes socioéconomiques définies plus haut par l'indice IMPR, afin de voir si les changements transversaux correspondent aux évolutions temporelles. Puis, l'estimation des distances entre les cinq classes en contrôlant les groupes d'âges et l'année de l'enquête. Enfin, le calcul des élasticités transversales et dynamiques permettra de dégager la relation entre la différenciation sociale et la dynamique temporelle dans le processus de création de nouveaux besoins. Pour compléter l'analyse de la convergence ou de la divergence des structures de consommation, il faudrait aussi analyser les *causes* de ces phénomènes, soit la variation du revenu réel et du niveau de vie, la modification de la norme de consommation et les changements des structures de prix relatifs. Seule la question de la convergence sera analysée ici, les causes étant étudiées dans des publications à venir.

Structure de la consommation

Le tableau 7 présente l'évolution des coefficients budgétaires dans les cinq classes socioéconomiques entre 1969 et 1992 pour les neuf fonctions: alimentation (à domicile et à l'extérieur), logement (loyer, intérêts hypothécaires et charges), habillement, équipement du foyer, protection (assurances et cotisations liées au travail), santé (santé et hygiène personnelle), culture (dépenses pour la culture, les divertissements et l'éducation), transports (achat, entretien et utilisation des véhicules, transports en commun) et divers (autres dépenses non incluses dans les fonctions précédentes). On peut y repérer les *changements transversaux* entre les ménages pauvres et les ménages riches et les comparer aux *évolutions temporelles* pour chacun des groupes.

[Ici tableau 7]

La variation transversale des coefficients budgétaires s'avère importante -- plus de 50% de variation pour la moitié des fonctions -- et elle est conforme aux résultats d'analyses antérieures de la consommation et des dépenses des ménages (Gardes 1983; Langlois 1989; Brown 1994). Ces modifications transversales sont très stables d'une enquête à l'autre, au moins dans leur direction. Les changements les plus importants de la structure budgétaire entre les classes pauvres et les classes riches concernent les dépenses alimentaires dont la part budgétaire diminue dans les mêmes proportions entre 1969 et 1992. Nous retrouvons ici un résultat observable depuis les premières grandes enquêtes budgétaires réalisées au siècle dernier. Lorsque leur situation financière réelle s'améliore, les ménages disposent d'un revenu discrétionnaire qui peut être affecté à la satisfaction de nouveaux besoins. Ces ressources sont utilisées prioritairement pour les dépenses de transports, dont la part budgétaire est quadruplée dans les dépenses des riches par rapport à celles des pauvres en 1969 et plus que doublée en 1992. Les ménages pauvres et riches se différencient de façon marquée d'après ces deux fonctions. La fonction transports passe même au premier rang dans la structure de la consommation des ménages les plus riches dès 1969, ce qui montre bien une fois de plus l'importance de la mobilité dans le mode de vie contemporain (Scardigli 1983; Aglietta et Brender 1984; Gardes et Louvet 1986). Ce résultat va dans le sens des analyses de la norme de

consommation selon lesquelles la fonction transports devient l'élément structurant essentiel du mode de vie et de la consommation des ménages. Le poste logement augmente en importance dans les budgets de tous les groupes de ménages, mais de façon plus importante chez les ménages les plus pauvres. Ce résultat est important car l'effort financier de plus en plus marqué que les ménages pauvres doivent supporter va affecter le rapprochement de leur structure de consommation avec les ménages les plus riches. Cinq autres fonctions ont connu une croissance transversale marquée, mais moins importante que la fonction transports: ce sont les fonctions habillement, culture, équipement du ménage, protection et dépenses diverses. Les dépenses de culture sont caractérisées par un changement transversal plus complexe lié à une forte augmentation de leur coefficient budgétaire pour la classe moyenne, sans doute parce que les dépenses pour l'éducation des enfants sont comprises dans ce poste. Les changements transversaux des pauvres à la classe moyenne et de la classe moyenne aux riches (sauf pour les dépenses d'hygiène) sont de nature semblable mais semblent nettement plus importants entre pauvres et classe moyenne.

Sur le plan longitudinal, les écarts entre les riches et les pauvres se réduisent entre 1969 et 1992 pour un certain nombre de fonctions: alimentation (l'écart entre pauvres et riches pour ce poste n'est plus que de 17% en 1992) et transports surtout, mais aussi habillement et culture. (Graphique 1). Ces écarts augmentent pour d'autres fonctions: le logement surtout, la protection, les dépenses de santé et les dépenses diverses, celles-ci révélant l'émergence des nouveaux besoins. Pour six fonctions, l'évolution temporelle permet aux ménages pauvres de se rapprocher des structures de consommation qu'avaient les riches en début de période, mais cette convergence n'est pas complète puisque trois postes -- logement, habillement, équipement du logement -- connaissent des évolutions temporelles contraires aux changements transversaux, comme l'indique la divergence des taux de variations transversale et temporelle (deux dernières lignes du tableau 7). Au total, les évolutions temporelles des coefficients budgétaires sont similaires pour les cinq groupes socioéconomiques, mais plus fortes pour les groupes riches, les ménages pauvres étant affectés par une inertie relative de leur structure de consommation. En fait, ce qui semble empêcher la structure de la consommation des ménages pauvres de se rapprocher davantage de celle des ménages de classe moyenne ou des ménages riches est l'obligation qu'ils ont eu d'augmenter plus fortement leurs dépenses pour se loger

à la fin des années 1980. Les ménages pauvres ont été plus touchés que les autres par le renchérissement du coût de l'habitation, ce qui a contraint l'ensemble de leur budget. Globalement, les évolutions temporelles semblent plutôt positivement corrélées aux évolutions transversales. Deux des trois cas de relations inverses sont très peu marqués (habillement et équipement du ménage). Ce premier résultat ne contredit donc pas l'hypothèse de convergence des structures de consommation au cours du temps.

Tableau 1

Caractérisation de la population à l'aide de sept variables, Canada, 1969-1992.

variables	1969	1978	1982	1986	1992
Revenu total brut (\$1992)	26 726	44 636	45 102	43 983	44 212
Revenu disponible par u.c. (\$1992)	15 245	16 975	18 341	17 917	17 867
Dépenses totales par u.c. (\$1992)	15 297	16 369	16 821	17 741	17 495
Coefficient budgétaire Alimentation	0.218	0.188	0.165	0.150	0.136
Taille moyenne du ménage	3.55	3.02	2.84	2.70	2.60
% des 29 ans et moins	16.1	19.5	19.7	17.9	13.3
% des 30-44 ans	31.4	31.2	33.1	34.3	36.4
% des 45-64 ans	34.5	31.5	30.0	28.7	30.1
% des 65 ans et plus	17.9	17.8	17.3	19.1	20.2
% primaire	39.9	27.4	22.4	19.9	16.7
% secondaire	39.9	44.0	43.3	43.8	42.1
% post-secondaire	20.2	28.6	34.3	36.3	41.2
Taille de l'échantillon	15 107	9 351	10 936	10 327	9 292

Source: Statistique Canada, microdonnées de l' *Enquêtes sur les dépenses des familles*, calculs des auteurs.

Tableau 2

Répartition de la population des ménages d'après l'indice multidimensionnel de pauvreté-richesse (IMPR), Canada, 1969-1992

Indice IMPR	1969	1978	1982	1986	1992
pauvres	5.8	5.7	6.3	6.5	6.0
quasi-pauvres	14.5	8.9	9.5	9.8	9.9
classe moyenne	65.2	71.3	69.5	69.1	69.7
quasi-riches	10.3	9.3	9.6	9.5	9.3
riches	4.3	4.8	5.3	5.1	5.1
Total %	100	100	100	100	100
N	15 107	9 351	10 936	10 327	9 292

Source: Statistique Canada, microdonnées de l'*Enquête sur les dépenses des familles*, calculs des auteurs.

Tableau 3
Répartition de la population selon les catégories de l'indice multidimensionnel pauvreté-richesse (IMPR) et les groupes d'âge, Canada, 1969-1992.

	Pauvres	Quasi-pauvres	Classe moyenne	Quasi-riches	Riches	Total %	N
1969							
moins de 30	4,6	11,7	69,8	10,7	3,3	100	2438
30-44	3,8	11,2	69,1	11,8	4,2	100	4747
45-64	6,0	13,2	64,6	11,0	5,1	100	5213
65 et +	9,7	25,3	55,4	6,0	3,6	100	2710
1978							
moins de 30	5,3	7,5	71	11,3	5,0	100	1824
30-44	5,8	7,1	71,6	9,8	5,7	100	2918
45-64	5,8	9,1	70,4	9,6	5,1	100	2945
65 et +	5,6	13,6	72,7	5,5	2,6	100	1664
1982							
moins de 30	6,9	8,5	68,3	10,8	5,4	100	2150
30-44	7,1	8,9	67,7	10,2	6,2	100	3617
45-64	5,9	9,0	70,4	9,6	5,1	100	3276
65 et +	5,1	13,0	72,6	6,1	3,2	100	1873
1986							
moins de 30	7,6	9,5	69,3	9,5	4,2	100	1848
30-44	6,9	9,9	66,3	10,1	6,7	100	3540
45-64	6,2	9,7	68,3	10,8	5,0	100	2965
65 et +	5,6	10,4	74,7	6,6	2,7	100	1974
1992							
moins de 30	6,9	9,5	70,2	9,5	3,9	100	1243
30-44	7,1	9,6	67,3	9,8	6,1	100	3404
45-64	5,2	9,5	68,7	10,7	5,9	100	2801
65 et +	4,0	10,2	76,8	6,9	3,0	100	1892

Source : Statistique Canada, microdonnées de *l'Enquête sur les dépenses des familles*, calculs des auteurs.

Tableau 4
Taux de pauvreté selon différents indices -- SFR, MFR et IMPR -- et la région, Canada, 1969-1992

SFR**				MFR**	IMPR		
base	base	base	base		pauvres	quasi	total

région	année	1969	1978	1986	1992		pauvres		
Atlantique	1969	33.0	--	--	--	--	7.1	14.6	21.7
	1978	14.5	17.2*	--	--	--	6.2	8.8	15.0
	1982	13.0	17.4	17.8	18.1	22.9	6.1	9.6	15.7
	1986	11.2	15.1	15.6	15.7	19.9	7.2	9.2	16.4
	1992	--	--	14.2	13.8	17.4	5.8	9.4	15.2
Québec	1969	24.2	--	--	--	--	5.7	15.6	21.3
	1978	12.0	14.6*	15.3	--	--	6.4	8.2	14.6
	1982	12.0	15.0	16.7	16.7	14.8	7.1	9.7	16.8
	1986	10.5	14.6	17.1	16.7	14.3	8.0	9.6	17.6
	1992	--	--	15.5	15.9	12.7	6.4	10.6	17.0
Ontario	1969	14.4	--	--	--	--	5.7	13.6	19.3
	1978	8.8	11.4*	--	--	--	5.0	9.2	14.2
	1982	8.7	10.9	12.1	12.2	8.3	6.1	8.6	14.7
	1986	6.7	8.5	10.1	9.8	8.5	6.1	10.0	16.1
	1992	--	--	11.2	11.1	10.2	6.5	9.6	16.1
Prairies	1969	26.2	--	--	--	--	4.9	15.1	20.0
	1978	10.2	13.7*	--	--	--	5.6	9.9	15.5
	1982	9.1	10.8	11.8	11.8	14.9	6.8	10.6	17.4
	1986	9.2	12.0	14.1	13.8	13.3	5.8	10.4	16.2
	1992	--	--	15.2	15.2	15.6	5.0	9.3	14.3
Colombie Britannique	1969	16.7	--	--	--	--	4.6	12.9	17.5
	1978	8.3	11.3*	--	--	--	4.6	7.4	12.0
	1982	9.4	11.9	13.8	13.5	12.4	4.9	8.9	13.8
	1986	10.3	13.2	15.6	15.1	13.6	5.7	10.0	15.7
	1992	--	--	13.4	13.5	11.4	6.0	9.5	15.5

* Année 1979

** Ménages de deux personnes et plus et familles.

Source : Statistique Canada, cat. 13-207, microdonnées des *Enquêtes sur les dépenses des familles*, calculs des auteurs. Les données sur les MFR et les SFR pour les années 1986 et 1992 ont été révisées par Statistique Canada en 1996, ce qui explique l'existence de certains écarts avec les publications précédentes.

Tableau 5

Indicateur de perte bien-être de Watts calculé selon les dépenses totales et les revenus selon l'indice multidimensionnel de pauvreté-richesse, Canada, 1969-1992

		1969	1978	1982	1986	1992
P	dép.	0.0433	0.0270	0.0273	0.0268	0.0242
	rev.	0.0425	0.0240	0.0268	0.0293	0.0236
QP	dép.	0.1071	0.0396	0.0428	0.0420	0.0416
	rev.	0.1309	0.0483	0.0524	0.0548	0.0583
QR	dép.	-0.0782	-0.0443	-0.0463	-0.0427	-0.0425
	rev.	-0.0772	-0.0500	-0.0517	-0.0505	-0.0491
R	dép.	-0.0303	-0.0232	-0.0259	-0.0226	-0.0234
	rev.	-0.0297	-0.0194	-0.0230	-0.0222	-0.0230

1ère ligne: calculé à l'aide des dépenses totales

2ème ligne: calculé à l'aide du revenu

Source: Statistique Canada, microdonnées de *l'Enquête sur les dépenses des familles*, calculs des auteurs.

Tableau 6

Indicateur de perte bien-être de Sen selon l'indice multidimensionnel de pauvreté-richesse,
Canada, 1969-1992

Enquête	Pauvres	Quasi-pauvres
1969	0.0344	0.0962
1978	0.0238	0.0438
1982	0.0266	0.0473
1986	0.0282	0.0489
1992	0.0239	0.0511

Source: Statistique Canada, microdonnées de *l'Enquête sur les dépenses des familles*, calculs des auteurs.

Tableau 7
Coefficients budgétaires pour 9 fonctions de consommation selon les catégories
de l'indice multidimensionnel pauvreté-richesse (IMPR), Canada, 1969-92

	ALIME.	LOGE.	HABILL.	EQUIP.	PROTEC.	SANTE	CULTUR.	TRANSP.	DIVERS
III									
3	0.452	0.198	0.077	0.026	0.014	0.058	0.077	0.046	0.053
43	0.316	0.221	0.086	0.036	0.026	0.072	0.088	0.084	0.071
80	0.257	0.187	0.098	0.043	0.046	0.064	0.102	0.129	0.074
45	0.221	0.171	0.103	0.048	0.055	0.058	0.109	0.156	0.078
5	0.181	0.157	0.108	0.051	0.054	0.054	0.110	0.201	0.084
III									
3	0.396	0.225	0.068	0.033	0.020	0.041	0.083	0.065	0.067
43	0.316	0.232	0.069	0.045	0.027	0.045	0.096	0.085	0.083
80	0.238	0.210	0.077	0.052	0.045	0.043	0.108	0.137	0.090
45	0.180	0.195	0.078	0.057	0.059	0.039	0.114	0.174	0.103
5	0.165	0.172	0.077	0.058	0.054	0.036	0.116	0.214	0.109
III									
3	0.349	0.251	0.062	0.027	0.020	0.046	0.101	0.072	0.068
43	0.285	0.262	0.063	0.033	0.029	0.049	0.102	0.092	0.081
80	0.219	0.231	0.072	0.041	0.047	0.048	0.108	0.136	0.094
45	0.165	0.215	0.072	0.048	0.065	0.042	0.103	0.178	0.108
5	0.159	0.197	0.072	0.045	0.059	0.037	0.114	0.176	0.137
III									
3	0.330	0.260	0.062	0.029	0.022	0.049	0.100	0.076	0.067
43	0.259	0.269	0.063	0.035	0.031	0.053	0.113	0.094	0.078
80	0.206	0.225	0.071	0.042	0.049	0.049	0.117	0.140	0.096
45	0.155	0.194	0.075	0.045	0.068	0.042	0.118	0.178	0.121
5	0.147	0.180	0.070	0.047	0.058	0.037	0.116	0.213	0.127
III									
3	0.300	0.285	0.053	0.028	0.020	0.050	0.118	0.081	0.064
43	0.238	0.286	0.054	0.031	0.033	0.057	0.126	0.099	0.077
80	0.186	0.239	0.058	0.035	0.056	0.053	0.130	0.140	0.102
45	0.139	0.211	0.061	0.041	0.081	0.044	0.127	0.170	0.125
5	0.134	0.201	0.055	0.045	0.073	0.038	0.119	0.192	0.142
	Taux de variation								
III	-0.30	0.31	-0.40	-0.10	0.35	-0.21	0.30	0.21	0.39
III	-0.93	-0.28	0.14	0.48	0.83	-0.17	0.18	0.97	0.60

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CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Chateau Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
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Taking Prices Seriously in the Measurement of Inequality

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Simon Fraser University

Session 6B: Trends in Inequality in Canada
October 31 8:30 AM - 11:00 AM

1. Introduction

The measurement of income¹ inequality usually focusses on income, and understandably so. However, both prices and demographics affect individual well-being, and these are incorporated into most analyses of economic inequality in very simple and misleading ways. Adjustments for price changes over time and differences across area of residence are usually done by dividing income by an income-independent price index. Adjustments for demographic differences across households are usually done by dividing income by a price-independent equivalence scale². In this paper, I will briefly describe when these procedures are appropriate, argue that they are not in general appropriate, and show what difference it makes in the assessment of Canada's changing distribution of income over 1978-1996 to allow for more complex adjustment procedures.

In particular, I look at two refinements to the measurement of income inequality: (1) I relax the restriction that price effects must come in through dividing income by an income-independent price index. This amounts to allowing rich families and poor families to respond differently to price changes over time; (2) I relax the restriction that demographic effects must come in through dividing income by a price-independent equivalence scale. This amounts to allowing equivalence scales to depend on relative prices. A price-dependent equivalence scale for a large family might increase with a food price increase and decrease with a rent price increase because food is not as shareable as rent. These refinements to our assessment of consumption inequality in Canada over 1978-1996 make a big difference. Standard methods lead the researcher to conclude that family consumption inequality increased by about 15% over 1978-1986 and was fairly constant thereafter. The more robust methods outlined above lead the researcher to conclude that family consumption inequality increased by only about 8% over 1978-1986 and was fairly constant thereafter.

¹I will use the terms income, consumption and expenditure interchangeably throughout this paper, in deference to the large literature on income inequality. In the empirical work, I evaluate changes in the distribution of consumption on a bundle of goods.

²In empirical work on economic inequality, equivalence scales for demographic adjustment are almost always assumed to be income-independent as well as price-independent. In this paper, I consider only the relaxation of price-independence. See Donaldson and Pendakur (1998) for a discussion of income- and price-dependent equivalence scales.

2. Theory

Define the expenditure function $E(p, u, z)$ as the minimum amount of expenditure necessary to give a household with demographic characteristics z facing prices p a utility level of u . Define the indirect utility function $V(p, x, z)$ as the level of utility attained by a household with income x and demographic characteristics z facing prices p . Define z^R as reference vector of household characteristics, to be used as the reference for demographic adjustments. For this paper, z^R is the vector of characteristics associated with a 40 year old single childless adult. Define $V^R(p, x) = V(p, x, z^R)$ as the indirect utility function of the reference household type and $E^R(p, u) = E(p, u, z^R)$ as the expenditure function of the reference household type. Define $\tilde{p}$ as a base vector of prices, to be used as a basis for price adjustments. For this paper, $\tilde{p}$ is the price vector faced by residents of Ontario in 1986.

The measurement of inequality requires an income measure that has been adjusted for differences in the price regimes faced by different households and the demographic characteristics of different households. Saying that it is possible to "adjust" for differences across household types in the measurement of inequality requires that the adjusted distribution with no differences in characteristics or price regimes is normatively equivalent to the unadjusted distribution with differences in characteristics and/or price regimes. When ethics are consequentialist, as they are under welfarist social evaluation, normative equivalence between two distributions is satisfied when the set of individual utilities in each distribution is identical. Thus, we define *adjusted income* denoted $y = Y(p, x, z)$ as the income that would give a household with reference characteristics facing base prices the same utility as a household with income x and characteristics z facing prices p . Adjusted income is defined implicitly by:

$$V^R(\tilde{p}, y) = V^R(\tilde{p}, Y(p, x, z)) = V(p, x, z). \quad (2.1)$$

A population of reference households facing base prices with incomes $\{Y(p, x, z)\}$ is normatively equivalent to a population of households with characteristics $\{z\}$ facing price vectors $\{p\}$ with incomes $\{x\}$. Given a population of individuals living in households with various demographics compositions and facing various price regimes, the researcher calculates an inequality index based on the adjusted income, $Y(p, x, z)$, assigned to each individual.

Without loss of generality, we can break the derivation of adjusted income into two steps: (1) adjustment for differences in demographic characteristics across

households evaluated at current prices; and (2) adjustment for differences in price regimes across different households. I consider these two steps in turn.

2.1. Adjusting for differences in household characteristics

Define $x^e = X(p, x, z)$ as equivalent income which gives the income necessary for a reference household (with characteristics z^R) facing prices p to achieve the same utility level as a household with characteristics z facing prices p . The equivalent income function $X(p, x, z)$ is implicitly given by

$$V^R(p, x^e) = V^R(p, X(p, x, z)) = V(p, x, z) \quad (2.2)$$

and given by

$$X(p, x, z) = E^R(p, V(p, x, z)).$$

A population of reference households facing prices p with incomes $\{X(p, x, z)\}$ is normatively equivalent to a population of households with characteristics $\{z\}$ facing prices p with incomes $\{x\}$. If the researcher knows the equivalent income function $X(p, x, z)$, then to measure income inequality within a group of households facing a common price vector p , s/he would assign equivalent income x^e to each member of each household and measure income inequality on these equivalent income data.

The most common strategy in the measurement of inequality is to use an equivalent income function of the form

$$X(p, x, z) = \frac{x}{S(z)}. \quad (2.3)$$

Here, equivalent income is calculated by dividing income by a price-independent equivalence scale function $S(z)$.

Unfortunately, Blackorby and Donaldson (1993) show that if the equivalent income function is given by (2.3), then the expenditure function is very restricted and must be given by

$$E(p, u, z) = E^R(p, u)S(z). \quad (2.4)$$

Pendakur (1999) further shows that if the equivalent income function is given by (2.3) then expenditure share equations $w_j(p, x, z)$ are given by

$$w_j(p, x, z) = w_j^R(p, \frac{x}{S(z)}) \quad (2.5)$$

where $w_j^R(p, x) = w_j(p, x, z^R)$ give the expenditure share equations of the reference household. Expressing (2.5) in terms of $\ln x$, we get

$$w_j(p, \ln x, z) = w_j^R(p, \ln x - \ln S(z)). \quad (2.6)$$

Here, we see that household characteristics are highly restricted in the way they enter expenditure share equations. If (2.3) holds, then expenditure share equations in $\ln x$ must be identical across household types except for a horizontal translation of $\ln S(z)$.

There is a wealth of parametric (Blundell and Lewbel 1991; Dickens, Fry and Pashardes 1993; Pashardes 1995) and semiparametric (Gozalo 1997; Pendakur 1999) research that tests the restrictions given by (2.5), and this research rejects the hypothesis that these restrictions hold. This means that the price-independence of $S(z)$ cannot hold. That is, the equivalent income function must have a more complicated relationship with income than that given by (2.3).

This suggests that empirical work measuring income inequality with equivalence scaling of the form (2.3) may be misleading. In this paper, I relax the restriction that the equivalent income function is independent of prices by using an equivalent income function of the form

$$X(p, x, z) = \frac{x}{R(p, z)}. \quad (2.7)$$

Blackorby and Donaldson (1993) show that under certain conditions equivalent income functions of the form (2.7) are identifiable from demand data. In this paper, I estimate $R(p, z)$ from demand behaviour (see the Estimation Appendix for details), and use this estimated price-dependent equivalence scale to evaluate how the change in measured inequality responds to using an equivalent income function more general than the naive equivalent income function (2.3).

2.2. Adjusting for differences in price regimes

Consider a population of households with identical reference characteristics z^R facing prices $\{p\}$ with incomes $\{x\}$. Define $\tilde{x} = D(p, x)$ as *deflated income* which gives the income necessary for a reference household facing a base prices $\tilde{p}$ to achieve the same utility level as a reference household facing prices p . Deflated income is implicitly defined by:

$$V^R(p^R, \tilde{x}) = V^R(p^R, D(p, x)) = V^R(p, x) \quad (2.8)$$

and given by

$$D(p, x) = E^R(\tilde{p}, V^R(p, x)). \quad (2.9)$$

A population of reference households facing base prices $\tilde{p}$ with a set of associated deflated incomes $\{D(p, x)\}$ is normatively equivalent to a population of reference households facing prices $\{p\}$ with incomes $\{x\}$. If the researcher knows the deflated income function $D(p, x)$, then to measure income inequality within a group of households with common reference characteristics facing different price vectors, s/he would assign deflated income $\tilde{x}$ to each household and measure income inequality on these deflated income data.

Note that a population of reference households facing prices $\{p\}$ with incomes $\{X(p, x, z)\}$ is normatively equivalent to a population of households with differing characteristics $\{z\}$ facing prices $\{p\}$ with incomes $\{x\}$. To simultaneously allow for differences in household characteristics, the researcher could use a two-step process. First assign each member of each household equivalent income x^e . Second, compute adjusted income $y = Y(p, x, z)$ as

$$Y(p, x, z) = D(p, x^e) = D(p, X(p, x, z)) \quad (2.10)$$

or, substituting in for D and X ,

$$Y(p, x, z) = E^R(\tilde{p}, V^R(p, E^R(p, V(p, x, z)))) \quad (2.11)$$

The most common form chosen for $D(p, x)$ in the measurement of income inequality is

$$D(p, x) = \frac{x}{I(p)} \quad (2.12)$$

where $I(p)$ is an income-independent price index. Here, deflated income is calculated by dividing income by the price index $I(p)$. In this case, if the researcher is using a relative inequality index (which is insensitive to scalings of the income data), it is not even necessary to use the deflated income measure: relative inequality will be the same whether calculated on a set of income data or a set of deflated income data.

Unfortunately, Diewert (REF) shows that if the deflated income function is given by (2.12) the (reference) expenditure function must be given by

$$E^R(p, u) = F(p)G(u). \quad (2.13)$$

and $I(p)$ is given by

$$I(p) = \frac{F(p)}{F(\tilde{p})}$$

This condition is called homotheticity and is a very tight restriction on preferences. If expenditure functions are given by (2.13) then expenditure share equations must be given by

$$w_j^R(p, x) = \frac{d \ln F(p)}{d \ln p_j}. \quad (2.14)$$

Here expenditure shares are independent of income.

A large body of empirical work suggests that expenditure shares for many commodities are highly dependent on income (see, for example, Banks, Blundell and Lewbel 1997). For example, poor households spend a larger share of their income on food than rich households. This suggests that the deflated income function might be related to income in a more complicated way than that given by (2.12).

If the researcher uses both the naive equivalent income function given by (2.3) and the naive deflated income function given by (2.12), then the expenditure function must be given by

$$E(p, u, z) = F(p)G(u)S(z). \quad (2.15)$$

This expenditure function is characterised by identically homothetic preferences for all household types. Here, expenditure share equations are given by

$$w_j(p, x, z) = \frac{d \ln F(p)}{d \ln p_j} \quad (2.16)$$

so that share equations are independent of income and household characteristics.

As noted above, in this paper, I relax the restriction that the equivalent income function take the form (2.3). I also relax the restriction that the deflated income function be dual to homothetic preferences and given by (2.12). I calculate $D(p, x)$ by estimating a nonhomothetic Quadratic Almost Ideal (QUAI) demand system due to Banks, Blundell and Lewbel (1997) (see Estimation Appendix for details). Whereas homothetic demand systems require that expenditure shares for different goods are constant across x , the QUAI demand system allows expenditure shares to be quadratic in the log of x .

3. The Data

This analysis uses the 1978, 1982, 1984, 1986, 1990, 1992 and 1996 Family Expenditure Surveys (FES). These surveys were conducted by Statistics Canada

and collect information on demographics, income and expenditures from five to ten thousand Canadian households in each survey year (Statistics Canada, various years). The universe for these surveys varied from year to year: the 1978, 1982, 1986, and 1992 surveys sampled from all urban and rural households in the ten provinces of Canada, while the 1984 and 1990 surveys sampled only from urban households in Canada's 15 largest Census Metropolitan Areas (CMAs). To maximize the number of survey years available and to avoid imputing rural consumption, I analyse data on urban residents only, unless otherwise specified.

The 1978, 1982, 1984 and 1986 surveys treat the "spending units" as the unit of analysis and the 1990, 1992 and 1996 surveys treat the household as the unit of analysis. In order to create a consistent sample across these units of analysis, I use only spending units and households comprised of a single economic family. An economic family is defined as an unattached individual, or a group of people, related by blood, marriage or adoption, who live together in a household. The FES data are weighted at the level of the family, so each individual in a family is assigned the family weight.

I use only economic families that fall into six household types: (1) single childless adults; (2) childless couples; (3) single parents with one child; (4) single with two children; (5) dual parents with one child; (6) dual parents with two children. A single childless adult aged 40 years old is the reference household type, denoted above as z^r .

I assess inequality in consumption of a bundle of five commodities: (1) food; (2) shelter, including rented and owned accommodation; (3) clothing for adults; (4) clothing for children; and (5) transportation. I use the Gini coefficient to measure inequality, and supply standard errors for estimated Gini coefficients following Barrett and Pendakur (1995).

Because the consumption flow from durables is smoother than the purchase path, I calculate imputed rental flows³ for households with owned accommodation and imputed transportation flows⁴ for households with automobile expenditures.

³I calculate imputed rental flows by taking predicted values from city- and year-specific regressions of rents on the number of bedrooms and bathrooms and income and income squared in housing units. The coefficients for these predictions are estimated from regressions using only rental units. The predicted values are applied to owned units. Thus, to the extent that owned accommodation is a better class of accommodation than rented accommodation, these imputed rental flows may underestimate the actual rental flow from owned accommodation.

⁴I calculate imputed transportation flows by taking predicted probabilities from city- and year-specific logit regressions of automobile purchase dummies on family income and family income squared. These probabilities are multiplied by predicted values from city- and year-

Imputed rental flows are added to and mortgage costs subtracted from shelter costs for households with owned accomodation. Imputed transportation flows are added and automobile purchase costs subtracted from transportation costs for households with automobile expenditures.

In order to assess the sensitivity of measured inequality to the relaxation of the restrictions given by (2.3) and (2.12), I use the following naive equivalent income and deflated income functions. The naive equivalent income function is given by

$$X(p, x, z) = \frac{x}{n^{1/2}} \quad (3.1)$$

where n is a an element of z equal to the number of household members. This equivalence scale lies roughly in the middle of the range of scales surveyed by Buhmann et al (1987), and is the same as that used by Atkinson (1994) in his study of income inequality in OECD countries. Each individual in a family is assigned equivalent consumption equal to the total family income or consumption divided by the square root of the number of household members.

As noted above the flexible equivalent income function is given by

$$X(p, x, z) = \frac{x}{R(p, z)}. \quad (3.2)$$

The functions $R(p, z)$ is Cobb-Douglas in prices and fully flexible with respect to the six household types noted above and also sensitive to the age of the household head (see Estimation Appendix for details). Table 1 shows the estimated relative equivalence scale $R(p, z)$ for each of the six household types, evaluated for a 40 year old household head and at the price vector for Ontario 1986.

Table 1: Estimated Price-Dependent Equivalence Scales					
	Couples	Single Parents		Dual Parents	
	0 Kids	1 Kid	2 Kids	1 Kid	2 Kids
$R(p, z)$	1.276	1.500	2.296	1.927	2.097
Std Error	0.089	0.197	0.423	0.213	0.256

The naive deflated income function is given by (2.12). Because relative inequality indices are homogeneous of degree 0, relative inequality indices do not change if a common income-independent price index is applied to all observations in a given year. Thus, from the point of view of inequality measurement using

specific regressions of automobile purchase prices on family income and family income squared to get imputed transportation flows.

relative inequality indices or Lorenz dominance criteria, when the researcher requires the deflated income function to take the form (2.12), it is not necessary to deflate the income measure.

The flexible deflated income function is that associated with Banks, Blundell and Lewbel's (1997) Quadratic Almost Ideal (QUAI) model. This model is characterised by expenditure share equations that are quadratic in the log of total expenditure (see Estimation Appendix for details). The (reference) indirect utility function associated with the QUA model is

$$V^R(p, x) = \left(\left(\frac{\ln x - \ln a(p)}{b(p)} \right)^{-1} - q(p) \right)^{-1} \quad (3.3)$$

where $a(p)$, $b(p)$ and $q(p)$ are homogeneous of degrees one, zero and zero, respectively. The key feature of the QUA model is that it allows for expenditure share equations that are quadratic in the log of total expenditure and has been shown to fit the data tolerably well (for details, see Banks, Blundell and Lewbel 1997).

4. Results

Table 2 presents estimated Gini coefficients for four measures of individual well-being. They are all functions of family expenditure, x , defined above as the sum of food, shelter, clothing and transportation expenditures. I note that I use the terms "income" and "expenditure" interchangeably to refer to family expenditure. The four measures are:

- Naive equivalent income, x_N^e , defined as family expenditure divided by a naive equivalence scale equal to the square root of household size. This equivalent income is defined by equation (3.1).
- Flexible equivalent income, x_F^e , defined as family expenditure divided by an equivalence scale that depends on prices. This equivalent income is defined by equation (3.2).
- Deflated naive equivalent income, $D(x_N^e)$, which is equal to naive equivalent income x_N^e deflated to Ontario 1986 prices using equation (??).
- Deflated equivalent income (1), $D(x_F^e)$, which is equal to flexible equivalent income x_F^e deflated to Ontario 1986 prices using equation (??).

I further note that the most common approach to the measurement of inequality is to calculate an inequality index on observations of naive equivalent income.

Table 2: Gini Coefficients for Family Consumption, Canada, 1978-1996							
Year	1978	1982	1984	1986	1990	1992	1996
x_N^e	0.1932	0.2040	0.2079	0.2217	0.2208	0.2236	0.2238
std err	<i>0.0028</i>	<i>0.0024</i>	<i>0.0033</i>	<i>0.0028</i>	<i>0.0037</i>	<i>0.0029</i>	<i>0.0026</i>
x_F^e	0.2140	0.2224	0.2238	0.2366	0.2345	0.2401	0.2366
std err	<i>0.0031</i>	<i>0.0026</i>	<i>0.0036</i>	<i>0.0030</i>	<i>0.0039</i>	<i>0.0031</i>	<i>0.0028</i>
$D(x_N^e)$	0.1901	0.1964	0.2027	0.2165	0.2117	0.2153	0.2143
std err	<i>0.0028</i>	<i>0.0023</i>	<i>0.0032</i>	<i>0.0028</i>	<i>0.0036</i>	<i>0.0028</i>	<i>0.0025</i>
$D(x_F^e)$	0.2108	0.2140	0.2181	0.2306	0.2245	0.2308	0.2256
std err	<i>0.0031</i>	<i>0.0025</i>	<i>0.0035</i>	<i>0.0029</i>	<i>0.0038</i>	<i>0.0030</i>	<i>0.0027</i>

Figure 1 shows the Gini coefficients for these measures over 1978-1996. Figure 2 shows how the Gini coefficient for these four measures changes over time in absolute terms, treating 1978 as the base year. Figure 3 shows how the Gini coefficient for these four measures changes over time in proportionate terms, treating 1978 as the base year.

The first row of Table 1 and the dotted lines with empty markers in Figures 1, 2 and 3 give the Gini coefficients found when we use standard (naive) method of adjusting for demographics and prices. Looking at Figure 1, we see inequality is rising over 1978-1986, falling to 1990 and rising through 1996. The 1986 peak is about the same as the 1996 peak, and these peaks are insignificantly different from each other. Between 1978 and 1996, the Gini coefficient computed off of the naive income measure rose just over three percentage points, most of which occurred during 1978-1986. This large increase in measured inequality is consistent with findings on the evolution of consumption inequality in Canada using the naive adjustment approach (see Pendakur 1998).

Comparing these estimates to those with naive demographic adjustment and flexible price adjustment (the dotted lines with filled markers in the Figures), we see that the Gini coefficient falls by a little less than one percentage point over the entire period. This is due to the fact that adjusting for price differences accounts for the fact that many wealthy families live in areas where the cost of living is high. However, more than just the measured level of inequality changes when we adjust for prices. Looking at Figure 2, we see clearly that in periods of income growth (1986-1990 and 1992-1996), the price adjustment pushes down estimated

growth in the level of inequality. In particular, while 1992-1996 is a period of rising inequality on the naive measure, it is a period of declining inequality on the price-adjusted measure. Turning to Figure 3, we see that the proportionate growth in inequality is about twelve percent with flexible price adjustment, compared to about sixteen percent with naive price adjustment. Most of this differs is over the period 1992-1996, a period during which price increases hurt the rich relatively more than the poor.

Turning now to the case where we use flexible demographic and price adjustments (heavy lines with filled markers in the Figures), Figure 1 shows that the flexible demographic adjustment also makes a big difference at the margin. In comparison to using a naive demographic adjustment, using a price-dependent equivalence scale pushes up the measured level of inequality by between one and two percentage points. Notably, it pushes measured inequality up by two percentage points at the beginning of the period and only one percentage point at the end of the period. Looking at Figure 2, we see that whereas inequality measured with flexible price adjustment and naive demographic adjustment rose by 2.4 percentage points, inequality measured with flexible price and demographic adjustment rose by only 1.6 percentage points. Figure 3 gives the proportionate changes in the Gini Coefficient. Whereas the Gini coefficient with naive demographic adjustment (and flexible price adjustment) rose by about twelve percent, the Gini coefficient with flexible demographic and price adjustment rose by only eight percent.

We can interpret the effect of flexible demographic adjustment on measured inequality in terms of the how equivalence scales vary across regions due to price differences across regions. In particular, equivalence scales for families with children tend to be smaller in Ontario and BC than in other regions. This is because the price of shelter, a highly shareable commodity, is higher in BC and Ontario than in other regions. Since residents of Ontario and BC are on average richer than residents of other regions, the flexible demographic adjustment pushes measured inequality downwards. Further, relative price changes over the period, especially the increases in the relative price of shelter in BC and Ontario in the early 1980s and early 1990s, sharpened this effect over time.

Turning to Figure 3, we see that the combined effect of flexible price and demographic adjustment substantially reduces our assessment of the growth in consumption inequality over the early 1980s. Whereas the naive method shows a sixteen percent increase in the level of inequality over 1978-1986, the estimates using flexible price and demographic adjustment show only an eight percent in-

crease in the level of inequality over this period. Further, whereas the naive method shows a statistically significant increase in inequality over 1992-1996, the estimates using flexible price and demographic adjustment show a statistically significant decrease in inequality over 1992-1996.

Figure 4 presents estimated Gini coefficients using naive price and demographic adjustments for five regions of Canada, and Figure 5 presents estimated Gini coefficients using flexible price and demographic adjustments for five regions of Canada. Looking at Figure 4, two conclusions emerge from the naive approach. First, the trend increase in inequality does not seem to be driven by any one region, or by inter-region inequality. It seems that all regions saw increasing inequality on the order of at least one-tenth over 1978-1996. Second, the cyclical path of inequality over the business cycle seems to be different across regions. In particular, Ontario and BC saw decreasing or flat inequality over growth periods 1978-1982 and 1992-1996, but other regions saw increasing inequality over these periods.

Turning to Figure 5, which uses flexible price and demographic adjustments, we modify our conclusions in two ways. First, although most regions have seen an increase in inequality over 1978-1996, this growth is much smaller than that depicted in Figure 4. Second, BC is a clear outlier when flexible price and demographic adjustments are used. Whereas using flexible adjustment pushes down our estimate of the increase in inequality in Canada as a whole over 1978-1996, it pushes up our estimate of the increase in inequality in BC over 1978-1996. Using flexible adjustment, inequality rose in most regions by about one and one-half percentage points. However, in BC, inequality rose by over four percentage points, concentrated in the period 1990-1992.

5. Conclusions

The measurement of inequality is usually characterised by the use of an inequality index and an adjusted income measure. The adjusted income measure is usually calculated by adjusting for demographic differences with a price-independent equivalence scale and adjusting for price differences with an income-independent price index. Relaxation of these independence restrictions allows for more flexible price and demographic adjustment and leads the researcher to substantively different conclusions about the path of consumption inequality in Canada over 1978-1996. Standard methods lead the researcher to conclude that family consumption inequality increased by about 15% over 1978-1986 and was fairly constant there-

after. The more robust methods outlined above lead the researcher to conclude that family consumption inequality increased by only about 8% over 1978-1986 and was fairly constant thereafter.

6. Estimation Appendix

To estimate the price-dependent equivalence scale $R(p, z)$ and the flexible deflated income function, $D(p, x)$, I specify functional forms for $R(p, z)$ and $V^R(p, x)$ and estimate by maximum likelihood. I estimate $R(p, z)$ as a Cobb-Douglas in prices as follows:

$$R(p, z) = R_0(z) \prod_{k=1}^N p_k^{R_k(z)} \quad (6.1)$$

with $\sum_{k=1}^N R_k(z) = 0$.

The functions $R_m(z)$ are linear indices of a vector of 5 household type dummies z^l and the age of the household head:

$$R_m(z) = \sum_{l=1}^5 R_m^l z^l + R_m^{age} \ln(\text{age of household head}) + R_m^{age^2} \ln(\text{age of household head})^2.$$

The age of household head is divided by 40, the average head age in the sample so that $R_m(z) = \sum_{l=1}^5 R_m^l z^l$ for households with heads aged 40 years old.

Because childless households do not demand children's clothing, I code children's clothing expenditures as zero for these households (4% of childless households have nonzero children's clothing expenditures, presumably due to gift-giving). Further, I restrict the demand system so that childless households have zero demands children's clothing.

The flexible deflated income function is that associated with Banks, Blundell and Lewbel's (1997) QUAI model. This model is characterised by expenditure share equations that are quadratic in the log of total expenditure. The (reference) indirect utility and expenditure functions associated with the QUAI model is

$$V^R(p, x) = \left(\left(\frac{\ln x - \ln a(p)}{b(p)} \right)^{-1} - q(p) \right)^{-1} \quad (6.2)$$

and

$$\ln E^R(p, u) = \ln a(p) + \frac{b(p)u}{1 - q(p)u} \quad (6.3)$$

where $a(p)$, $b(p)$ and $q(p)$ are given by

$$\begin{aligned} \ln a(p) &= a_0 + \sum_{j=1}^m a_j \ln p_j + \frac{1}{2} \sum_{j=1}^m \sum_{k=1}^m a_{jk} \ln p_j \ln p_k \\ \text{with } \sum_{j=1}^m a_j &= 1, \quad \sum_{j=1}^m a_{jk} = 0 \forall k, \quad a_{jk} = a_{kj} \quad \forall j, k; \\ \ln b(p) &= \sum_{j=1}^m b_j \ln p_j + \frac{1}{2} \sum_{j=1}^m \sum_{k=1}^m b_{jk} \ln p_j \ln p_k \\ \text{with } \sum_{j=1}^m b_j &= 0, \quad \sum_{j=1}^m b_{jk} = 0 \forall k, \quad b_{jk} = b_{kj} \quad \forall j, k; \\ q(p) &= \sum_{j=1}^m q_j \ln p_j \quad \text{with } \sum_{j=1}^m q_j = 0. \end{aligned}$$

Given these choices for $a(p)$, $b(p)$ and $q(p)$, the adjusted income function $Y(p, x, z)$ is given by

$$\begin{aligned} \ln Y(p, x, z) &= \ln E^R(\tilde{p}, x^e) \\ &= \ln E^R(\tilde{p}, \frac{x}{R(p, z)}) \\ &= \ln a(\tilde{p}) + \ln x - \ln R(p, z) - \ln a(p). \end{aligned}$$

Defining $\widetilde{\ln x} = \ln x - \ln a(p)$, application of Roy's Identity generates translated log-quadratic reference expenditure share equations $W_j^r(p, \ln x)$ as follows:

$$W_j^r(p, \ln x) = \frac{\partial \ln a(p)}{\partial \ln p_j} + \frac{\partial \ln b(p)}{\partial \ln p_j} \widetilde{\ln x} + \frac{\frac{\partial q(p)}{\partial \ln p_j}}{b(p)} \widetilde{\ln x}^2. \quad (6.4)$$

Substituting in the relevant derivatives and elasticities,

$$W_j^r(p, \ln x) = a_j + \sum_{k=1}^N a_{jk} \ln p_k + b_j \widetilde{\ln x} + \frac{q_j}{b(p)} \widetilde{\ln x}^2. \quad (6.5)$$

Pendakur (1999) shows that if a price-dependent equivalence scale gives an exact cost-of-demographics index, the equivalence scale $R(p, z)$ fully defines nonreference expenditure share equations in terms of reference share equations as follows:

$$W_j(p, \ln x, z) = a_j + \sum_{k=1}^N a_{jk} \ln p_k + b_j (\widetilde{\ln x} - \ln R(p, z)) + \frac{q_j}{b(p)} (\widetilde{\ln x} - \ln R(p, z))^2 + R_j(z). \quad (6.6)$$

Blundell, Duncan and Pendakur (1998) find that this specification for share equations and demographic effects stands up quite well in comparison with a nonparametric alternative.

After adding an error term to each equation, this equation system was by maximum likelihood using TSP. Notable issues include:

- Cross-equation correlations in errors are estimated.
- The errors are assumed homoskedastic across x and z .
- I do not use a GMM estimator to allow for endogenous x . Many researchers allow for endogeneity in income because their expenditure data are available for very short periods (eg, British expenditure data is based on two-week expenditures) and therefore suffer from durable goods contamination. Canadian expenditure data cover one-year expenditures.
- These results are similar to Pashardes (1995) results based on American quarterly expenditure data.
- Detailed parameter estimates are available from the author on request.

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Figure 1: Gini Coefficients for Canada, 1978-96

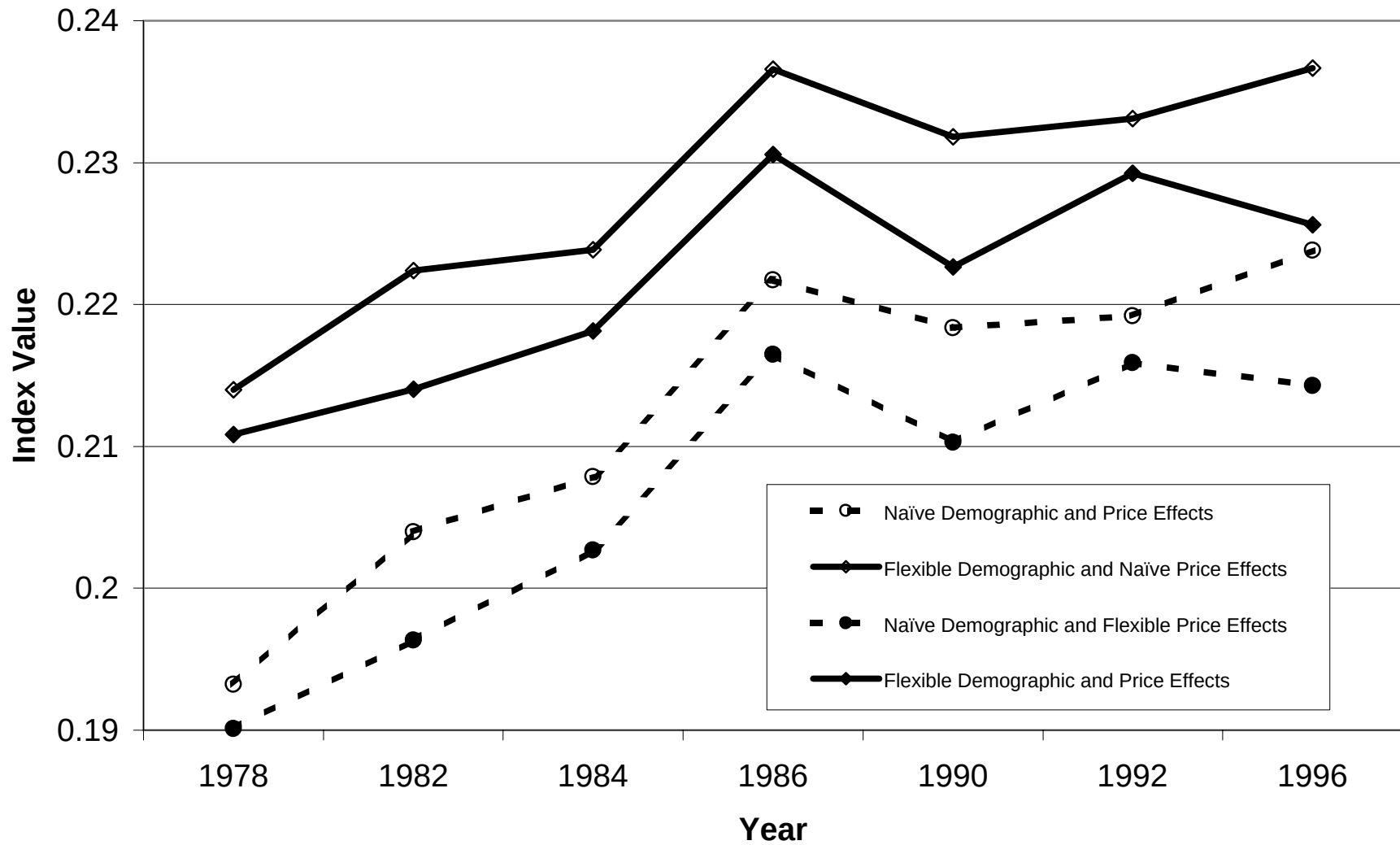


Figure 2: Change in Gini Coefficients, Canada, 1978-96

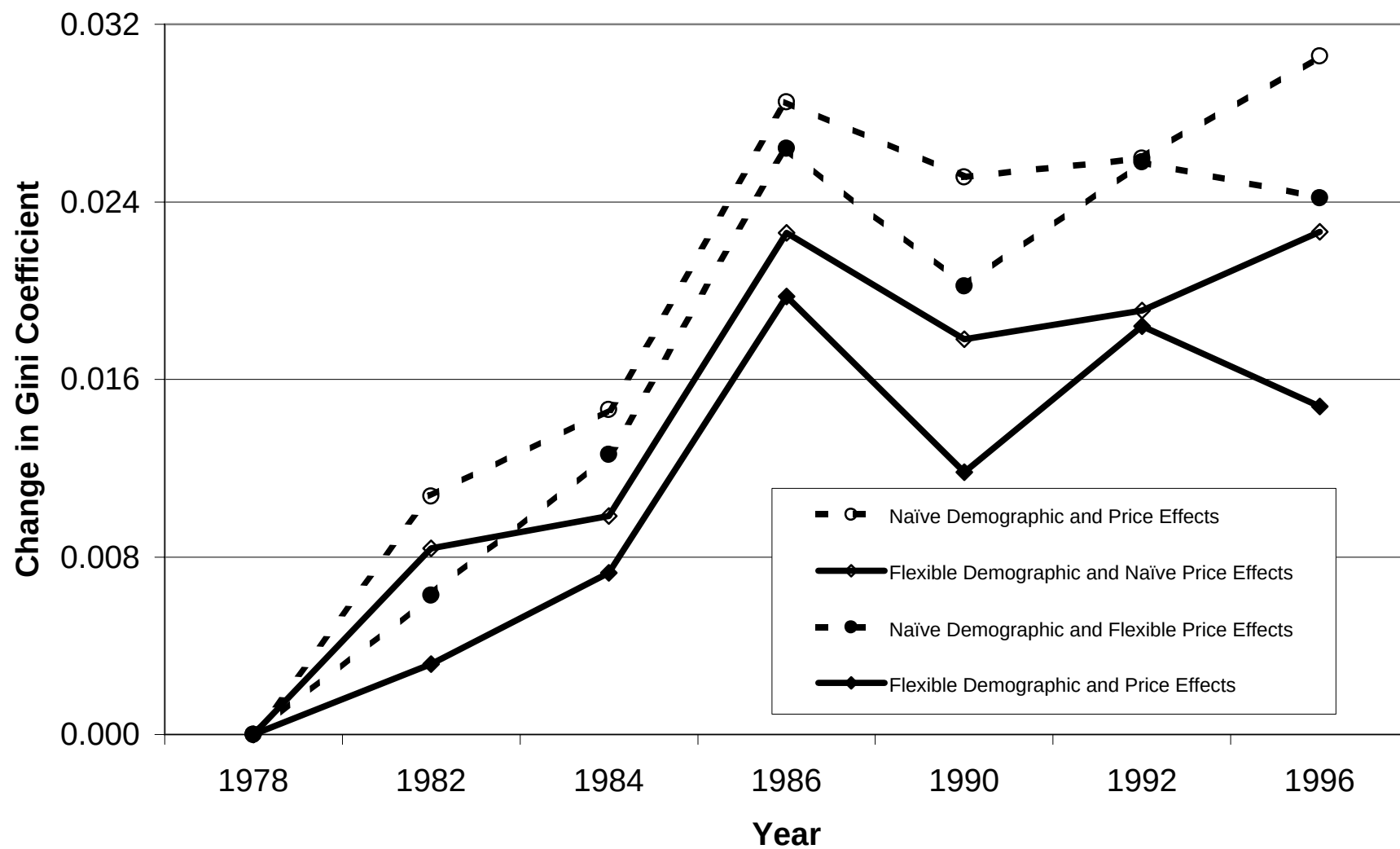


Figure 3: Proportionate Change in Gini Coefficients, Canada, 1978-96

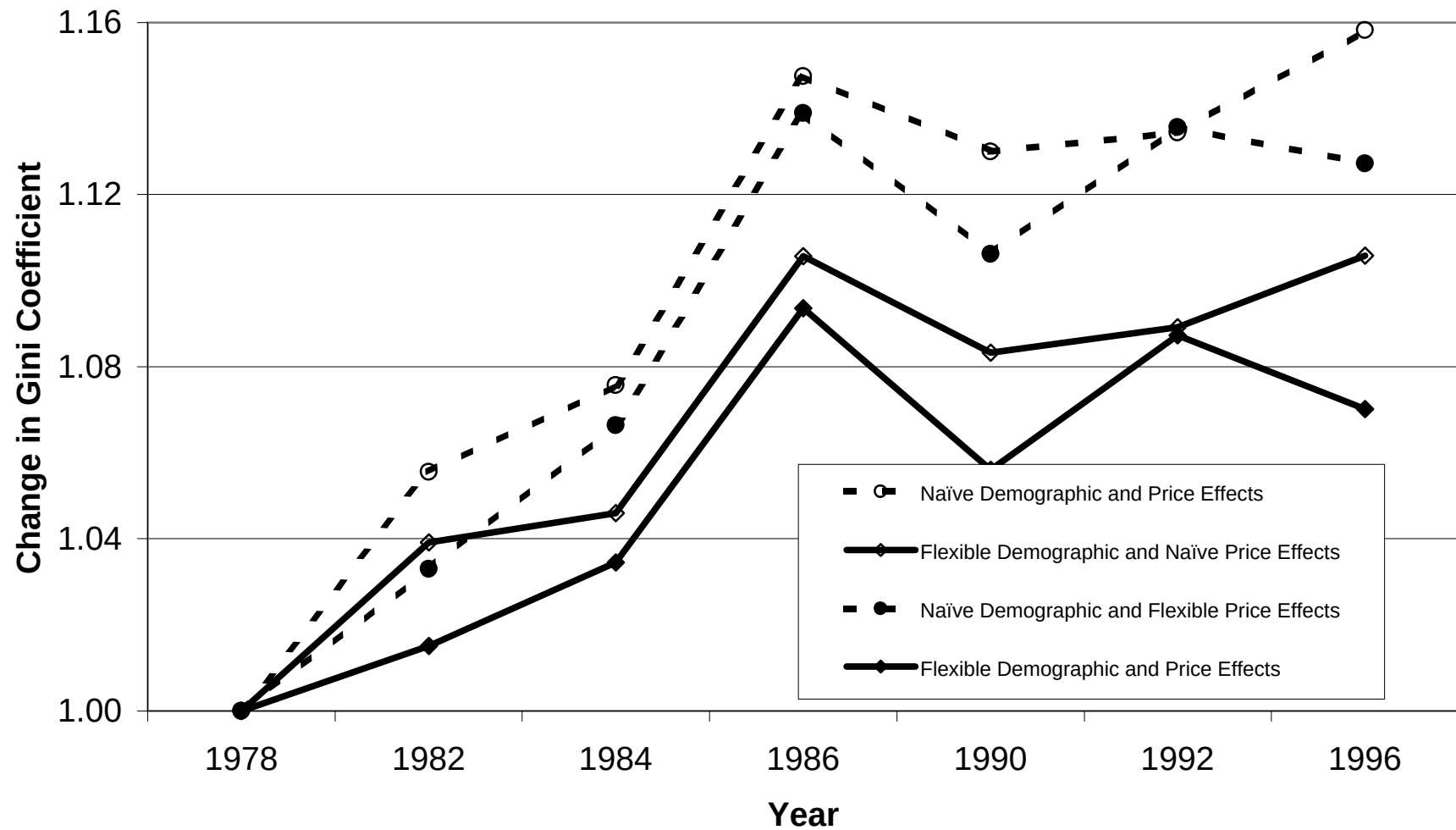


Figure 4: Gini Coefficients for Canada, by Region, 1978-96
Naïve Measures

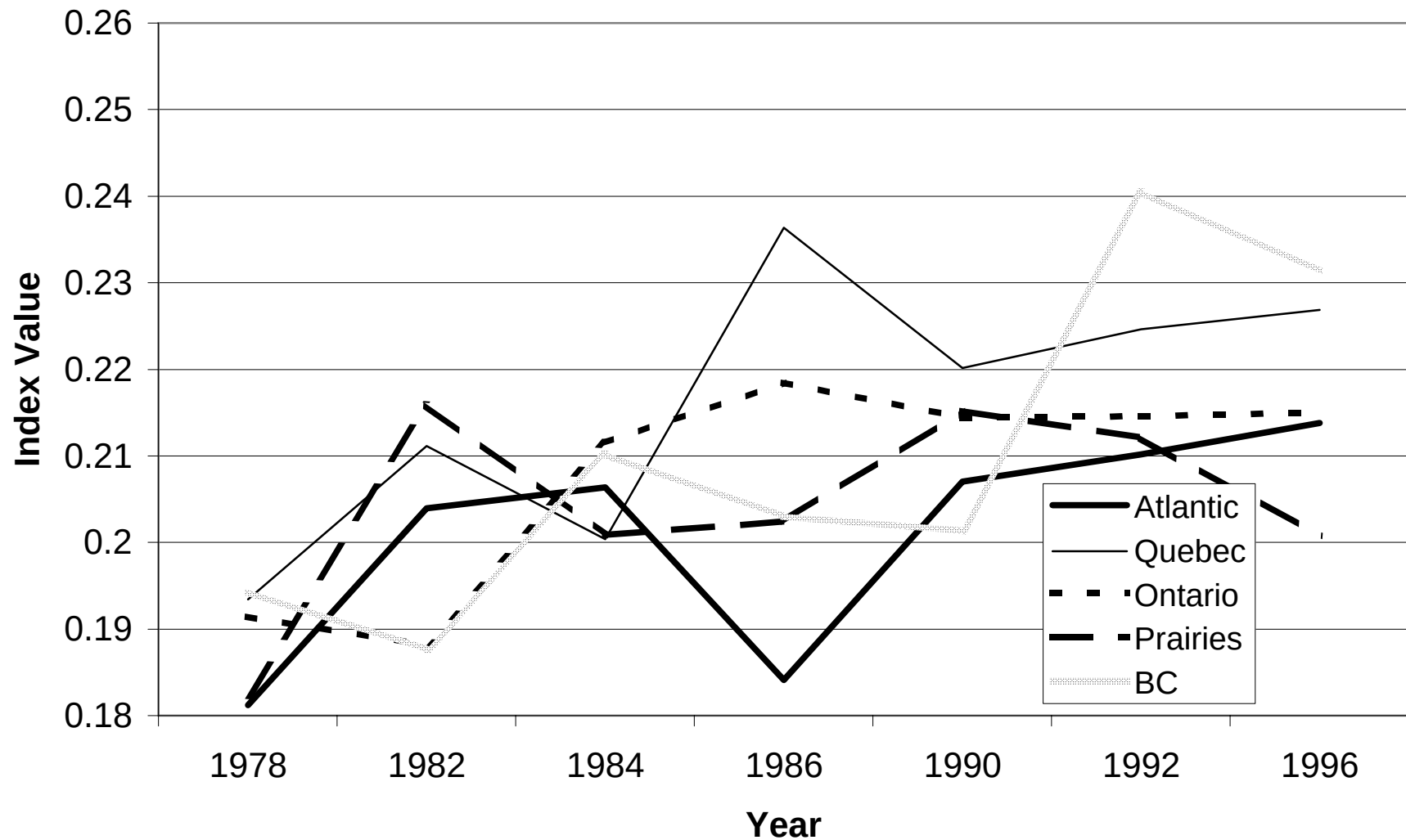


Figure 5: Gini Coefficients for Canada, by Region, 1978-96
Flexible Adjustment



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Measures of Poverty in Canada: Ambiguity and Conflict

Gordon Anderson
University of Toronto

Peter Ibbott
University of Toronto

Session 6B: Trends in Inequality in Canada
October 31 8:30 AM - 11:00 AM

Measuring Poverty in Canada: Ambiguity and Conflict

Gordon Anderson and Peter Ibbott

October, 1998

Abstract

New evidence is presented that suggests that Statistics Canada's Low Income Cut-Off (LICO) can misrepresent poverty trends. Statistics Canada's alternative to the LICO is the Low Income Measure (LIM), which avoids this problem by being simple. One further advantage of the LIM methodology is that it can easily be adapted to check whether measured trends are robust to reasonable changes in the underlying assumptions. Our results indicate that small changes to the adult equivalence scale, changes in the measure of household resources, and changes in the cut-off percentage of median income can each substantially alter conclusions about both the size and direction of change in the incidence of poverty. We also examine the impact of using distribution sensitive poverty measures from the Foster-Greer-Thorbecke family. The evidence points to the poverty incidence frequently being at odds with higher order poverty measures. Finally, we propose statistical tests for implementing the Foster and Shorrocks poverty ranking criteria. These tests allow the determination whether there is sufficient information for a conclusion of a change in poverty for any poverty line. The empirical results indicate that the increase in the LICO incidence between 1992 and 1996 is contradicted by declines in other poverty measures.

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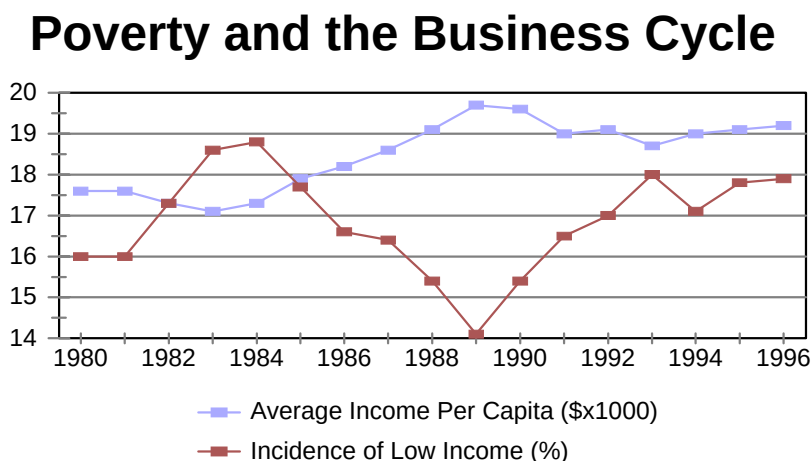
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Many thanks are due to the research assistance of Carol Wilson.

1. Introduction

The proportion of people falling below Statistics Canada's Low Income Cut-Off (LICO) is frequently used as a diagnostic test for changes in the condition of Canada's poor. The recent rise in the LICO incidence of poverty has generated some attention, appearing as it does during a time of economic expansion. (figure 1.1). Is this apparent increase a signal of a significant social change?

Figure 1.1



The simple answer is that these increases may signal nothing. Everything depends upon the whether the LICO incidence of low income is a good indicator of the changing economic status of Canada's poor. In the next section of the paper, some of the more important shortcomings of the LICO methodology are reviewed, and new empirical evidence of a serious flaw in the econometric methodology is presented. Following this, simpler, more robust poverty indicators based on Statistics Canada's Low Income Measure (LIM) methodology are proposed and estimated.

Even with more robust indicators of poverty status, the incidence measure of poverty is a crude social index for determining the size of the poverty problem. In section 3, the shortcomings of the incidence measure are reviewed, and the use of several alternative poverty indices that have received little empirical attention are recommended. Estimates of these higher order poverty indices follow, with special attention to the questions of whether poverty has been rising over the mid 1990's.

Even with the use of more robust poverty lines and poverty indices, apparent trends in sample

data can be rejected on two counts. First of all, the lines reflect the assumptions of the investigator, and there is a legitimate concern that alternative assumptions might generate a different result. Sensitivity analysis in the robust LIM and LCM approach do go some way in answering these questions, but the whole range of assumptions on the poverty line or on the poverty index used cannot be tabulated. Second, the poverty indices have been calculated from sample data, and no attempts are made in the sections 2 and 3 to formally test whether the data provides sufficient evidence of change. Without a statistical test it is legitimate to wonder whether the indicated trends are simply artefacts of a limited sample.

To address these concerns, a poverty ranking criteria is proposed in section 4, and non-parametric statistical tests are developed. By applying these tests to the data, it is possible to statistically test whether the indicated changes in sections 2 and 3 are consistent with the choice of any reasonable absolute poverty line. Following a discussion of the results, conclusions are drawn in section 5.

All poverty indices and poverty dominance tests in this study are estimated on the micro-data set from Statistics Canada's Family Expenditure Survey for the years 1978, 1982, 1986, 1992, and 1996. These years were chosen because they are the only available surveys that examine both income and expenditures on a national scale. While there are other micro-datasets, the FAMEX is unique in allowing investigation of both income and consumption patterns.

2. Identification of the Poor

“By necessities I understand, not only the commodities which are indispenably necessary for the support of life, but whatever the custom of the country renders it indecent for creditable people, even the lowest order, to be without”. (Smith, 1776, 821-2)

Poverty is difficult to diagnose because perceptions of its symptoms vary. The consequence is a an abundance of methodologies for identifying the poor. Despite the choice, most attention in Canada is paid to Statistics Canada’s Low Income Cut-Off (LICO) as the threshold income that divides the poor from the non-poor. The source of this authority is surprising since Statistics Canada is always careful to warn against this use. In what follows, a new reason for heeding this warning will be presented, and some simpler, more robust standards will be proposed.

The LICO lines have perhaps received their authority as poverty lines because the Economic Council of Canada (1968) was an early user of the LICO for this purpose, and because the lack of any alternative from Statistics Canada, at least until recently. Beyond the prestige of these two agencies, the appeal of the LICO may also rest on its use of econometric techniques in the determination of an appropriate line and adult equivalence scale. This can lead to an impression that the LICO is less arbitrary and more precise than the numerous alternatives. Unfortunately, appearances are deceiving. Hidden within the estimation procedure in which the LICO line is based (and periodically re-based) are a number of arbitrary assumptions that strongly affect the outcome of the estimation process. Furthermore, the estimation process is itself deeply flawed, leading to poverty lines that have the potential to mis-inform public debate. Each problem will be dealt with in turn.

The LICO methodology begins by determining the average proportion of income spend on food shelter and clothing. Then an arbitrary 20% is added to this proportion to determine the cut-off percentage of income devoted to necessities that reflect straightened circumstances. Finally, a simple Engel curve is estimated using household expenditure data,

$$\log(E) = a + b \cdot \log(Y) + \sum c_j D_j + u$$

where E = total expenditure on food shelter and clothing

Y = family income, before tax

D_j = dummy variables indicating family size, and location characteristics of residence

u = error term.

The estimated relationship between income and expenditures on necessities is then used to estimate the income that, on average, a household would need to just afford the cut-off share of necessities.

No doubt part of the appeal of this approach lies in the ease with which the LICO can be re-estimated whenever new family consumption survey data becomes available (about every four years). For those that prefer a relative poverty standard, this ability to automatically adjust the poverty line to changing consumption norms through time is a compelling reason for adopting the LICO as a poverty standard. While there are numerous other relative poverty standards that could be used, the LICO methodology is unique (in Canada) in using family behaviour to adjust for differences in consumption caused by family structure or family location. Wolfson and Evans (1989,27-28) found that further refinements of the basic estimation equation failed to improve the statistical fit of the estimated Engel curves. The apparent implication is that the LICO methodology seems to be a statistically robust technique for identifying an intuitive household income threshold. Families below the LICO must spend at least 20% more of the household budget on necessities than the community average.

Unfortunately, these apparent advantages do not hold up well under closer scrutiny. First of all the community average expenditure on necessities is simply total expenditures on necessities by all families divided by total income of all families. By calculating it this way, richer families count for more than poorer families, and the average necessities share is biased significantly downwards, which in turn significantly biases the LICO and the poverty incidence up (Wolfson and Evans (1989), 18). The 20% parameter is arbitrary and does not reflect any precise notion of deprivation. Altering this assumption by even a few percentage points can change the estimated incidence of poverty by a substantial amount (Love, 1984). Finally, the families identified as being in low income may or may not spend a 20% greater share of their income than the average on necessities. As Wolfson and Evans (1989, 16-17) point out, the Engel curve does not fit the data very well at all.

There are many who are identified as poor who spend a significantly smaller proportion of income on necessities than the cut-off, and many non-poor who spend a significantly higher proportion on necessities than the cut-off proportion. Because of this poor fit, the LICO incidence has the potential to misinform public debate on poverty.

It might be argued that the LICO is a good compromise. After all there is no getting around the arbitrariness of setting a relative community standard, and the poor fit of the Engel curve is simply an unavoidable statistical fact. At least the methodology relies on family behaviour to estimate the income cut-offs and adjust these cut-offs by family structure and location of residence. Unfortunately, even these advantages are illusory.

While it is true that the existing specification is not improved by adding further variables this does not mean that the specification is a good one. The dummy variables for household location that are used to adjust the LICO for region and size of community do not perform very well (Wolfson and Evans, 73-77), and they conclude that the adjustments for geographical variation are likely to be too large (31). The implication is that the LICO standard could be simplified and improved by removing the geographical variability.

Beyond the question of what should or should not be in the estimating equations is the question of whether the log-linear specification is suitable to the task of estimating the Engel curves. The original choice no doubt comes from the results of Prais and Houthakker's (1955) classic study. One problem with this form is that it fails the theoretical test of adding up (Deaton and Muellbauer, 1980, 17). A second problem is that the specification assumes a constant income elasticity of demand. Alternatives that avoid these difficulties by having stronger choice theoretic foundations do exist, though they have not been much explored in Canada.

Detailed income elasticities for food shelter and clothing for Canada are hard to come by¹ and none have been calculated for specific groups defined by their location in the income distribution. They are usually obtained via the Engel curve component of the corresponding demand equation.

¹ Nicol (1993) provides estimates for the food category for 1978 and 1986 for specific family types in the process of comparing parametric and non-parametric estimation techniques. Anderson and Blundell (1983) provide aggregate food and clothing estimates in the context of modelling dynamic demand equations. All estimates are substantially below one.

One demand system that avoids the adding up problem of the LICO methodology is the Almost Ideal Demand System (AIDS), which can be altered in the same manner as the LICO methodology to examine the impact of demographic differences on consumption patterns. The conventional formulation of the Engel curve expresses the share of total expenditure made by the i 'th household on the j 'th commodity group (w_{ijt}) as a linear function of the natural logarithm of its total expenditure ($\alpha_j + \beta_j \ln(y_{it})$). The LICO methodology focusses attention on the Engel curve for necessities (food, shelter and clothing), and adds variables for demographic impacts on consumption. To adapt the Almost Ideal Demand System to do the same thing, begin with three demand equations for food, shelter, and clothing and add demographic variables. The result is the following equation for $j = 1, 2, 3$:

$$w_{ijt} = \alpha_j(D_{it}) + (\beta_j + \beta_{jc}I(nc_{it} > 0)) \left(\ln\left(\frac{y_{it}}{(na_{it} + nc_{it})p_t}\right) + (\gamma_j + \gamma_{jc}I(nc_{it} > 0)) \ln(na_i + nc_i) + \sum_{j=1}^3 \delta_j \ln p_{jt} \right) + e_{ijt}$$

where D_i are dummy variables reflecting household makeup, na_i and nc_i respectively correspond to the numbers of adults and children in the i 'th household in period t , $I(\cdot)$ is an indicator function, p is an overall price index and p_{jt} , $j=1, 2, 3$ correspond respectively to price indices for food, shelter and clothing in period t . Under this extension to the Almost Ideal Demand System, $\gamma=0$ implies a household scale elasticity of 1 (this reflects no economy of scale in consumption see Lanjouw and Ravallion (1995) for details)². The Income elasticity implied by this formulation is:

$$e_{ij} = \frac{\beta_j + \beta_{jc}I(nc > 0)}{w_{ij}} + 1$$

with an approximate standard error of the elasticity estimate is given by:

² Note this is not the true adult equivalence scale (defined as the scaling factor by which the cost functions of households of differing composition should be equated at a given utility level for a given price level) which cannot be identified by demand data alone (see Blundell and Lewbel (1991)).

$$se(e_{ij}) = \frac{se(\beta_j^*)}{w_{ij}}$$

where $se(\beta_j^*)$ is the standard error of β_j^* , the estimator of $\beta_j + \beta_{jc} I(nc > 0)$.

Using the 1982 to 1992 FAMEX micro-data sets³, approximately 1000 observations were randomly selected from each survey after eliminating all units who recorded less than \$100 on each of the expenditure categories and less than \$500 on total consumption or receiving less than \$500 in income. The estimation results are presented in Table 2.1

Table 2.1 Expenditure shares and income elasticities 1982-1992

	Food	Shelter	Clothing
means	0.2028	0.2553	0.0759
medians	0.1933	0.2395	0.0681
minimum	0.0123	0.0086	0.0027
maximum	0.5719	0.8881	0.4256
elasticity (nc) ("t's"(h ₀ :e=1))	0.5985 (49.3656)	0.7338 (50.1896)	1.1843 (56.0867)
elasticity ("t's"(h ₀ :e=1))	0.5928 (155.9894)	0.7898 (136.8969)	1.2195 (492.0113)

³Comparable information on family structure for the 1978 sample was not available.

Income Elasticities (“t’s”(h₀:e=1)) for selected quantiles (no children)

0 < .125	0.7232 (2.8010)	1.0323 (0.2025)	0.8545 (0.5341)
.125 < .25	0.9806 (0.0611)	0.6501 (0.7690)	1.8579 (1.1860)
.25 < .5	0.5650 (7.8121)	0.6709 (4.6928)	1.2931 (2.7441)
.5 < .75	0.3477 (6.3771)	0.5687 (3.6648)	1.0551 (0.3410)
.75 < 1.0	0.6414 (8.2658)	0.6984 (6.9676)	1.0301 (0.5266)

Income Elasticities (“t’s”(h₀:e=1)) for selected quantiles (children)

	Food	Shelter	Clothing
0 < .125	0.8632 (2.1056)	0.8144 (1.7685)	0.9255 (0.4158)
.125 < .25	1.0641 (0.1918)	0.4037 (1.2418)	1.6311 (0.8268)
.25 < .5	0.6112 (6.8509)	0.8019 (2.7709)	1.1497 (1.3750)
.5 < .75	0.3264 (5.2136)	0.6843 (2.1237)	0.9745 (0.1252)
.75 < 1.0	0.6744 (2.2625)	0.9061 (0.6540)	1.0998 (0.5269)

The overall elasticities are reported as well as the elasticities of a set of quantile regressions. $\chi^2(44)$ hypothesis tests (P values) of the restrictions implied by the overall model over the quantile regressions for food, shelter and clothing are respectively 214.0 (3.41e-24), 176.3 (9.52e-18) and 132.6 (8.07e-11) suggesting substantial and significant variability of Engel curve structures over the income distribution⁴. The results indicate income elasticities of around 1 for all three consumption

⁴ Regression coefficients (not reported here for space reasons) indicate household size elasticities differed across commodity groups (approximately .6 for food, 0 for shelter and 1 for clothing).

categories in the low income groups (i.e. in the lowest quartile) and significantly less than one elsewhere for food and shelter. The presence of children appears to have little effect on these elasticities, the conclusion that can be drawn is that increasing the income of the poor might well cause their consumption of necessities to rise as a share of their income. The implication is that the Engel curve estimated by the LICO methodology seriously misrepresents the true relationship between income and the expenditures on necessities by the poor. In other words the LICO income lines do not provide a reasonable estimate of the income level below which expenditures on income will be at least 20% higher than the community norm.

One final bit of criticism is that the LICO methodology was a failed attempt to develop a relative measure of poverty. The fact that it is only re-based every four years, leads to the unusual result of a predictable increase in poverty every time that there is a new estimated base. If one holds to a pure relative measure, the poverty rate should only be calculated in years in which a FAMEX survey is done. The practice that has evolved is to use a single LICO poverty base to track poverty over time, resulting in an absolute standard.

So what poverty standards should be employed? There are many alternatives to the LICO that have been proposed and used in identifying the poor in Canada. Determining the best among alternatives will have to wait until a clear consensus emerges over exactly what poverty is. As things stand now, there is not even a consensus about whether poverty is best conceived under a welfarist or entitlement framework, and whether it is an absolute or relative condition.

The attempt to provide a relative poverty measure in the LICO methodology therefore cannot be easily swept aside.⁵ Even Amartya Sen's influential voice in favour of an absolutist standard admits that in observable indicators of household economic power, poverty might best be conceived as a relative concept.⁶ Statistics Canada's recent proposal for a Low Income Measure (LIM) as an

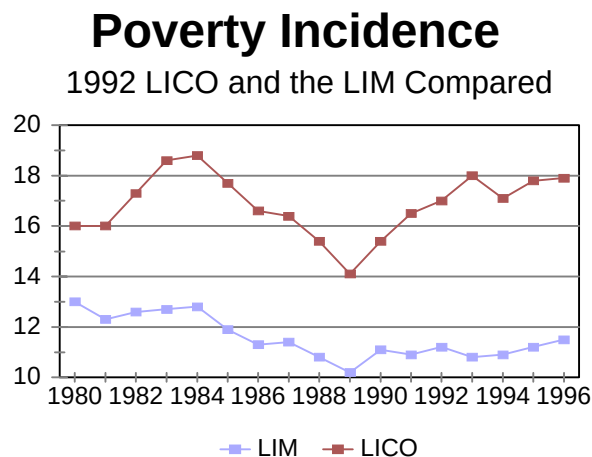
⁵Sarlo (1996) has been perhaps the most prominent among Canadian researchers in arguing against the relative notion of poverty implicit in the LICO. His alternative of defining an income sufficient to afford a minimum standard level of necessities has a pedigree stretching back to Rowntree (1901). The problem is that Sarlo's absolute standard has an obvious relative core that is apparent if the suggested budget is examined.

⁶"Poverty is an absolute notion in the space of capabilities but very often it will take the relative form in the space of commodities or characteristics." (Sen, 1983, 161)

alternate measure of relative deprivation succeeds where the LICO fails. It is an obviously arbitrary standard, with obviously arbitrary adult equivalent scales, having the added cachet of being similar to the proposed OECD methodology (OECD, 1982). Its simplicity makes it difficult to be misinterpreted - providing a level of reliability that the LICO cannot provide. Finally, the ability to make annual adjustments to the poverty standard makes the LIM a true relative measure of poverty.

Under the LIM, poverty trends over the last fifteen years look similar in terms of the trends in poverty by age, and in the pattern over the business cycle. The main difference seems to be that the LICO indicates that poverty in 1996 was worse than it was in 1980, while the LIM suggests that there was some improvement (see figure 2.1). Both show the same counter-cyclical rise between 1994 and 1996.

Figure 2.1

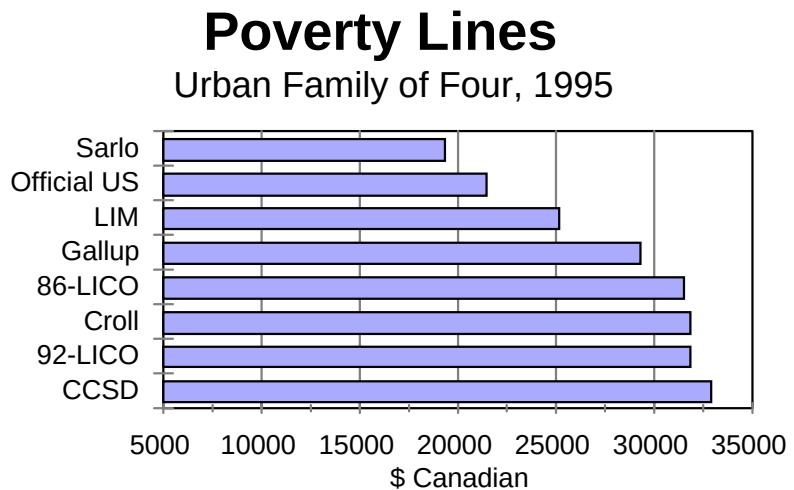


Despite the attractions of the LIM as a relative poverty measure, there are a number of objections that might be advanced against it. The first is the use of an arbitrary adult equivalence scale that is dramatically different from the estimated adult equivalent scales that come out of the LICO methodology.

Numerous procedures for estimating adult equivalence scales with a stronger choice theoretic basis than found in the LICO methodology have been developed.⁷ An empirical problem identified in this research is that theoretically desirable equivalence scales are probably not identifiable

⁷The attempts to provide a stronger choice theoretic basis for adult equivalence scales can be traced to Barton (1964) who derived adult equivalence scales using a direct utility function. Muellbauer (1974) used indirect methods to achieve the same end.

(Blundell and Lewbell,1991). Even if they were, they would rest on an assumption of comparable utility. This gets the researcher back to the problem of deciding what is a reasonable adult equivalence scale, and based on practice, there appears to be a wide variety of opinion concerning what is reasonable.



Buhmann *et al.* (1989) examined 34 different equivalence scales and discovered that each could be closely approximated by estimating $Y = M / d^\epsilon$, where Y is equivalent income, M is money income, d is family size, and ϵ is an elasticity of family size. Estimation results indicated that the value for ϵ depends on the methodology used to estimate the equivalence scale. Expert programme scales used in welfare programs typically have a family size elasticity of about 0.55, while equivalence scales estimated from observed consumption behaviour come in at about 0.36. The 1986 LICO lines had an adult equivalence scale that had an elasticity of 0.56. Based upon this finding, we decided to use a household elasticity of 0.5 to form our base adult equivalence scale, and use elasticities of 0.4 and 0.6 to check for the robustness of the results.

A second objection to the LIM methodology is the use of 50% of median income as the poverty line. Numerous alternatives have been proposed, with the LIM being substantially below many popular lines, though significantly above the official US poverty line (figure 2.2).

Figure 2.2⁸

⁸These poverty lines are taken from the National Council of Welfare's (1997) Poverty Profile, 1995 and from the US Bureau of Labour Statistics.

It is straightforward to extend the LIM methodology to examine poverty trends under a 40% and 60% of median income assumption. The 40% of median income assumption provides a poverty line below the US official poverty line, while the 60% of median income assumption provides a poverty line above the Gallup survey line, and very close to the LICO lines. Doing this allows trends to be examined under different, intuitive assumptions of what constitutes deprivation.

The final problem with the LIM, and for that matter all the other poverty and low income lines in use, is their use of before tax income. Statistics Canada has recently developed after tax LICO and LIM thresholds and low income statistics (cat.13-592). While this is an improvement over before tax income, there are many reasons for questioning the validity of any income measure in the identification of the adequacy of household resources. If concern is with the level of resources available to the household, the appropriate measure would be wealth, or perhaps an annuity value of wealth (permanent income) as proposed by Weisbrod and Hansen (1968). The difficulty of developing reliable wealth estimates has led to the use of consumption expenditures as a more reliable indicator of permanent income. Of course this is not without its difficulties. One problem is that liquidity constraints facing many poor families weakens the connection between wealth and spending. A second problem is that poor families have a lower level of ownership of consumer durables, and so the relationship between consumption expenditures and actual consumption is different than for more prosperous families (Kay *et al.*, 1984, 170). Despite these problems, consumption expenditures remain an attractive method for measuring household living standards.

The point of the LICO measure though was to measure the adequacy of income for affording necessities. As Atkinson (1989, 10) points out, this concern for the tolerable minimum level of necessities does not fit within the usual welfare framework that economists are familiar with, residing somewhere closer to the 'specific egalitarianism' identified by Tobin (1970). Certainly

concern about child poverty is focussed on whether the necessities are affordable. If concern about poverty is really a concern about the adequacy of necessities consumption, then neither income nor total consumption expenditures would be appropriate to the task of measuring deprivation. Both are often weakly correlated with the consumption of necessities. The best way of getting a picture of the adequacy of necessities consumption is to measure necessities expenditures directly.

This raises the question of whether income is at all useful in measuring the adequacy of household resources. Atkinson (1989, 13) suggests that where poverty is concerned with the right to a certain level of participation in society (Adam Smith's notion), a minimum level of income might well be more appropriate than consumption as an indicator of whether individual rights are being fully met. Consumption might be more appropriate if concern rests primarily on the level of welfare attained by the poor family. The proviso of course is that if income is used as an indicator of individual rights, it should be income after taxes and transfers.⁹

The bottom line is that income (after taxes and transfers), consumption expenditures, and expenditures on necessities can each claim some authority in measuring an aspect of the adequacy of household resources, and each should be considered when examining the state of poverty in Canada. Each can be easily integrated in the LIM methodology to supplement the picture provided by income.

Our proposal is for a Robust Low Income Measure (RLIM), a Robust Low Consumption Measure (RLCM), and a Robust Low Necessities Measure (RLNM). The construction of this set would use income after tax, total consumption expenditures, and total necessities expenditures (food, shelter, clothing) as the respective indicators of household resources. Conversion of household resources would be based on the Buhmann *et al.* (1989) conversion using household size elasticities of 0.4, 0.5, 0.6. After the individual resources available are associated with each individual in the sample, the poverty line can be determined as 40%, 50%, and 60% of the median of the adjusted (individualized) sample.

While the multiplicity of standards (27 in all) has its drawbacks, the absence of consensus on what would constitute an unequivocal poverty test leaves researchers with the task of constructing

⁹Recent income after tax LICO and LIM statistics have been published by Statistics Canada (cat. 13-592).

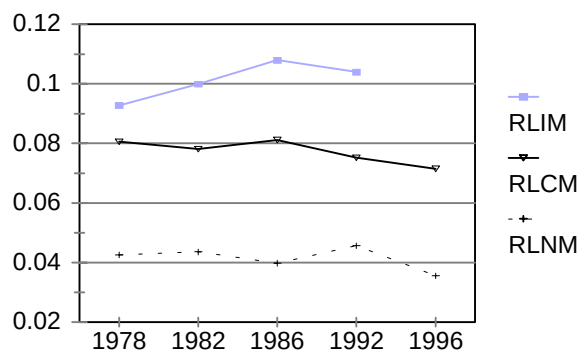
a set of symptoms that fit the poverty diagnosis. Some of the complexity can be reduced by agreeing on a base case and doing sensitivity analysis. For instance, a household size elasticity of 0.5 might be an appropriate base case for household size elasticity, with sensitivity analysis done for elasticities of 0.4 and 0.6. Similarly, 50% of the median might be considered the standard cut-off, with sensitivity done for 40% and 60%. However the complexity problem is dealt with, areas of real ambiguity in poverty measurement should be made clear to policy makers and the public.

Given these relative standards, the trends in poverty incidence indicate that under the base case assumptions (the household size elasticity = 0.5, while the cut-off = 50% of the median), the

Figure 2.3

trend in poverty seems to depend on the measure of household resources. Using income as a measure, poverty seems to have risen above the levels seen in the late 70's. Using consumption expenditures or necessities expenditures as a measure of household resources, the poverty trend indicates a decline in poverty. The impact of varying the adult

RLIM, RLCM, and RLNM
Base Case Comparison



equivalence scale assumptions used in constructing the RLIM measure are presented in table 2.2. The important point to note that changes in the assumption of the adult equivalence scale and the cut-

off can alter the measured direction of change in poverty.

Table 2.2 Sensitivity of Poverty Incidence to Changes in Adult Equivalence Scale

	RLIM		RLCM		RLNM	
Year\Elasticity	E=0.4	E=0.6	E=0.4	E=0.6	E=0.4	E=0.6
1978	0.0995	0.0889	0.0850	0.0751	0.0494	0.0386
1982	0.1055	0.0962	0.0831	0.0722	0.0491	0.0407
1986	0.1114	0.1026	0.0857	0.0763	0.0431	0.0398
1992	0.1124	0.0996	0.0826	0.0718	0.0479	0.0422
1996			0.0808	0.0666	0.0400	0.0344

Sensitivity of Poverty Incidence to Changes in Cut-Off

	RLIM		RLCM		RLNM	
Year\Cut-Off	40%	60%	40%	60%	40%	60%
1978	0.0437	0.1641	0.0304	0.1412	0.0129	0.0993
1982	0.0523	0.1638	0.0295	0.1396	0.0141	0.1039
1986	0.0543	0.1743	0.0306	0.1498	0.0115	0.0963
1992	0.0506	0.1701	0.0253	0.1413	0.0138	0.0994
1996			0.0241	0.1365	0.0108	0.0934

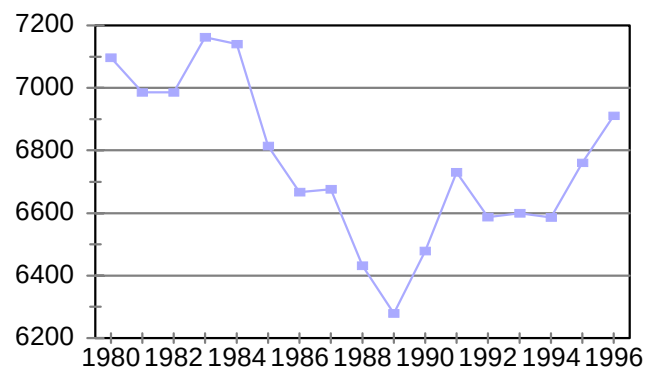
Between 1986 and 1992 poverty went up under the RLIM if the adult equivalence scale used had an elasticity of around 0.4. If the elasticity was 0.6, however, the evidence indicates that poverty declined. Between 1978 and 1982, the RLIM indicates that the poverty incidence increased if a 40% cut-off was used, while the poverty incidence seemed to go down under a 60% cut-off. The conclusion that should be drawn from this is that the choice of household resource, adult equivalence scale, and relative threshold values for the cut-off can each affect more than the level of poverty. It can affect even the measured direction of change.

3. Measuring Poverty

Beyond the controversies surrounding identification of the poor is the problem of aggregation. While poverty incidence receives the most attention among the policy community, it arbitrarily assumes that every poor person contributes $1/n$ to the poverty problem, where n is the size of the population. The size of the poverty problem is then simply q/n , where q is the number of poor individuals. As is well known, this fails to account for changes in the depth of poverty. Because of this known deficiency in the incidence measure of poverty, Statistics Canada and other groups that track Canadian poverty also publish the average poverty gap. As is evident in figure 3.1, the poverty gap declined over the 1980's, and has begun a slow rise in the 1990's.

Figure 3.1

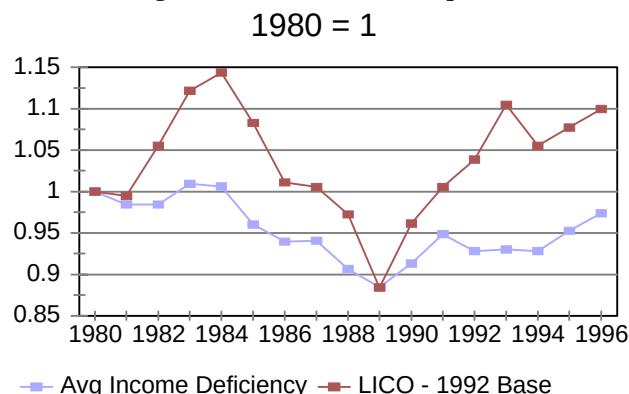
Average Income Deficiency In Constant 1996 Dollars



As is illustrated in figure 3.2, the path of the average income deficiency has followed a similar trend to the LICO poverty incidence. There is one important difference. The LICO indicates that poverty was a more serious problem in 1996 than in 1980, while the average income deficiency indicates the opposite. The dilemma that emerges is how to interpret the increase in the incidence of poverty given declines in the average poverty gap.

Figure 3.2

Poverty Index Comparison



The most commonly suggested solution to this dilemma is to develop a measure that weights people further from the poverty line more heavily than people closer to the poverty line. The range of reasonable alternatives that have been proposed is truly remarkable (Zheng, 1997). Even if attention is restricted to poverty measures that meet every property (axiom) that has been identified as desirable in a poverty measure, no ideal poverty measure or index emerges.

This would not be a problem, except that the choice made might determine the outcome. Take, for example, the Foster, Greer, Thorbecke (1984) class of poverty indices,

$$FGT = \frac{1}{n} \sum_{i=1}^q \left(1 - \frac{x_i}{z} \right)^\alpha$$

where z is the poverty line, x_i is the income of poor family i , n is the total population, and α is the scaling factor for the family of poverty indices. Many members of members of this class satisfy all the core axioms identified by Zheng.

When α is 0, the poverty index is simply the poverty incidence. For $\alpha=1$, the poverty index is the product of the poverty incidence and the income gap ratio (average income gap expressed as a percentage of the poverty line). As α rises, the weighting of families rises for those far from the poverty line, and falls for those close to the poverty line. For $\alpha \in (1,2]$, the poverty index satisfies all the major axioms usually expected of a poverty index, except for the weak transfer axiom. For $\alpha = 2$, the measure can also be decomposed into the product of poverty incidence, and a combination

of the income gap ratio and the coefficient of variation of incomes among the poor. For $\alpha > 2$, the weak transfer axiom also holds. For most practical purposes then, calculating the FGT poverty index for $\alpha = 2$ and $\alpha = 3$ should provide good measures of poverty, with the $\alpha = 3$ having a more strongly biased weighting scheme.

Estimates of the FGT index for $\alpha = 0, 1, 2$, and 3 were made under the base-line assumptions.¹⁰ The estimates were normalized to 1 for 1978 (for ease of comparison). The estimates based on after tax income are graphed in figure 3.3 as FGT0, FGT1, FGT2, and FGT3 respectively.

Figure 3.3

Comparing Poverty Indices

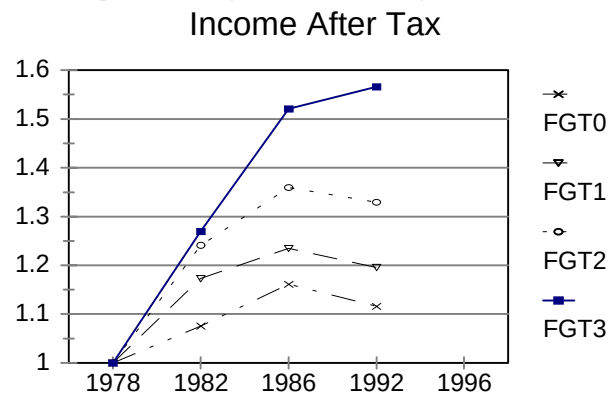


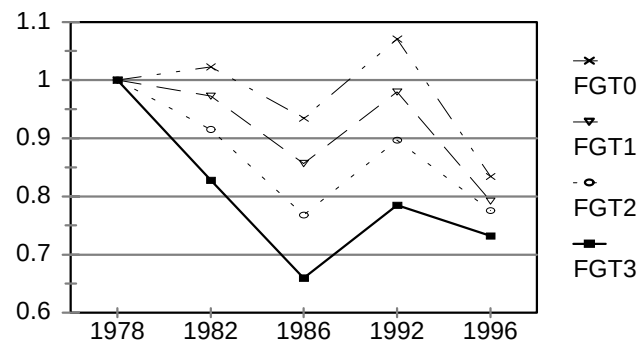
Figure 3.3 shows the highest order poverty index (FGT3) to be rising between 1986 and 1992 while all other poverty indices indicate declining poverty. When consumption expenditures are used as an indicator of household resources, the poverty incidence falls between 1992 and 1996, while all the higher order poverty indices indicate that poverty is rising (figure 3.4).

¹⁰Under the baseline assumptions the equivalence scale is based on a household size elasticity of 0.5 and a cut-off of 50% of the median.

Figure 3.4

Comparing Poverty Indices

Necessities Expenditures

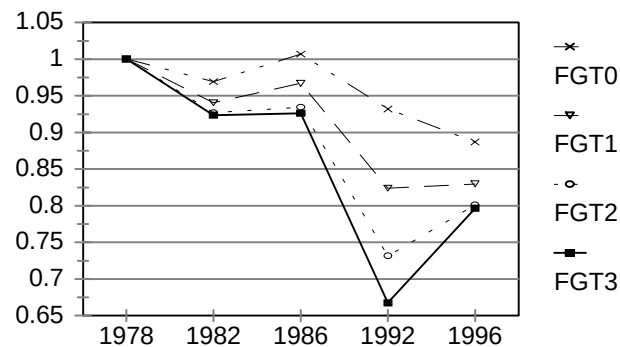


Between 1978 and 1982, the FGT0 calculations on necessities expenditures also showed a different trend than the higher order poverty indices (figure 3.5). In each cases, the choice of distribution sensitive measure of poverty can alter perceptions about the trends in poverty.

Figure 3.5

Comparing Poverty Indices

Consumption Expenditures



Disagreement between indices of the same family would seem to be a fairly common occurrence.

Given this possibility it would seem wiser to choose a higher level index of poverty if a single poverty index is to be reported. The common practice of focussing attention on the poverty incidence has little to recommend it.

It should be noted that simply using a higher order poverty index does not eliminate ambiguity about the trends in poverty. As the above graphs show, the choice of household resource measure largely determines the perception about the direction of change. No alternative aggregation strategy will eliminate this basic ambiguity.

4. Poverty Rankings

The discovery that poverty may be shown to go up or down depending on the choice of the poverty line, household resource indicator, adult equivalence scale, and aggregation strategy (poverty index) is perhaps not surprising. This raises the question of whether there are conditions under which poverty can be said to have unambiguously increased or decreased. Beginning with Atkinson (1987), a growing literature on poverty dominance rankings have sought such conditions. The Foster and Shorrocks (1988) approach identified a direct correspondence between α -degree stochastic dominance rankings and the poverty orderings from any α -degree FGT poverty index.¹¹ These orderings are unambiguous in the sense that if stochastic dominance can be shown between two distributions, then the dominating distribution has lower poverty no matter which poverty line is chosen.

Let Y be the range space from two income distributions A and B described by distribution functions $f_A(y)$ and $f_B(y)$ respectively and for notational convenience define:

$$F^i(y) = \int_0^y F^{i-1}(z) dz$$

where $F^0(y) = f(y)$. Order “ i ” stochastic dominance of f_A over f_B (denoted $f_A \succeq_i f_B$) is defined as:

$$F_A^i(y) \leq F_B^i(y) \quad \forall y \in Y \text{ and } F_A^i(y) \neq F_B^i(y) \text{ for some } y \in Y \quad [1]$$

The demonstration of First Order Stochastic Dominance is a sufficient condition to conclude that there exists a social preference of f_A over f_B for *any* monotonic utilitarian social welfare function. Similarly, Second Order Stochastic Dominance corresponds to a social preference of f_A over f_B for *any* utilitarian social welfare function that is increasing in mean preserving progressive transfers. Finally, Third Order Stochastic Dominance implies a social preference of f_A over f_B for *any* utilitarian social welfare function that is increasing in mean preserving progressive transfers and is increasing

¹¹Jenkins and Lambert (1996) have developed a similar set of ranking criteria.

at a greater rate for such transfers at lower income levels. Furthermore, i 'th order dominance implies j 'th order dominance for all $j > i$. This relationship admits a wider range of characterisations of orderings than is possible using Generalised Lorenz curves¹². Given suitable empirical approximations to these theoretical concepts, comparisons can be made between income distributions of the same group over time (providing information on the progress of social welfare within a group) and between groups at a particular point in time (providing information on the comparative welfare of two groups). It is also important to note that this dominance relationship is transitive in that if $f_A(y) \succeq_i f_B(y) \succeq_i f_C(y)$ then $f_A(y)$ correspondingly dominates $f_C(y)$.

Tests for condition [1] were developed in Anderson (1996), based upon a common partitioning of the range space of the variable Y and forming a discrete empirical analogue of [1]. The partition points have a well defined asymptotic distribution, providing a means for testing for stochastic dominance and the implied welfare ranking. The tests for stochastic dominance can easily be modified to examine the plight of the poor over time in the context of some given poverty line which shall be denoted by Y^p . Following Atkinson (1987) this simply involves contemplating the inequalities:

$$F_A^i(y) \leq F_B^i(y) \quad \forall \quad y < Y^p \text{ and } F_A^i(y) \neq F_B^i(y) \text{ for some } y < Y^p \quad [2]$$

The tests employed for [1] are simply applied to [2] over the range $0, Y^p$ rather than over the whole range of Y .¹³ First order dominance of f_A over f_B over the range $0, Y^p$ corresponds to lower poverty incidence for all poverty lines below Y^p . Second order and third order dominance imply that there

¹²Lorenz curves are a popular means of comparison (see Lambert (1993) for a discussion). Statistical comparison was facilitated by the development of asymptotic distributions of Lorenz curve ordinates (Beach and Davidson (1983)) and joint confidence bands for such ordinates (Beach and Richmond (1985)). Concerns regarding Lorenz curves (Sen (1973)) lead to the development of the Generalised Lorenz curve (Shorrocks (1983)) (the asymptotic distribution of its ordinates had in fact been derived implicitly by Beach and Davidson (1983)). However the range of statements that can be made using Generalised Lorenz curve comparisons remains limited and is essentially equivalent to confining analysis to second order dominance comparisons.

¹³Details of the statistics are reported in Anderson (1996).

is lower poverty using any poverty line below Y^p if calculated by the FGT1 and FGT2 indices respectively. An interesting byproduct of this procedure is that the last element of the first, second and third order dominance tests can be used as a test for changes in the FGT0, FGT1, and FGT2 indices using the Y^p poverty standard.¹⁴

Estimates of the poverty dominance test statistics (first, second and third order) were made using three indicators constructed from the FAMEX micro-data set. The baseline assumptions for the construction of these indicators was a household elasticity of 0.5 and Y^p equal to 60% of the 1986 median for income after tax, consumption expenditures, and necessities expenditures.¹⁵ The final elements for the first, second and third order poverty dominance test statistics using Income After Tax (Y), Consumption Expenditures (C), and Necessities Expenditures (N) are reported with their asymptotic standard errors in Table 4.1.

Table 4.1

Year (A vs B)	FGT0 _A - FGT0 _B	FGT1 _A - FGT1 _B	FGT2 _A - FGT2 _B
1978 vs 1982 : Y	0.0115 (0.00308)*	-0.000330 (0.00207)	-0.00344 (0.00137)*
C	-0.0126 (0.00297)*	-0.00517 (0.00185)*	-0.00279 (0.00123)*
N	-0.0140 (0.00244)*	-0.00577 (0.00131)*	-0.00288 (0.000920)*
1982 vs 1986 : Y	-0.00119 (0.00308)*	-0.00629 (0.00211)*	-0.00265 (0.00139)
C	0.0112 (0.00298)*	0.00894 (0.00183)*	0.00495 (0.00123)*
N	0.00853 (0.00246)*	0.00416 (0.00132)*	0.002137(0.000931)*
1986 vs 1992: Y	-0.00220 (0.00329)	-0.00136 (0.00226)	-0.0000378 (0.00149)
C	-0.00380 (0.00310)	-0.00179 (0.00187)	-0.000730 (0.00126)
N	-0.02699 (0.002689)*	-0.0149 (0.00147)*	-0.00787 (0.00102)*

¹⁴See the Appendix 1 for details.

¹⁵The 60% of 1986 income was chosen because 1986 was in the middle of the period of study, and because it was a peak year in terms of income after tax, consumption expenditures and necessities expenditures. This provides a high poverty line that includes most others considered.

1992 vs 1996: Y			
C	0.00969 (0.00313)*	0.00862 (0.00186)*	0.00482 (0.00126)*
N	0.00865 (0.00285)*	0.00932 (0.00156)*	0.00592 (0.00109)*

The above results effectively illustrate the danger from relying exclusively on the income based poverty incidence. Between 1978 and 1982, the income based incidence significantly declined, despite there being a significant increase in poverty according the consumption and necessities based incidence. Furthermore, all higher order poverty indices indicate a significant decline in poverty. Between 1982 and 1986, the income based incidence significantly increased, while the consumption and necessities based incidence significantly declined. The disagreement in the trends of poverty carried through to the higher order indices, with income based poverty indices all rising while consumption and necessities based poverty declined. Between 1986 and 1992, no significant finding could be supported for the data except for a significant increase in poverty using the necessities indicator of household living standards. This observation seems quite unexpected as it is usual to think that necessities expenditures are likely to be less volatile than income or consumption expenditures. Finally, between 1992 and 1996, the consumption and necessities based poverty indices all indicate a *decline* in poverty - exactly opposite to the change indicated by the LICO incidence discussed in the introduction.

The problem with these statistics is that they only consider the poverty line at Y^p . This raises the question of whether the same outcome would be supported by all possible poverty lines below Y^p . The poverty dominance tests using the Kodde and Palm (1986) multiple comparison procedure allows this question to be addressed. The P values for the poverty dominance composite hypothesis are presented in table 4.2. As this is a symmetric test procedure, the tests for poverty dominance in both directions can be easily tested. Low P values reject the maintained hypothesis of dominance.

An examination of the results provides further insight into a number of anomalies that appeared in the simple tests for change in the FGT indices. For instance, the 1978 to 1982 comparison provided the anomalous result of a statistically significant increase in the income based poverty incidence, while higher level poverty indices calculated on income showed a significant decline in poverty.

Table 4.2 - P Values for the Poverty Dominance Tests

Indicator	Null Hypothesis	1 st Order	2 nd Order	3 rd Order
Income	1982 > 1978	1.25 e -04	3.25 e -14	1.18 e -14
	1978 > 1982	4.39 e -08	0.989	1.00
Consumption	1982 > 1978	1.37 e -06	1.78 e -06	8.40 e -07
	1978 > 1982	0.745	0.986	1.00
Necessities	1982 > 1978	2.01 e -13	2.93 e -13	1.15 e -13
	1978 > 1982	0.711	0.972	1.00
Income	1986 > 1982	2.31 e -3	2.95 e -3	1.61 e -3
	1982 > 1986	0.752	0.990	1.00
Consumption	1986 > 1982	0.745	0.985	1.00
	1982 > 1986	9.48 e -7	1.20 e -6	5.59 e -7
Necessities	1986 > 1982	0.707	0.968	1.00
	1982 > 1986	1.68 e -6	2.44 e -6	1.53 e -6
Income	1992 > 1986	4.12 e -4	5.67 e -23	1.00
	1986 > 1992	0.5347	1.026 e -19	3.25 e -5
Consumption	1992 > 1986	9.12 e -3	5.19 e -37	1.00
	1986 > 1992	0.3045	8.09 e -31	6.86 e -4
Necessities	1992 > 1986	3.19 e -27	4.19 e -27	1.62 e -27
	1986 > 1992	0.705	0.977	1.00
Income	1996 > 1992			
	1992 > 1996			
Consumption	1996 > 1992	0.736	0.984	1.00
	1992 > 1996	7.15 e -07	9.80 e -07	4.78 e -07
Necessities	1996 > 1992	0.720	0.985	1.00
	1992 > 1996	6.21 e -12	8.84 e -12	3.86 e -12

The first order poverty dominance test on income shows that no dominance can be found, ruling out the unambiguous decline in poverty suggested by the simpler tests. In other words, the direction of change in poverty incidence depends on where the poverty line is drawn. By contrast, the income data does not reject second and third order dominance of 1978 over 1982, suggesting that poverty rose when measured with higher order poverty indices. The data on consumption and necessities expenditures is completely consistent with the earlier finding of an increase in poverty over the 1978 to 1982 period. The uncontroversial conclusion that comes out of this evidence is that poverty increased over this first period.

For the comparisons of 1982 to 1986, the dominance results reinforce the earlier statistical findings. The clear dominance result using income indicates that any poverty line at or below Y^p will show that any FGT poverty index will register an increase in poverty. Consistent with the earlier tests, consumption and necessities data shows the opposite - an unambiguous decline in poverty. The irreducible contradiction leaves the analyst with the problem of settling on a preferred indicator if concrete conclusions are to be made about the direction of change in poverty over the 1982-86 period.

The 1986 to 1992 comparisons show a peculiar result where for income and consumption, first and third order dominance seem to indicate two different directions of poverty change. Most analysts would probably opt for the higher order dominance result as being the more influential as it has a correspondence to the axiomatically preferable FGT3 poverty index. For income and consumption the evidence rejects 3rd order dominance of 1986 over 1992, but fails to reject 3rd order dominance of 1992 over 1986, leading to the conclusion that poverty decreased. For necessities, the evidence points in the opposite direction to an increase in poverty. Again such a contradiction can only be resolved by deciding on a preferred indicator.

Finally, the 1992 to 1996 evidence on consumption and necessities expenditures both indicate a decline in poverty, contradicting the increase in the LICO incidence. One conclusion is that the new pro-cyclic rise in poverty would appear to be simply a strange artefact of the LICO methodology. Finally, the secular increase in the LICO poverty incidence apparent in figure 1.1 finds no consonance with the dominance rankings.

5. Conclusions

The use of the LICO poverty incidence in tracking poverty in Canada suffers from too many flaws to be considered reliable. Statistics Canada's LIM methodology avoids the problems of the LICO methodology by being simpler. It is easier to correctly interpret, and it does not rely on a shaky econometric foundation. The greatest advantage of the LIM methodology might well be the ease with which it can be extended to examine the implications from changing: assumptions made in constructing the adult equivalence scale, the cut-off percentage, and the measure of household resources. The RLIM, RLCM, and RLNM measures examined here, indicate that changing these assumptions can have a profound impact. Not just the measured level, but even the direction of change can depend on small, but reasonable changes in assumptions.

Adding to the confusion of determining the direction of change in poverty is the consideration of higher order, distribution sensitive poverty indices. With all three indicators considered here, there were instances where the incidence measure went in one direction while the other, more axiomatically sound indices went in another. What seems clear from this is that poverty incidence provides an unreliable indication of changes to poverty.

The poverty dominance approach can reduce some of this ambiguity by providing criteria under which poverty can be said to have changed for any reasonable poverty line. This obviates the need for checking for the robustness of different poverty line assumptions. The results indicate that poverty rankings are often possible and can serve the useful role of making robust poverty rankings. The only proviso is that a debate must take place on the appropriateness of various indicators of the resources available to households. Unless a consensus emerges on this, no strategy can solve the measurement problem.

To see why this is a serious problem, consider the question of whether the period between 1978 and 1996 has seen improvement in poverty. Using consumption expenditures as a guide, the tests for change in the FGT indices all indicate a reduction in poverty (see Table 3). Furthermore, these results are robust to changing the assumed adult equivalence scale. If, however, necessities expenditure is used as the measure of household resources, poverty shows unequivocal evidence of rise. Again this is true for all the FGT poverty indices and is robust to changes in the adult equivalence scale. Tests for poverty dominance confirms these opposite findings, leaving a deep

confusion about whether any progress has been made in the fight against poverty.

Table 5.1 Comparing Poverty in 1978 and 1996

		FGT0 _A - FGT0 _B	FGT1 _A - FGT1 _B	FGT2 _A - FGT2 _B
$\varepsilon=0.4$	Y			
	C	-0.00442 (0.00305)	0.00470 (0.00188)*	0.00504 (0.00126)*
	N	-0.0339 (0.00264)*	-0.0107 (0.00143)*	-0.00410 (0.00100)
$\varepsilon=0.5$	Y			
	C	0.00445 (0.00303)	0.00997 (0.00183)*	0.00673 (0.00123)*
	N	-0.0238 (0.00259)*	-0.00768 (0.00138)*	-0.00297 (0.000975)*
$\varepsilon=0.6$	Y			
	C	0.0175 (0.00302)*	0.0168 (0.00180)*	0.0110 (0.00122)*
	N	-0.0143 (0.00263)*	-0.00441 (0.00140)*	-0.00146 (0.000988)*

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Appendix 1.

Given a common partitioning of the range space of two distributions into k mutually exclusive and exhaustive intervals of length $d_j, j=1,...,k$ with respective relative frequency vectors p_A and p_B , define two matrices as follows:

$$I_f = \begin{pmatrix} 1 & 0 & 0 & . & . & 0 \\ 1 & 1 & 0 & . & . & 0 \\ 1 & 1 & 1 & . & . & 0 \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ 1 & 1 & 1 & . & . & 1 \end{pmatrix}$$

$$I_F = .5 \begin{pmatrix} d_1 & 0 & 0 & . & . & 0 \\ d_1+d_2 & d_2 & 0 & . & . & 0 \\ d_1+d_2 & d_2+d_3 & d_3 & . & . & 0 \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ d_1+d_2 & d_2+d_3 & d_3+d_4 & . & . & d_k \end{pmatrix}$$

discrete empirical analogues can be developed to contemplate i 'th order dominance by orienting test statistics around a null of no dominance viz:

$$H_0: I_F^{i-1} I_f(p^A - p^B) = 0 \text{ against } H_1: I_F^{i-1} I_f(p^A - p^B) \leq 0: \\ \text{(note } H_2: I_F^{i-1} I_f(p^A - p^B) \leq \wedge \geq 0 \rightarrow \text{indeterminacy)}$$

where, in each case, under the alternative strict inequality must hold for at least one element of the vector. Let v be the difference between two k dimensioned empirical relative frequency vectors of households from two independent samples falling into the k mutually exclusive and exhaustive categories then, under the null hypothesis that the two samples come from a common distribution, it is known that v is asymptotically distributed $N(0, \Omega)$ where:

$$\Omega = \frac{n^A + n^B}{n^A n^B} \begin{bmatrix} p_1(1-p_1) & -p_1p_2 & \cdot & \cdot & -p_1p_k \\ -p_2p_1 & p_2(1-p_2) & \cdot & \cdot & -p_2p_k \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ -p_kp_1 & -p_kp_2 & \cdot & \cdot & p_k(1-p_k) \end{bmatrix}$$

Here the p_i , $i = 1, \dots, k$ correspond to the probabilities under the null of a randomly selected household falling into the i 'th category and the n^A and n^B are the sample sizes from the respective distributions. Stochastic dominance hypotheses can be examined in the context of $v^i = I_F^{i-1} I_1 v$ for $i=1, \dots, 3$ which, for suitably specified partitions, also have well defined asymptotically normal distributions (see Anderson (1996)). In practice, the pooled sample is employed to determine the fractiles (employed in calculating I_F) in the case of predetermined p , or the vector p (employed in calculating Ω) in the case of a predetermined partition of Y . The tests involve multiple comparison procedures which have been worked out (Richmond (1982)) and employed in the context of Lorenz curve ordinate confidence regions (Beach and Richmond (1985)) and require the use of the Studentized Maximum Modulus Distribution (Stoline and Ury (1979))¹⁶. Following the convenient convention of Bishop et. al. (1989) the hypothesis of dominance of distribution A over distribution B requires that no element of the appropriate vector v is significantly greater than 0 whilst at least one element is significantly less. Since the test is perfectly symmetric, dominance of B over A requires that no element of v is significantly less than 0 whilst at least one is significantly greater. In the event that v has both significantly negative and positive elements the comparison falls into the inconclusive region and no unambiguous statements regarding relative welfare can be made. In the event that no elements of v are significant the null of no stochastic dominance is not rejected.

There is a considerable literature on the joint testing of inequality restrictions (see Kodde and Palm (1986) and Wolak (1989) and references therein). Letting v_{iw} be the inequality constrained estimate of the vector v_i and let $(\Omega_{v_i})^+$ be the Moore- Penrose inverse of the covariance matrix of v_i , then for:

$$W = (v_i - v_{iw})' (\Omega_{v_i})^+ (v_i - v_{iw})$$

the distribution of W is such that:

¹⁶ Appropriately normed quadratic forms of v^1 , v^2 and v^3 would yield identical χ^2 statistics however this is not the case for multiple comparison procedures involving these vectors. Note that the nature of the matrix that transforms v into v^1 yields a value of the last element of v^1 that is identically 0.

$$P(W \geq c) = \sum_{i=0}^{k-1} P(\chi^2_{i \geq c}) w(k, k-i, \Omega_{v_i})$$

where $w(k, k-i, \Omega)$ is a weight function corresponding to the probability that v , with covariance matrix Ω , has $k-i-1$ of its $k-1$ independent elements positive. This weight function is complex to compute and closed form expressions only exist for $k-1$ up to 4, however following the suggestion in Wolak (1989) they can readily be approximated via pseudo normal random number generation.

Appendix 2

This may be seen by observing that the difference in the headcount measure for two distributions and a given poverty line is simply $F^1_A(Y^p) - F^1_B(Y^p)$. Note the depth of poverty measure (often referred to as the normalised deficit) for distribution j , D_j , is normally expressed as:

$$D_j = \frac{1}{Y^p} \int_0^{Y^p} (Y^p - y) dF_j(y)$$

A “well known result” in mathematics (see O’Brien (1984)) states that:

$$\int_0^{Y^p} (Y^p - y) dF_j(y) = F^2_j(Y^p)$$

thus it follows that $D_A - D_B$ may be written as $(Y^p)^{-1} (F^2_A(Y^p) - F^2_B(Y^p))$ which is the last element of the second order stochastic dominance vector divided by the poverty level. Obviously tests of the change in the normalised poverty depth measure and the significance of the last element of this vector are equivalent. Further, this presents a ready interpretation of the latter as the change in average income of people in poverty.

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
niveaux de vie*

Are Canadian Couples Better Off or Just Working Harder?

Mary Kilfoil
Dalhousie University

Session 6B: Trends in Inequality in Canada
October 31 8:30 AM - 11:00 AM

1. Introduction

Are Canadian married couples really better off in 1994 than they were in 1975, given the increased time spent to acquire earned income? Are Canadian married couples better off than similar couples in other countries if one takes account of the differences across countries in the time spent earning income? Although there has been a growing concern in understanding the impact of increased labour force participation of married women and the emergence of the “dual earner” family in Canada on the level and distribution of household earnings and income¹, little attention has been given to the change in the amount of labour time devoted to earning income, and the extent to which this also impacts the level of economic well-being of families. The counterpart to increased market earnings of second earners in the household is a decline in the number of hours available for domestic production in the home and for leisure.

The value of non paid work time is now widely recognized as an important indicator of economic well-being. In fact, the demand to recognize and value non-paid production, including household work, in a national accounting sense (Clift and Wells, 1990) has lead Canada to pioneer efforts to value housework in monetary terms. Methodologies to value non paid production, initially developed in the mid-1970s, have been updated using time-use surveys to produce estimates on a regular basis.²

Together, husbands and wives in Canada are spending more time in paid employment, which has occurred, to a large extent, due to the increased labour force participation of women. Where the social norm in Canada used to be one earner within the family unit, the norm has now moved to two-earner families. In 1967, only one-third of husband-wife families (with and without children) were families in which both spouses reported earnings, but by 1988, dual earner families represented approximately 62% of all husband-wife families.³ The percentage distribution of husband-wife families in Canada by earning status of spouses from 1967 to 1995 is shown graphically in Appendix Figure A-1. Dual earners also represent the majority of husband-wife families with children. By 1995, both parents were employed in approximately 70.7% of two-parent families.

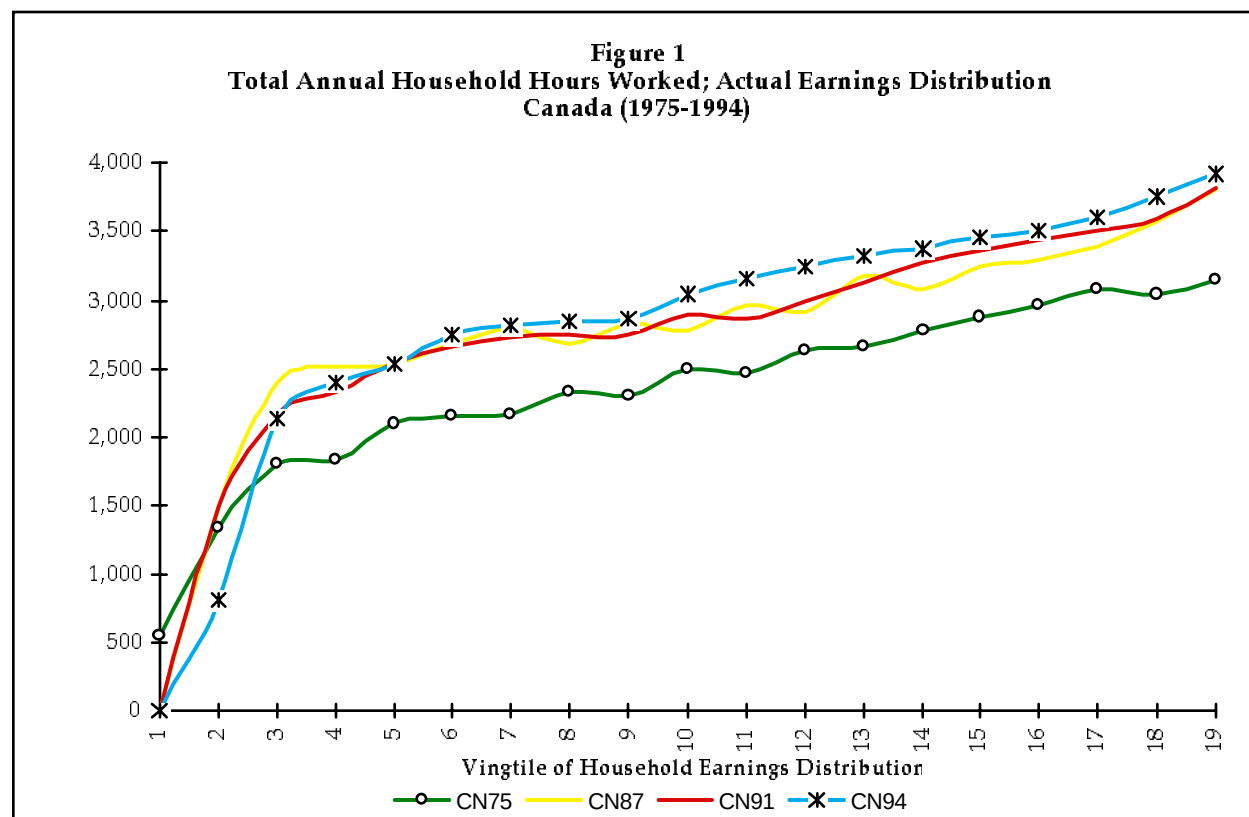
Average annual hours worked, however, mask what is happening to hours of work throughout the earnings distribution within a country. Examining the distribution of average annual hours of paid labour for married couples in Canada at each vingtile of the earnings distribution for selected years over the period from 1975 to 1994, (Figure 1), reveals significant differences in the number of hours spent in paid labour for married couple households at every point in the

¹ Saunders, O'Connor and Smeeding (1994); Saunders (1993) Danziger (1980), Cancian, Danziger and Gottschalk (1993), and Cancian and Schoeni (1992)

² Barbara Clift and Stewart Wells, “The Reliability of the Canadian National Accounts Estimates”, Canadian Economic Observer, Statistics Canada Catalogue 11-010, February, 1990.

³ Source: Statistics Canada, Household Surveys Division, “Characteristics of Dual earner families, 1991 (Ottawa: 1993) Catalogue # 13-215, Table 5.

earnings distribution. (See Appendix Table A-1). Canadian couples are spending a great deal more time in the paid labour market in 1994 than they did in 1975.⁴



One of the most striking features of the analysis of paid labour time by Canadian households is the substantial increases in hours worked throughout the distribution over time. In 1975, the average annual household hours worked in the 20th vingtile of the household earnings distribution was 3,097 hours. By contrast, in 1994, the average annual hours worked in the 20th vingtile was 4,027 hours. This represents an increase of roughly 1,000 hours worked by the household per year or roughly 20 hours per week. Similarly, households at the 15th vingtile of the earnings distribution worked an average of 2,876 hours in 1975, versus 2,457 hours worked by households in 1994. Again, this represents an increase of roughly 600 hours worked per household. Large increases in annual household hours worked per year are evident from the 60th percentile upward when comparing the household earnings distributions of 1975 and 1994. An average of 700 hours worked per year per household is equivalent to every household supplying 14 more hours of paid work per week. While the trend toward increases in two earner households in Canada may result in higher earned income, these trends do not necessarily imply increased economic well-being. Examining the distribution of household earnings, without an examination of the changes in hours worked over time in Canada ignores

⁴ The Average annual hours household worked is computed hours for each vingtile of the earnings distributions of married couple households using the Luxembourg Income Study (LIS) database. Average annual hours of paid labour for married couples are examined for the years 1975, 1987, 1991 and 1994. A description of the data used is provided below in Section 3 of this paper.

the impact on households of allocating additional time to the paid labour market away from potential household production or leisure activities.

Substantial differences in hours of paid labour have also emerged among several OECD countries over the 1980's and early 1990's.⁵ During this period, the amount of time spent in paid employment by Canadians and Americans compared to Western European workers increased noticeably.⁶ Table A-2 presents the differences in annual hours worked among advanced OECD countries.⁷ Bell and Freeman (1996) in their study "Changes in Work Time in Canada and the United States" examined differences in annual hours worked among advanced OECD countries. One notable pattern, identified by Bell and Freeman, which emerges is the correlation between the "English-speaking" countries and high average annual hours worked per adult. Average annual hours worked per adult are greatest in the United States, Australia, the United Kingdom and New Zealand, followed by Canada.⁷ The Scandinavian countries such as Sweden and Finland rank next, with relatively high hours worked per adult. Average hours worked in the OECD European countries such as the Netherlands, Germany and France are much lower, with the Netherlands showing the lowest average annual hours worked per adult among the OECD European countries.⁸ The five countries examined in this paper, Canada, United States, Australia, Finland and the Netherlands, are selected based on the wide variation in annual labour market hours for husbands and wives.

Average annual hours worked, however, mask differences in hours of work throughout the earnings distribution across countries. Comparing average annual hours worked by married couples at each vingtile of the earnings distribution among the five countries examined in this study (Figure 2) reveals striking cross-country differences in the supply of annual hours of paid labour.⁹

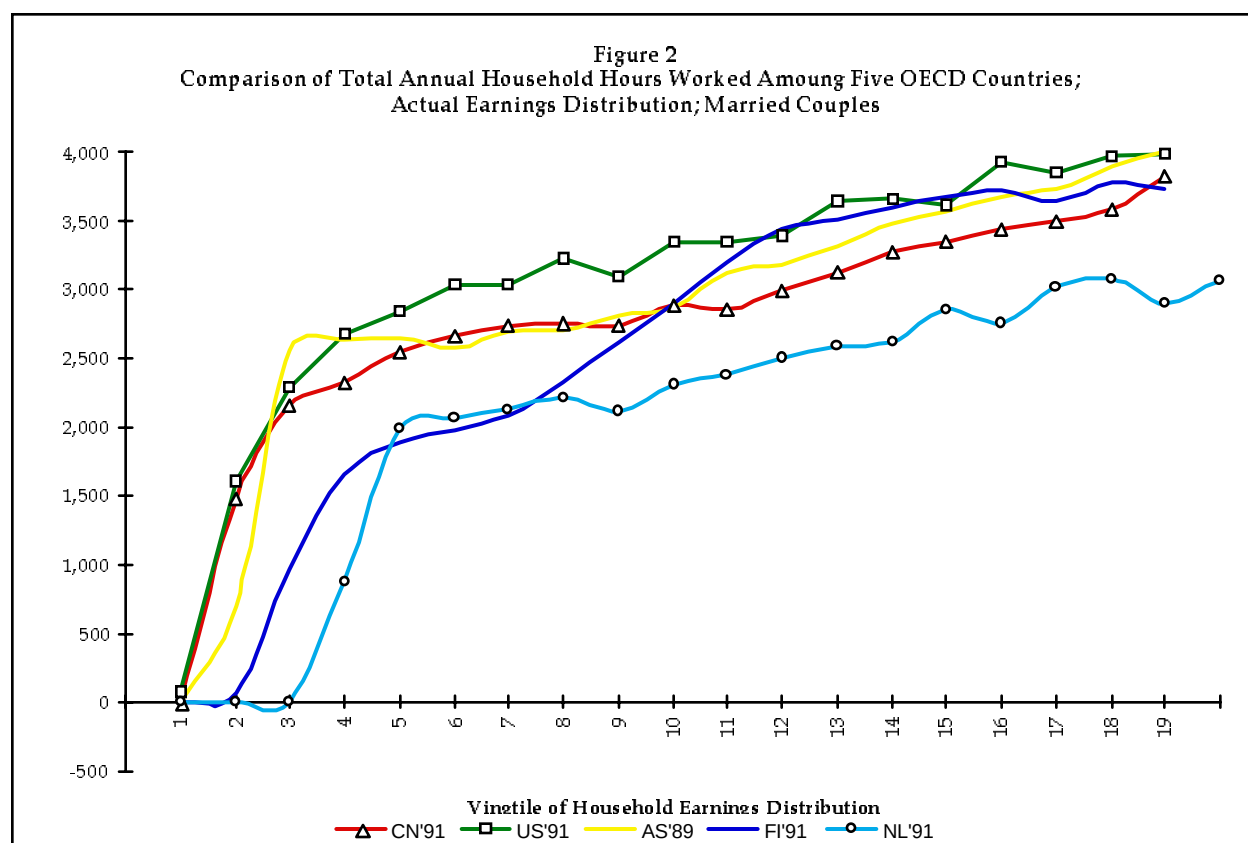
⁵ Source: OECD Employment Outlook, 1995, Table A, Table C.

⁶ Americans and Canadians spend more hours in the paid labour than Western Europeans who enjoy considerable leisure while employed as well as longer vacations and holidays. In fact, in many European Union countries work-sharing is encouraged as a method for dealing with unemployment.

⁷ The exception being Japan, which has the highest average annual hours worked per adult.

⁸ Bell and Freeman (1996) found that the differences in hours worked between North Americans and Western Europeans to be a relatively recent phenomenon, developing in the 1970s and 1980s.

⁹ The figures in Figure 2 represent average annual hours worked per married adult at each vingtile of the earnings distribution, with household head aged 15 to 64. Data taken from LIS micro data country files for 1991 for Canada, the United States, Finland and the Netherlands and 1989 for Australia.



The average annual household hours worked across countries within each vingtile of the earnings distribution shown in Figure 2 is given in Appendix Table A-2. The average annual household hours worked throughout the earnings distributions in each country is also shown at the bottom of Table A-2. This analysis shows average *household* hours worked follow the same ranking as average annual hours worked *per adult* reported as reported by the OECD across the countries examined in this study.

Examining the entire distribution of hours worked across countries provides a more complete understanding of the distribution of household hours embodied in the average hours worked. Figure 2 reveals that couples in the United States spend more time in the paid labour market, throughout most of the earnings distribution, than do families in other countries. At the bottom of the earnings distribution, the US is followed by Canada with the next highest number of household hours spent in the labour market. Average household hours worked in Canada however, experience a slight decline at around the median with average household hours worked dropping off. Hours worked by married couples in the Netherlands are the lowest overall, with the lowest distribution beyond the 8th vingtile of the earnings distribution. Married couple households in the Netherlands work on average 600 to 800 hours less per year than households in the other five countries examined in the upper end of the earnings distribution. Based on a 50-week work year, this translates into 12 to 16 hours less each week.

Comparisons of earned incomes of families across countries, even when standardized for prices and family size, (and the subsequent measures of inequality based on these incomes), are likely to give misleading implications of the relative level and distribution of economic well-being,

since they implicitly assume everyone has the same amount of time available for home production and leisure.

This paper examines the relationship between the distribution of average annual household pre-tax earnings and average annual household hours of market work for married couple households. The point of departure in this paper is the treatment of the variation in annual hours worked either over time within Canada or across countries. This paper adds to the literature explicit consideration of the differences in hours worked across households, (across countries or over time periods), by proposing an additional standardization of household earnings to account for differences in the number of hours worked across households. Total annual household hours worked by couples are fixed to a common number of hours and household earnings are derived based on assumptions regarding the manner in which couples could potentially package their labour supply.¹⁰ Annual household earnings, adjusted for differences in prices, family size, and hours worked are compared to determine whether or not the standard of living derived from these adjusted earnings differs.

The objective of standardizing household hours is to determine if, when we adjust for differences in time spent working, whether or not there are differences in the earnings distributions of married couples. In the case of a within country analysis, adjusting household earnings for differences in prices, family size, and hours worked, allows one to determine if, all else equal, families are any better off now than they were in previous years, where the average annual hours worked by husbands and wives were less. In the case of a cross-country analysis, further standardizing household earnings for differences in hours spent working addresses the second question of determining the relative economic well-being of Canadian married couples and similar couples in other countries. Also novel to this paper is the examination of average annual hours worked at each vingtile of the earnings distribution. This allows for a clearer understanding of annual average hours worked at both the bottom and the top of the distribution, rather than using an overall average hours worked.

A brief review of the relevant literature is provided in Section 2. Section 2.1 presents a review of the literature concerning the impact of changes in hours worked and the resulting the impact earnings for Canadian households and Section 2.2 presents a brief review of the literature concerning cross-country comparisons of the impact of differences in hours worked in earnings and economic well-being. A description of the data, the sample selection criteria, and the methodology used to standardize married couples' earnings in this study is contained in Section 3. This section includes a discussion of the derivation of the household pre-tax earnings distribution. Section 4 presents a comparison of the resulting pre-tax earnings distributions over time in Canada when standardized for differences in household hours worked. Household hours are fixed at both the average annual household hours worked in 1975 in each vingtile of the earnings distribution and at common number of hours (2,000 hours) throughout the earnings distribution.¹¹ While earnings in 1994, adjusted for prices and family size, show Canadian households to be maintaining a comparable standard of living as compared with

¹⁰ The total household earnings for married couples rather than the individual earnings of husband and wife are examined in order to facilitate an examination of the relationship between household hours of paid labour and the way in which husbands and wives "package" their combination of paid and unpaid work.

¹¹ The choice of 2,000 hours is based on 40 hours of work per week over 50 weeks of work per year.

previous periods, once we account for the differences in the amount of time spent to acquire these earnings, Canadian households in 1994 are not as well off as they were in 1975 in the bottom 65 percent of the earnings distribution.

Section 5 presents the cross-country comparison of actual pre-tax household earnings, expressed in 1991 US dollars, adjusted for differences in prices across countries using a PPP index, equivalized for real purchasing power by adjusting for differences in family size using an OECD equivalence scale, and adjusted for differences in hours worked, throughout the earnings distribution in each of the selected countries in the sample. Two alternative levels of annual household hours worked are used as the standard number of annual hours worked across countries: annual household hours worked are standardized to the average annual household hours worked in the US at each vingtile of the earnings distribution and to a common number of hours (2,000 hours) throughout the distribution. The results of the cross-country analysis show, that when household earnings are adjusted for differences in hours worked, countries, such as the US, in which households supply greater hours of paid labour are not as well off as countries in which households supply fewer hours of paid labour, in the lower portion of the earnings distribution.¹² Section 6 presents the conclusions.

¹² This assumes a positive value to time spent outside the labour force.

2. Literature Review

2.1 Literature Review: Canadian Analysis

Much of the literature concerned with the relationship between employment earnings and the economic well-being of families in Canada has focussed on the level of earnings, (or lack thereof), the distribution of earnings or measures of inequality in earnings in general.¹³ However, very little attention has been given to the amount of labour time embodied in earned income, and the extent to which this also impacts the level of economic well-being of families. Canadian households have been spending more time in the labour market over the past twenty years, due largely to the increased labour force participation of women.

Studies have found that the rising inequality in Canada in annual labour market incomes, has been offset by social transfers so that, unlike the United States, the final distribution of total household incomes in Canada have been relatively stable in the 1980's (Economic Council of Canada (1991); Wolfson (1992); Blank and Hanratty (1991); Love and Poulin (1991)).

Canadian studies (Leckie (1988); Myles, Picot and Wannell (1988); Burbidge, Magee and Robb, (1993)) have also documented the rise in earnings inequality for individuals and the polarization of the labour force which took place between 1981 and 1986 in Canada. Wolfson (1992) and Beach and Slotsve (1994) found this shift was not simply a cyclical phenomenon induced by the recession of the early 1980's. Beach and Slotsve found that overall earnings inequality in Canada increased less than the distribution of individual earnings. Morissette, Myles and Picot (1994) concluded that the rise in inequality and polarization observed in the 1980's is not due solely to the 1981-83 recession, but they found that shifts in Canadian earnings inequality, at the aggregate level, were mainly driven by changes in the distribution of annual hours worked. They focus their analysis on individual annual earnings inequality rather than on household or family economic inequality changes and they show that increased female labour force participation over the past two decades may have had partial offsetting effects in terms of household economic inequality.

As pointed out by Picot (1996), in most of the work on increasing earnings inequality in Canada, changes in the distribution of working time have been largely ignored. Freeman (1994), Juhn, Murphy and Topel (1991) and Kuhn and Robb (1996) have examined the declining hours of work of lower paid, less skilled workers relative to the higher paid resulting from a supply side response on the part of workers. Studies which have recognized the polarization in hours worked through the 1980s as influencing the degree of earnings polarization for individuals include Picot, Myles and Wannell (1990), McPhail (1993) Morrisette, Myles and Picot, (1994) and Morissette (1995). They found that the increased polarization in hours worked increased inequality in annual earnings inequality, with the more highly paid individuals working longer hours versus the less paid working relatively shorter hours.

¹³ Studies on the increased polarization of employment earnings in Canada include: Myles and Picot, (1988); The Economic Council of Canada, (1991); Morissette, Myles and Picot (1994); Burbidge, Magee and Robb, (1993); Beach Slotsve, (1994). The relationship between declining real and relative wage of young workers and increased earnings polarization have also been analyzed: Myles, Picot and Wannell, (1988); Davis, (1992); Betcherman and Morrisette, (1994).

2.2 Literature Review: Cross-Country analysis

Evidence that the trend toward narrowing earnings distributions experienced during the post-war period was reversed during the 1980s in many OECD countries has generated much research in the area of earnings inequality.¹⁴ Although much of the research in cross-national comparisons of earnings inequality has focussed on trends in male earnings inequality, reflecting the lack of comparable data across countries¹⁵ as well as a focus on the distribution of wages in an attempt to explain the distribution of earnings,¹⁶ several studies have examined the distribution of female earnings. This research has concentrated primarily on examining the correlation between husbands' and wives' earnings and the impact of wives' earnings on family income inequality.¹⁷ Two important facets of the literature on cross country earnings dispersion which are of relevance to this paper deserve mention. First, there is a general recognition in the literature that individual's total earnings are determined not just by their earnings per hour but also by the number of hours they work, and that differences in hours worked should be studied when examining earnings inequality.¹⁸ However, it also recognized that in proceeding from the study of individual wage inequality to the study of household income inequality, one is necessarily led to consider theories of family formation and family labour supply. Second, there has also been a general recognition, evident in the empirical analysis that differences in earnings and income inequality trends across countries must be put into context against the backdrop of differences in their social and institutional framework.¹⁹ Although studies such as Blackburn and Bloom (1994) do not attempted to develop and estimate a structural model of family earnings, their empirical results are tempered by a recognition of variations across countries in household hours worked. Blackburn and Bloom (1994) analyze only families headed by married couples in order to facilitate analyze the influence of the growth in two-earner couples on overall income inequality across countries.²⁰

¹⁴ Studies in this area include OECD, 1993, Chapter 5; Blackburn and Bloom, 1994; Saunders, O'Connor and, 1994; Atkinson, 1995; U. Wagschal, 1997; Danziger, S., 1980; Danziger, S., and Gottschalk, P., 1993; Green, Coder and Ryscavage, 1992 and Katz and Murphy (1992).

¹⁵ This is acknowledged in the research of authors such as Blackburn and Bloom, (1994), Saunders, O'Connor and, (1994), U. Wagschal, (1997), and Danziger, S., (1980). However the emergence of efforts toward improved comparability in data, such as the LIS micro-data sets, has facilitated cross national comparisons of the level of earnings inequality.

¹⁶ Since the large changes in labour force participation of women, experienced in many countries, make it difficult to separate changes in the distribution of wages from changes in the composition of the female labour force, earnings and wage inequality research was directed primarily, although not exclusively, on male earnings.

¹⁷ For example, see Cancian Danziger and Gottschak (1993); Karoly and Burtless (1993); Blackburn and Bloom (1994); Saunders (1993); and Beach and Slottve (1994).

¹⁸ See for example, Blackburn Bloom (1994); Bell and Freeman (1996), OECD (1993, 1995).

¹⁹ Freeman, (1994); Gottschalk and Smeeding (1995); Katz and Murphy, (1992).

²⁰ One of the key empirical results which emerges from the analysis of Blackburn and Bloom (1994) is that increased income inequality in the United States in the 1980s is associated with a sizable increase in the correlation between husbands' and wives' earnings.

The contribution of the earnings of a second earner in families to the level of and distribution of family earnings and income has become an area of income distribution analysis of increasing interest and policy relevance. Saunders, O'Connor and Smeeding (1994) provide evidence to suggest that cross-country variations in female participation rates are a factor underlying cross-country differences in the distribution of family earnings and incomes. They found married women's earnings cause a reduction in income inequality among married couples across countries. Other studies which found that the earnings of wives has had an equalizing effect on the distribution of family income for a range of countries include: Saunders (1993) for Australia, and Danziger (1980), Cancian, Danziger and Gottschalk (1993), for the United States and Cancian and Schoeni (1992) for a range of countries, including Australia, Canada, United States, and the Netherlands, which are of particular relevance to this study.²¹ Cancian Danziger and Gottschalk (1993) apportion little of the change in family income inequality to wives' earnings, whereas Karoly and Burtless (1993) and Blackburn and Bloom (1994) give them a larger role. Saunders (1993) found that in Australia, changes in married women's earnings lead to increased earnings inequality in the 1980s, whereas, Beach and Slottve (1994) found the opposite effect in Canada. There is however, wide agreement that the correlation in earnings among husbands and wives has never been large, but has grown during the 1980s, which would make wives' earnings more disequalizing.

The approach used by Cancian and Schoeni (1992) and Saunders, O'Connor and Smeeding (1994) is similar, where the actual distribution of family income is compared to an estimate of family income if each country had the **same** female labour force participation rate. This involves comparing the actual distribution of income with the distribution of income where all the earnings of wives are set to zero. The countries examined by Saunders, O'Connor and Smeeding also included Australia, Canada, United States, and the Netherlands, and in addition, (West) Germany. In all five countries examined, they found the actual distribution of earnings of couples Lorenz-dominated the earnings distribution where only husbands worked. They also found the actual earnings distribution of couples is less equally distributed in the United States than the earnings distribution of husbands alone in the Netherlands.

While studies have shown that married women's labor force participation reduced the measured level of overall earnings inequality in many countries, (Cancian, Danziger and Gottschalk, Saunders (1993)), these same studies also found that increased labour force participation of married women may not always have an equalizing effect on earnings distributions. Cancian, Danziger and Gottschalk, (1993) found the participation rate of wives whose husbands have the highest earnings has increased disproportionately in the U.S. Therefore the traditional explanation of the equalizing impact of wives earnings may be reversed. Also, due to assortative mating, the correlation of spouses' earnings may have risen. Saunders (1993) examined Australian data and also found that it is possible that the size of the equalizing impact of wives earnings may decline over time.

It is also recognized in the literature on cross-country earnings comparisons that the counterpart to the increased market earnings of married women is a decline in either the number of hours of domestic production worked in the home or in leisure time available.

²¹ The countries analyzed in the Cancian and Schoeni study include: Australia, Canada, United States, the Netherlands, France, West Germany, Israel, Norway, Sweden, and the United Kingdom,

(Saunders, O'Connor and Smeeding, (1994)). The resulting impact on the value of home production and leisure time available act to offset the increase in economic welfare of the family resulting from the increased money income due to the "second earner".²² Economists have argued for many years that ignoring the income and wealth generated by housework introduces a bias in various areas of economic analysis. Mitchell et al. (1921), Kuznets (1944) and Clark (1958), have pointed out that national income is significantly underestimated by not taking into account income in-kind provided by productive household activities. Weinrobe (1974) noted that measured growth rates are biased upwards as more and more women move into the labour market since no allowance is made for the resulting decline in non-market household production. These considerations have prompted studies in which authors develop alternative measurement methods in recognition of the value added of productive activities of households outside the market. For example, the earnings capacity approach used by Saunders, O'Connor and Smeeding, (1994), which involves replacing actual earnings (whether positive or zero), by an estimate of full-time earnings capacity.²³

²² It is further recognized by Saunders, O'Connor and, (1994) that the degree of such overstatement is likely to vary across families within and between countries, thus affecting the interpretation of national and cross national differences in the distribution of (money) income.

²³ Full-time earnings capacity is derived using estimates of conventional human capital earnings functions.

3. Data Description, Sample Selection and Methodology

3.1 Data Description and Sample Selection: Canadian Analysis

In the Canadian analysis, the pre-tax earnings distributions for married couple households are examined over the period from 1975 to 1994. The specific years of analysis are 1975, 1987, 1991 and 1994. Data on Canadian earnings is taken from the Luxembourg Income Study (LIS) data. The original source of the LIS data for Canadian households is the Canadian Survey of Consumer Finances. One major advantage of using the LIS data as a source for the Canadian data rather the micro data files from the Canadian Survey of Consumer Finances is that information on household hours worked for both household head and spouse is available in the LIS data for the years prior to 1987, but not available on the micro data files from the Survey of Consumer Finances.²⁴

Households selected are specified as married (or equivalent), containing a household head, (aged 21 to 65), with a spouse present. Records which reported hours worked but zero earnings were omitted from the sample to facilitate the standardization procedure used.²⁵ All households with negative earnings are excluded from the sample, but all households with zero earnings are included in the sample. Both full-time and part-time earners are included in the sample. Households which reported zero or negative disposable incomes were excluded from the sample. Self-employed persons are included in the analysis for each country selected. Table A-4 in the Appendix shows the impact on the weighted sample size of the LIS data for each of the sample selection criterion used.

For the years 1987 to 1994, households are defined as single family units, corresponding to the definition of the "Census Family", by Statistics Canada.²⁶ For 1975 the household units contained in the LIS survey data (Canadian Survey of Consumer Finances) are defined as "Economic Families", a broader definition of family than the single family unit. Economic families include single family units plus households with where a husband, wife and children may be also living with other relatives. However, for the purposes of this paper, we are

²⁴ The variables on household hours worked are available through the LIS data due to a special request to match files with the Canadian Labour Market Activity Survey so that these files would correspond to the LIS data format. Information on hours worked for individual records is not available through the Canadian Survey of Consumer Finances micro data files prior to 1987.

²⁵ This is due to the fact that the household earnings distributions are broken down into vingtiles based on the actual household earnings distribution for each year. Records with reported earnings, but no reported hours worked are placed within a particular vingtile of the earnings distribution, based on reported actual earnings, and remain in that vingtile under each of the standardizations considered. If average hours worked are reported as either zero or missing, this may seriously alter the average "standardized" earnings within each vingtile computed through various standardization procedures.

²⁶ The term Census Family refers to the traditional "nuclear" definition of family which includes a husband and/or wife, with or without children. The term Economic Family refers to a group of individuals who share a common dwelling who are either related through blood or marriage. This definition includes in-laws as well as persons adopted.

concerned only with households in which husband and wife (a couple) are present and the allocation of time between couples to paid work.²⁷

3.2 Data Description and Sample Selection: Cross-Country Analysis

Data on hours worked for head and spouse of the household is available for all years selected in the sample. Data on household earnings in 1975 is not broken down into earnings of head and spouse, however, but is available for each of the subsequent years. The gender of the household head is given for all years in the sample but the gender of the spouse is not given. Households were selected if the gender of the household head was indicated, and a frequency was done on the gender of the head. In all selected years in the Canadian sample, all records reported household heads as male. Given this, earnings and the hours worked of the head were assigned as male earnings and hours worked and those of the spouse were assigned as female hours and earnings.

The data on earnings and hours worked for the five countries examined (Canada, (1991), United States, (1991), Finland, (1991), the Netherlands, (1991) and Australia, (1989)) is obtained from the country files contained in the LIS data base.²⁸ Table A-5 shows the original sources of the country-specific data used in this study. Extensive effort has been made by country specialists to make information on income and household characteristics contained in the LIS data as comparable as possible across countries.

Households selected are specified as married (or equivalent), containing a household head, (aged 21 to 65), and a spouse. The pre-tax earnings distributions for married couple households are examined across countries in each of the selected years. Households are further defined as single family units, corresponding to the definition of the "Census Family", by Statistics Canada. Records which reported hours worked but zero earnings were omitted from the sample to facilitate the standardization procedure used. All households with negative earnings are excluded from the sample, but all households with zero earnings are included in the sample. Both full-time and part-time earners are included in the sample. Households which reported zero or negative disposable incomes were excluded from the sample. Self-employed persons are included in the analysis for each country selected. Table A-6 in the Appendix shows the proportion of the weighted sample size affected by each sample selection criterion across countries. The gender of the household head is given for all countries in the sample but the gender of the spouse is not given. Households were selected if the gender of the household head was indicated. Earnings and hours worked of the head were assigned as male earnings and hours worked and those of the spouse were assigned as female hours and earnings.²⁹ Due to the lack of information on the gender of the spouse, households containing same gender couples cannot be identified

²⁷ The breakdown of the number of households from single family households and from multi-family households given by the weighted sample size for the years 1987, 1991, and 1994 are given in Table A-2 in the Appendix.

²⁸ The country sample was selected on the basis of the variation across countries in annual household hours worked as well as providing a set of countries with the year of analysis as similar as possible.

²⁹ A frequency distribution showed that in all households selected (where both household head and spouse are present) all records reported household heads as male for all selected countries in the sample.

This paper adopts the Purchasing Power Parity (PPP) index created by Summers and Heston (1991) to transform the distributions of Figure 1 into a common currency under the strong assumption that the PPP conversions reflect differences in purchasing power that are equal at all points in the distribution or, if they are not, that these differences across percentile points are the same in all countries.³⁰

3.3 The Distribution of Household Earnings Defined

Total annual pre-tax earnings for married couples, (unadjusted for prices, family size or hours worked), within the selected sample were first sorted in ascending order and then split into twenty groups (vingtiles), of equal size for each year of analysis. Each vingtile contains an equal number of households for a given year of analysis. The average earnings and average number of hours worked within each vingtile are then calculated for males and females. For example, at the bottom of the earnings distribution, the average hours worked in the first vingtile of the distribution represents the average total household hours worked by all households included within this vingtile. This includes all households up to, and including the bottom 5th vingtile of the household earnings distribution.

Table A-7 shows the variables used to examine the distribution of earnings and annual hours worked. Data on annual pre-tax earnings is a reported variable in the LIS data set for all datasets used in the Canadian and cross-country analysis. Total annual hours worked is computed using total average hours worked per week multiplied by total weeks worked per year for both household head and spouse.

While standardizing earned income for differences in family size could alter the relative rank order of households in the earnings distribution, standardizing for hours worked certainly will alter the rank order of households in the earnings distribution. However, it should be stressed that the same households within each vingtile were used to examine hours worked and earnings for each of the subsequent adjustments to the earnings function. In this manner, the impact of each of the adjustments on earnings, and hours worked for males and females can be examined. Since each vingtile always contains the same households as were included in the actual unadjusted earnings distributions, the same households are compared throughout this analysis for any given year.

³⁰ It should be noted that the use of purchasing power parity measures involve strong assumptions regarding cross-country comparisons of inequality.

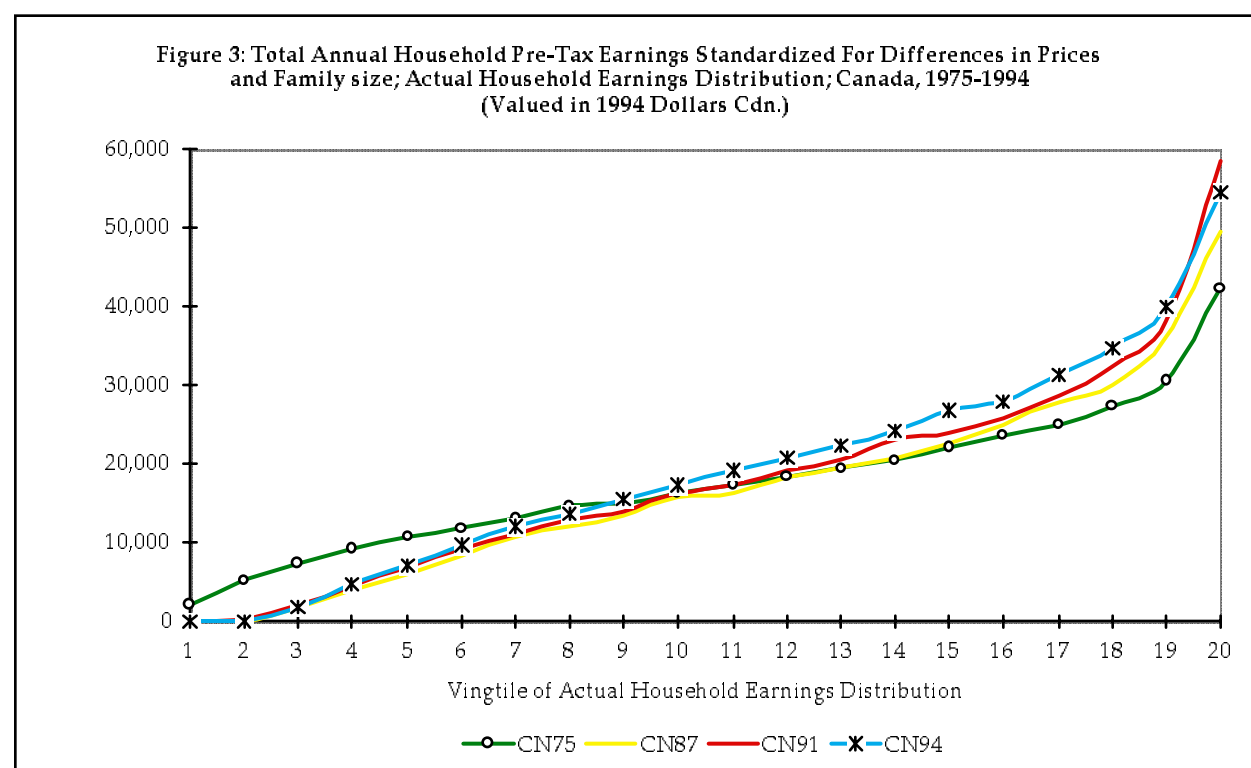
4 Standardizing for Trends in Hours Worked: Canadian Analysis

4.1 Canadian Married Couples' Earnings Adjusted for Differences in Prices and Family Size, 1975-1994

Married couples' earnings from 1975 to 1994 are standardized, adjusting for differences in prevailing prices over this time period using Statistics Canada CPI indices. All earnings are reported in 1994 Canadian dollars. Household earnings are adjusted for differences in family size using the OECD equivalence scale. Figure 3 shows the distribution of real household earnings adjusted for differences in prices and family size for each vingtile of the distribution. (See Appendix Table A-8).

Examining real household earnings, adjusted for differences in prices and family size (Figure 3), reveals that households in 1975 had greater equivalized earnings than did households in all other years in the bottom 40% of the distribution, but had lower equivalized earnings than did households in all subsequent years from the 15th vingtile upwards. Households in 1987 and 1991 show lower real earnings, standardized for prices and family size throughout much of the earnings distribution, except in the bottom 15% of the distribution, where average household earnings in 1987 and 1991 are greater than average earnings in 1994. Households in 1991 also show equivalized earnings greater than those in 1994 in the top 5% of the earnings distribution.

This analysis shows that although average family size in 1974 was larger than in 1994, couples had greater equivalized earnings in 1975 than did couples in subsequent years in the bottom 40% of the distribution.



4.2 Standardizing Household Hours Worked: Canada

The standardization procedure used to adjust household earnings for differences in hours worked is the Proportional Hours Standardization, where household hours worked are scaled up or down to the standardized number of hours by allocating hours to husbands and wives in proportion to their actual allocation of hours within the household.³¹ The Proportional Hours standardization procedure is invariant to the choice of total standardized household hours used. Actual wages of individuals within the household are used to value their share of the standardized hours to calculate household earnings.³²

Standardizing total household hours worked in proportion to actual hours worked by husbands and wives resulted in two separate standardization processes:

- 1) Establishing a common set of hours worked based on the average number of household hours worked in each vingtile of the distribution of earnings in 1975; and
- 2) Standardizing hours to a common number of hours (2,000 hours per year) based on the proportion of the hours worked by husband and wife to total household hours worked;³³

The first procedure determines the hours to be the average number of hours worked in each vingtile of the distribution in 1975, and then allocates these hours based on the husband and wife's proportion of total household hours. The second procedure assumes a given amount of hours would be allocated based on the proportion of hours contributed to total household labour supply by husband and wife given in the data. The quantity of household hours selected in this study is 2,000 hours per year.

The result of the first Proportional Hours type of standardization procedure is shown in Figure 4. (See Appendix Table A-9). The 1975 adjusted earnings function again lies above the adjusted earnings of 1994 throughout the bottom half of the earnings distribution (up to the 13th vingtile). This would suggest that, if households in the years since 1975 worked the same number of average hours within each vingtile as did households in 1975, Canadian families in the years subsequent to 1975 have not obtained a higher standard of living in the bottom 65 percent of the earnings distribution. In leveling the playing field in terms of hours worked across time periods, Canadian households in the bottom 65 percent of the earnings distribution in the years subsequent to 1975 have not kept pace with the bottom 65 percent of households in 1975 in terms of household earnings.

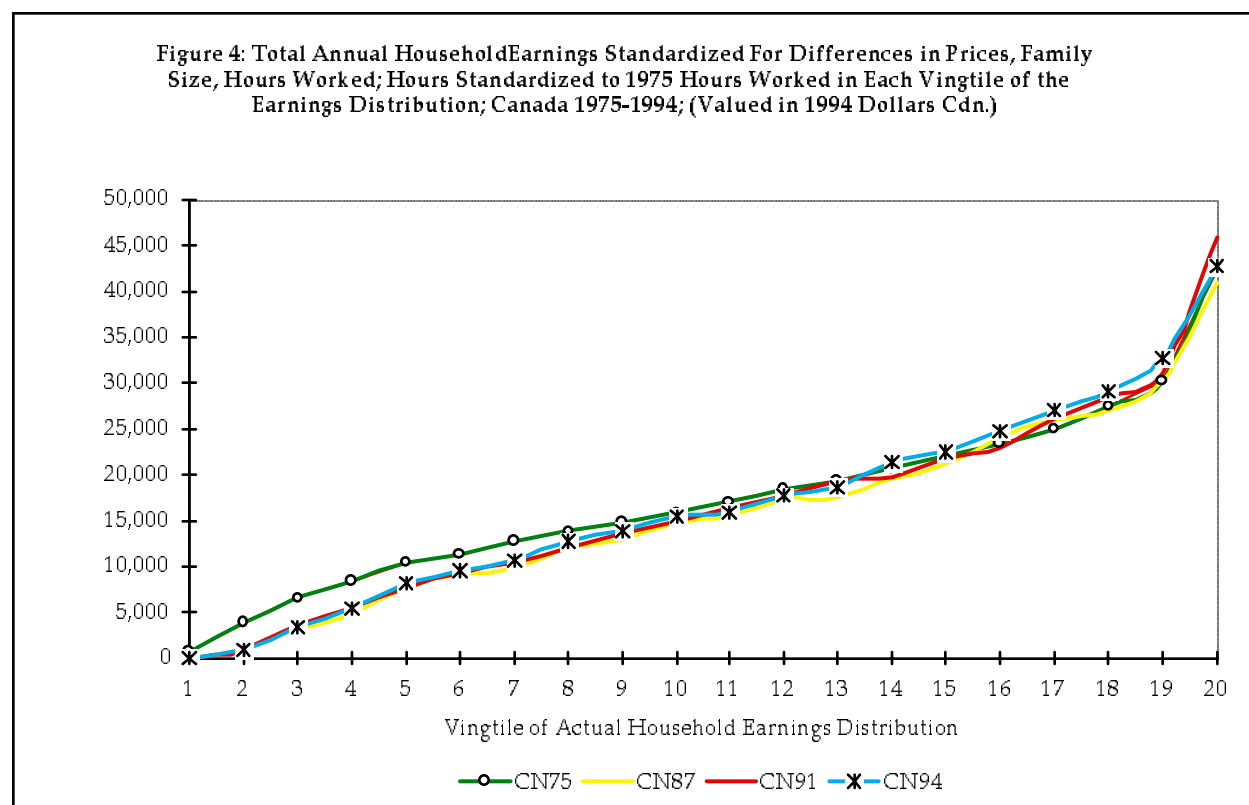
The earnings distributions of 1991 and 1987 are indistinguishable from the 1994 adjusted earnings, especially in the bottom half of the distribution with the 1994 earnings distribution lying above that of 1987 and 1991 in the upper portion of the distribution. This result implies

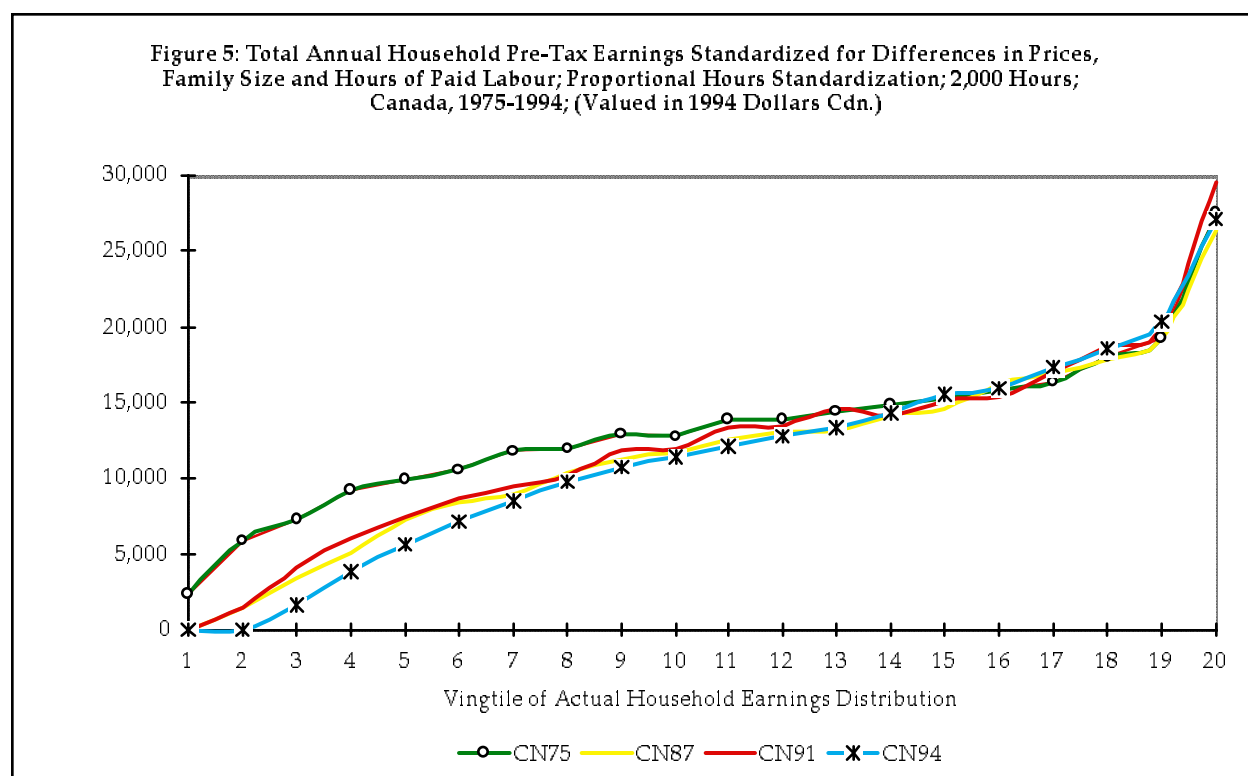
³¹ Two alternative standardization procedures used, (the High Wage procedure and the Wife as a Second Earner procedure) were also used to standardize average annual household hours worked yielded similar results.

³² The husband-wife ratio of hours worked within the household is maintained and is the same as the ratio for actual earnings distributions since the changes in hours worked are proportional for both husbands and wives.

³³ This represents one possible choice of standardized hours, based on a 40 hour week for 50 weeks; any number of other hours may be used as a standardized number of hours.

that the additional hours worked in 1994 over previous years has not resulted in an increase in economic well-being, especially at the bottom of the earnings distribution. Households are supplying increasing hours in order to maintain their standard of living, and if we adjust earnings in terms of these additional hours, valued at the wages households receive for their labour time (assuming a proportionate combination of husband and wife's supply of household





labour), we see that the bottom 65 percent of households are not maintaining the standard of living that the bottom 65 percent of households did in 1975 in Canada.

The results of the second proportional hours standardization procedure are shown in Figure 5 below, (See Appendix Table A-10). As can be seen in Figure 5, the 1975 adjusted earnings lie above the adjusted earnings of 1994 throughout the bottom half of the earnings distribution up to the 15th vingtile (i.e., the bottom 75% of the household earnings distribution) and then lies very close to the adjusted 1994 earnings in the upper region of the distribution. Once earnings are adjusted for the variations in the amount of time spent in the workplace, the earnings distribution of 1994 (or at least in the bottom 75% of the earnings distribution) no longer lies above the earnings of previous years. This would suggest that not only were Canadian families at least as well-off in 1975 as they are today, but in fact they were better off (obtaining a higher standard of living) once we account the differences in time spent working between the earnings distributions. Not only does the hours-adjusted 1975 earnings distribution lie above the 1994 distribution, but also, the distributions of 1991 and 1987 lie above adjusted 1994 earnings throughout the bottom of the distribution (up to the 14th vingtile). In the top half of the earnings distribution all three adjusted earnings distributions are indistinguishable from the adjusted 1994 earnings distribution.

Both types of proportional hours standardizations methods resulted in comparable, if not higher, levels of earnings in the years prior to 1994 as compared to 1994. Once earnings are adjusted for the variations in the amount of time spent in the workplace, the earnings distribution of 1994 no longer lies above that of 1994. This would suggest that not only were Canadian households at least as well-off in 1975 as they are today for the bottom 65% of the earnings distribution, but in fact they were better off (obtaining a higher standard of living) once we account the differences in time spent working between the earnings distributions.

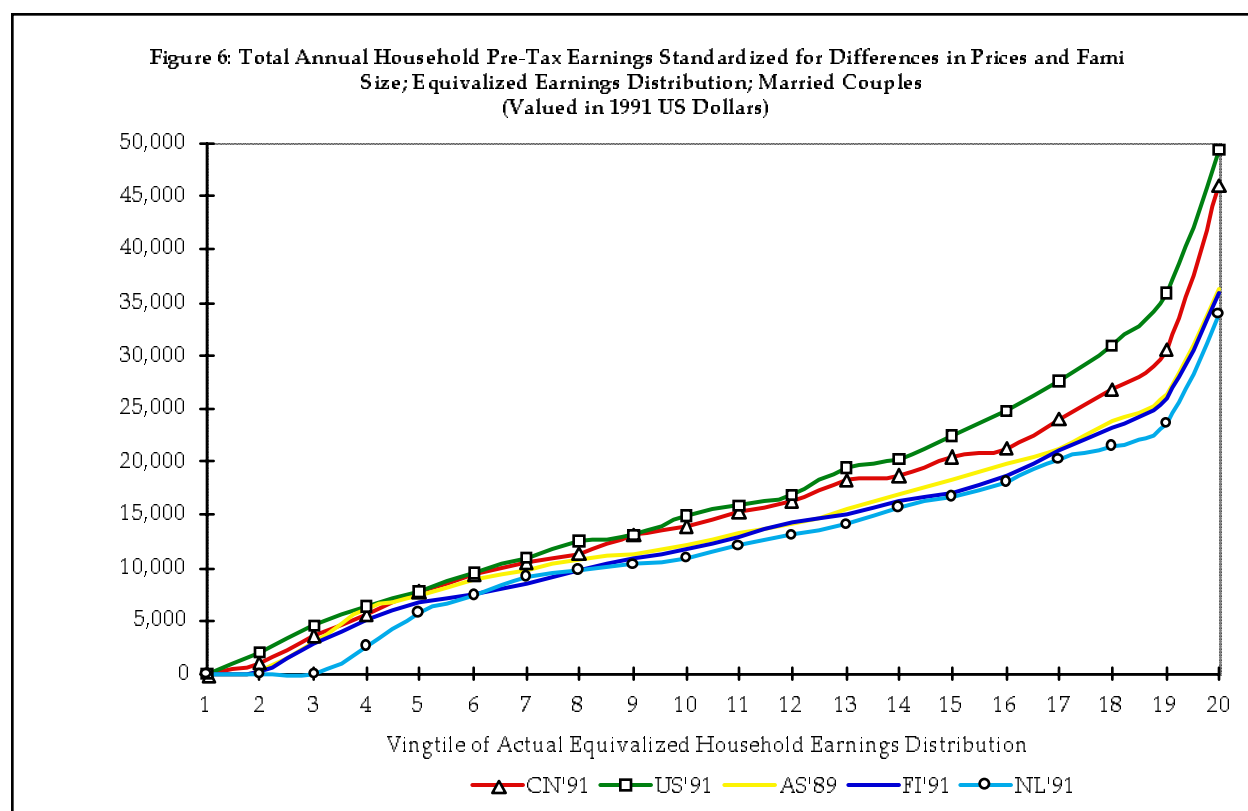
5 Standardizing for Differences in Hours Worked Across Countries

5.1 Cross-Country Comparison of Married Couples' Earnings Adjusted for Differences in Exchange Rates, Purchasing Power and Family Size, 1975-1994

Once household earnings are adjusted for prevailing currency and price differences across countries, real household earnings are further adjusted for differences in family size using the OECD equivalence scale.³⁴ Figure 6 shows the distributions of real household earnings, (valued in 1991 US dollars), standardized for differences in prices, purchasing power and family size for each vingtile of the distribution. (See Appendix Table A-11). As can be seen in Figure 6, average equivalized household earnings in the US are greater than equivalized earnings for all other countries examined throughout most of the distribution. Based on the distribution of real household earnings which has been standardized for differences in both prices and family size, households in the United States could be considered to be better off than households in other countries. However, a comparison of household earnings which have been fully adjusted for purchasing power, may not give a valid ranking of economic well-being if one considers the variation in hours spent in paid labour across the countries examined.³⁵

³⁴ The OECD equivalence scale calculates the equivalent earnings of each household member as: Equivalent Earnings = $E / (1 + .7(A - 1) + .5(C))$, where E represents household earnings, A is the number of adults in the household, and C is the number of children under the age of 18.

³⁵ Referring to earnings which have been fully adjusted for purchasing power includes the conversion of earnings to a common monetary unit, standardizing for differences in prices faced by households across countries, and standardizing for differences in family size across households.



5.2 Standardizing Household Hours Worked: Cross-Country Analysis

Given the variation in household hours worked among the five OECD countries examined, this paper proposes an additional standardization to facilitate cross-country comparisons of household earnings. As in the case of the Canadian analysis, the Proportional Hours standardization procedure uses the actual proportion of male and female (husband and wife) hours to total household hours in each household, to allocate a standard number of hours to the household. The existing share of husband's and wife's hours of paid labour hours are used to apportion the standardized number of hours between them. Standardizing total household hours worked in proportion to the actual hours worked by husbands and wives is done in two separate standardization processes:

- 1) Using a common set of hours worked based on the average number of household hours worked in each vingtile of the household earnings distribution of the United States; and
- 2) Standardizing hours to a common number of hours (2,000 hours per year) based on the proportion of the hours worked by husband and wife to total household hours worked.

The first procedure determines the average total number of household hours worked to be the average number of hours worked in each vingtile of the distribution in the United States in 1991, and then allocates these hours based on the husband and wife's proportion of total household hours. The second procedure assumes 2,000 annual hours would be allocated based on the proportion of average annual hours actually contributed to total household labour supply by husband and wife given in the data for each of the selected countries.

The resulting earnings distributions for each of the standardization procedures represent earnings for comparable households, which have been standardized for differences faced by households in prices, family size, and hours of paid labour across countries. Earnings are presented for each vingtile of the actual earnings distribution and represent the *same composition of families within each vingtile* as in the actual earnings distributions.

The results of the first type of Proportional Hours standardization procedure produces are shown in Figure 7, where hours worked are set equal to the average annual hours worked in the US at each vingtile of the earnings distribution. (See Table A-12). This analysis shows the earnings distributions of Canada, and the Netherlands lie again above the distribution of the US throughout much of the middle portion of the earnings distribution, (from 4th vingtile to the 15th vingtile). The earnings distribution of Finland lies above the US earnings distribution for the bottom 40 percent of households in the distribution. This again suggests that when adjusting household earnings for differences in hours of paid labour in this manner, not only were families at least as well-off in Canada, the Netherlands, Finland and Australia, as they were in the United States, but in fact they were better off.

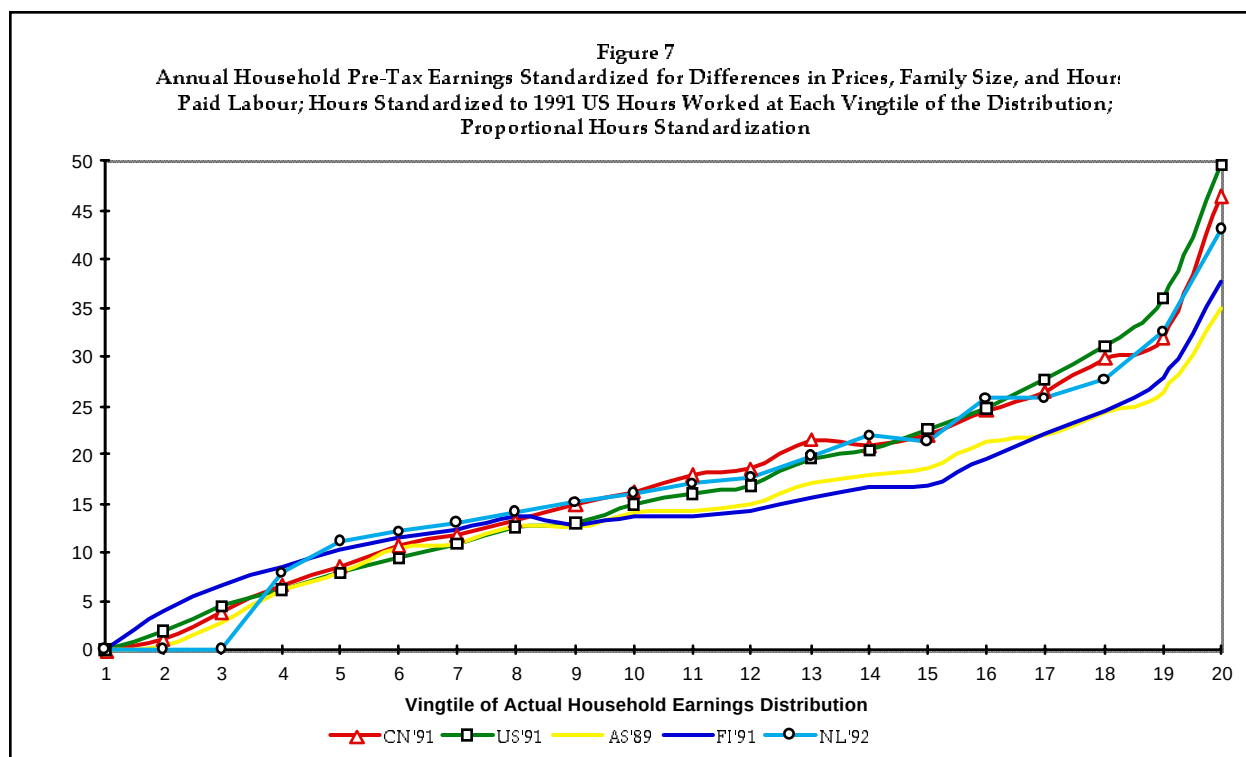
This would suggest that, if couples in countries other than the United States worked the same number of average hours within each vingtile as did households in the United States in 1991, couples in countries such as Canada and the Netherlands would have obtained higher earnings throughout the middle portion of the earnings distribution (households from the 20th vingtile to the 70th vingtile). Also, families in Finland would obtain greater earnings for the bottom 40 percent of the population.

In top of the earnings distribution, however, the top 20 percent of households in the United States are still better off in terms of greater earnings, when comparing across countries, even if households in other countries worked the same number of hours (at each vingtile of the earnings distribution) as did Americans in 1991. Also, in the bottom tail of the distribution, households in the United States show greater earnings than did households in Canada and Australia for the bottom 20 percent of earners. The earnings distribution in Australia lies predominantly below the earnings distribution of the United States except between the 4th vingtile to the 8th vingtile, where Australian earnings are slightly greater than in the United States. The earnings distribution of the Netherlands is pulled down to zero below the 4th vingtile due to the large number of zero earner families in that country.

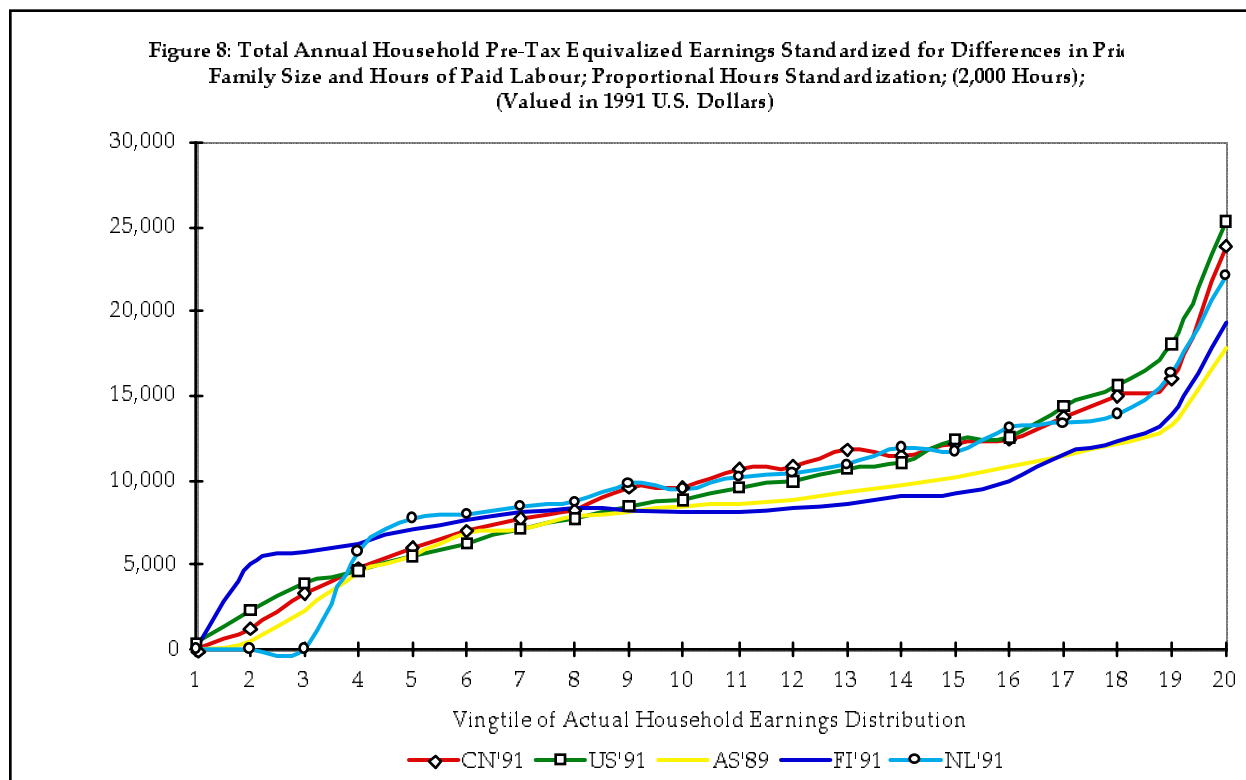
The results of the second type of Proportional Hours Standardization procedure, shown in Figure 8, yields similar results. (See Appendix Table A-13). Once household earnings have been standardized for variations in hours of paid labour, the household earnings distribution of the US no longer lies above the earnings distributions of the four other countries examined throughout much of the earnings distribution. As can be seen in Figure 8, the earnings distributions of Canada, and the Netherlands lie above the distribution of the US throughout much of the middle portion of the earnings distribution, (from 4th vingtile to the 15th vingtile). The earnings distribution of Finland lies above the US earnings distribution for the bottom 40 percent of households in the distribution, when the higher hours worked above of the median of the distribution reduces the standardized earnings distribution back below the US distribution. This would suggest that when adjusting household earnings for differences in hours of paid labour in this manner, not only were families at least as well-off in Canada, the Netherlands, Finland and Australia, (over the portion of the distribution where they lie above

the US earnings distribution), as they were in the United States (for the years of comparison), but in fact they are better off (obtaining a higher standard of living). Comparing households at the top of the earnings distribution, (the highest 15 percent of household earners) across countries, however, households in the US at the top of the distribution still enjoyed higher earnings even when standardized for hours worked. This implies US. couples at the top of the distribution earn a lot of money, given the size of the adjustments for the large number of hours worked.

“Leveling the playing field” across countries, in terms of paid labour time, to facilitate comparisons of household earnings, results in a different ranking of the level of household earnings than that which results from standardizing household earnings for differences in prices and family size only. The earnings distribution of the United States no longer lies above the households earnings distribution of other countries throughout most of the earnings distribution. This result implies that the additional hours worked in United States, (over the hours worked in other countries), does not result in increased economic well-being, as measured by household earnings, when we take account of the value of these hours of paid labour, especially in the middle and lower portions of the earnings distribution. If we adjust household earnings for differences in hours worked, valued at the wages households receive for their labour time (assuming a proportionate combination of husband and wife supply of household labour), we see that the middle and lower portions of the household earnings distribution (from the 4th to the 14th vingtile) in the United States are not achieving higher earnings than comparable households in countries where the average annual household hours worked is much lower (i.e., Finland and the Netherlands). Both types of proportional hours standardization methods resulted in comparable, and higher, levels of earnings in the countries such as Canada, Finland and the Netherlands on the middle and lower portion of the household earnings distribution.



here U.S 1991 hours



here 2,000 hours

6. Conclusion

6.1 Discussion of Results: Canada

While the results in this study are preliminary, they do raise concern about the use of standard monetary measures as comparisons of economic well-being over time periods, without taking into account changes in couples' time devoted to earnings.

In the case of the Canadian analysis, the results of adjusting earnings for trends in time spent working, indicate that levels of economic well-being may not have increased for Canadian families as much as implied by earnings alone. For a vast majority of Canadians, (the bottom 65 percent of the earnings distribution), not only are they no better off than they were twenty years earlier, they are, in fact, worse off, when we take account of the significant increase in household hours spent earning income.

Once hours worked are standardized, the variation in earnings arises solely from wages. This raises some concern that the distribution of wages has not kept pace with standards of living in the bottom half of the earnings distribution. While it is recognized that during the 1980's in Canada, transfer payments (social security, unemployment insurance benefits) played a significant role in alleviating income inequality in Canada (see. Osberg, Erksøy and Phipps, 1994), wage distributions (undistorted by the transfer payments), are often examined in order to understand earnings (from market sources) inequality. The work done in Canada by Juhn, Murphy and Topel (1991) and Kuhn and Robb (1996) indicate that structural changes have caused shifts in the distribution of wages, inducing greater hours worked in order to maintain a standard of living.³⁶

In the case of the cross-country analysis, several issues should be highlighted. First, the cross-country comparison of real pre-tax earnings adjusted for only differences in currency, prices and family size found married couples in the US to be the most affluent among the countries examined, (in terms of pre-tax labour earnings for married couples), throughout the earnings distribution.³⁷ While this result may not seem to be a significant finding of this analysis, it is consistent with the findings of Gottschalk and Joyce, (1995), in comparing the level of male earnings across countries.

Second, the preceding analysis resulted in the finding that in the bottom and middle portions of the earnings distribution, the difference in affluence could be partially attributed to differences in hours worked. This analysis attempted to determine to what extent cross country differences in the level of earnings for married couples is due to differences in hours worked. The relative ranking of economic well-being of married couples households across countries depends on

³⁶ See also Xu (1996), who used generalized Lorenz (GL) dominance criteria to rank wage distributions over time in Canada using data from the Canadian Labour Market Activity Survey (LMAS) during the period 1986-1990. This analysis showed the wage distributions have improved from 1986 to 1987, in the sense of GL dominance (wage distribution in 1987 shows a higher level and smaller inequality). However, the study showed a similar change did not occur in the period after 1987.

³⁷ Except at the 9th vingtile, where earnings distribution of Canadian married couples is slightly higher than that of the US.

where families lie in the household earnings distribution. These results suggest the “working poor” are worse off in the US and married couples at the top of the U.S. earnings distribution still enjoyed higher earnings even when we consider the value of the time spent to acquire their earnings. This implies that even if high earner couples in Canada, Australia, Finland or the Netherlands worked as much as the high earnings counterparts in the US, they still would not match their earnings.³⁸

Third, the use of substantially different procedures to value a common number of hours, all yield the same result: that smoothing out the “playing field” across countries, in terms of paid labour time, to facilitate comparisons of household earnings, results in a much different ranking of relative affluence among married couples than that which results when using earnings adjusted for differences in prices and family size only.³⁹ In each procedure used, the earnings distribution of the United States no longer lies above the households earnings distribution of other countries throughout the earnings distribution.

Fourth, there are potential distributional impacts associated with wives spending more time working outside the home since the loss in the value of household production associated with greater female force participation has possible gender implications. Time use studies have shown that women, on average, contribute to a larger share of total household production than men, not only in Canada, but in other countries as well.⁴⁰ Whether or not women carry the brunt of the burden of diminished time available to take care of home and child care responsibilities depends on how couples “package” their supply of labour for both work inside and outside the home in response to the emergence of the dual-earner family, as experienced in countries such as Canada, the United States and Finland.⁴¹ More specifically, the results of this study, indicating that the “working poor” were the worst off among the countries examined in the US, (once earnings are adjusted for the variance in time spent working), places the “working poor women” in the US in the worse position of all.

The fifth point which deserves mention concerns putting the above results into the context of prevailing differences in social institutions and policies across countries. Market forces go a long way in explaining the diversity of experiences across countries, but institutions also matter. Cross country comparison of earnings does not allow for a comparison of full consumption potential or the full command over goods and services of families. Hence, the relationship between labour market earnings and “full” family income is less clear due to

³⁸ This is, of course, assuming couples’ labour supply would be similar to that assumed in the procedures used to standardize hours worked.

³⁹ Two other procedures (High Wage Standardization procedure, where the higher wage earner between husband and wife supplies total standardized hours and the Wife as a Second Earner Standardization procedure, where the wife acts as a supplementary earner) were used in previous work and both yielded similar results.

⁴⁰ For Canada, see the General Social Survey on Time Use, Statistics Canada, 1992. For the results of time use surveys for a selected number of other countries, see “The Measurement of Non-Market Production, OECD Survey Reports, OECD, 1992. See also Phipps (1996), p. 92. Other evidence on gender differences in the use of time across countries which suggest women contribute to a larger share of household responsibilities can be found (Daly, (1996), Witt and Goodale (1981), and Presser (1989)).

⁴¹ Husbands and wives may equally share the household work, or perhaps some household work doesn’t get done or is contracted out to a third party, or perhaps women put in a “double-work” day and feel the time crunch.

differences in political and social institutions across countries. Among the five countries examined in this study, large differences in social policies and programs play a substantial role in the economic well-being associated with household earnings.⁴² Low earner families in the countries such as Canada and the United States face very different income transfer schemes and social policies than is the case for low earnings families in a country such as Finland.

In short, the monetary carrot on the end of the stick which Canadian couples are spending an increasing amount of time chasing, is shrinking if we value our time spent chasing it.

⁴² See Phipps (1996) for a comparative cross country review of social policy in five countries, including Finland and Canada. Also, S.B. Kamerman, (1980). The comparative section on social policy is taken from Phipps, 1996. Also, Maureen Baker, (1995).

Figure A-1
Percentage Distribution of Husband-Wife Families by Earning Status of Spouse:
1967-1995



Table A-1
Total Household Annual Hours Worked; Actual Earnings Distribution

Vingtile	CN75	CN87	CN91	CN94
1	542	0	0	0
2	1,333	1,496	1,480	807
3	1,800	2,401	2,161	2,137
4	1,842	2,515	2,325	2,401
5	2,091	2,534	2,549	2,521
6	2,153	2,672	2,665	2,739
7	2,171	2,791	2,734	2,812
8	2,333	2,672	2,751	2,842
9	2,291	2,819	2,744	2,858
10	2,500	2,779	2,894	3,044
11	2,470	2,950	2,855	3,156
12	2,635	2,912	2,997	3,243
13	2,659	3,177	3,121	3,323
14	2,780	3,079	3,272	3,371
15	2,876	3,244	3,349	3,457
16	2,962	3,291	3,431	3,506
17	3,071	3,385	3,499	3,611
18	3,037	3,568	3,581	3,755
19	3,142	3,799	3,825	3,923
20	3,097	3,802	3,864	4,027

Table A-2			
Differences in Annual Hours Worked Among Advanced OECD Countries, 1994			
Country	Annual hours Per Employee, 1994	Employment Population Ratio (Ages 15-64)	Annual Hours Per Adult (Ages 15-64)
<i>United States</i>	1,780	73.2	1,303
<i>Australia</i>	1,882	67	1,261
<i>Canada</i>	1,719	63.8	1,097
<i>Netherlands</i>	1,395	63.7	889
<i>Finland</i>	1,780	60.1	1,070
 United Kingdom	 1,717	 66.5	 1,142
New Zealand	1,843	68.2	1,257
Norway	1,415	72.7	1,029
Germany	1,578	62.6	988
France	1,631	59	962
Sweden	1,631	70.3	962
Japan	1,965	74.2	1,458
(1992)			

Source: Column 1, OECD Employment Outlook July 1995, Table C.
Column 2, OECD Employment Outlook July 1995, Table A.

Table A-3 Total Household Annual Hours Worked; Actual Earnings Distribution					
Vingtile	CN'91	US'91	AS'89	FI'91	NL'91
1	0.00	78.68	0.00	0.00	0.00
2	1,479.69	1,602.38	705.31	63.32	0.00
3	2,160.63	2,294.71	2,552.20	966.79	0.00
4	2,324.94	2,672.82	2,631.72	1,647.08	883.91
5	2,549.23	2,846.12	2,643.49	1,885.54	1,990.86
6	2,664.99	3,036.10	2,572.96	1,976.76	2,072.28
7	2,733.56	3,039.30	2,698.40	2,087.02	2,129.21
8	2,750.76	3,230.23	2,704.13	2,316.23	2,224.65
9	2,744.27	3,100.93	2,817.48	2,619.48	2,114.15
10	2,893.51	3,340.82	2,877.55	2,894.45	2,306.48
11	2,855.15	3,348.44	3,128.86	3,194.54	2,385.64
12	2,996.72	3,391.18	3,188.91	3,429.38	2,499.86
13	3,121.01	3,644.13	3,312.27	3,515.64	2,583.79
14	3,271.59	3,654.35	3,481.50	3,599.76	2,617.62
15	3,348.50	3,621.10	3,563.35	3,678.59	2,863.29
16	3,430.93	3,927.74	3,668.37	3,715.73	2,746.17
17	3,499.30	3,844.15	3,733.78	3,646.70	3,021.96
18	3,580.73	3,963.28	3,894.31	3,777.17	3,080.20
19	3,825.37	3,986.24	3,999.60	3,728.82	2,894.08
20	3,863.92	3,898.68	4,055.13	3,726.91	3,070.40
Average	2,804.74	3,126.07	2,911.47	2,623.50	2,074.23

Table A-4
Sample Selection Criteria, LIS Data, Canada; For Selected Years

	Canada '75		Canada '87		Canada '91		Canada '94	
Total Sample:	26,247		10,351		21,566		32,653	
Single Family Households	26,247	100.00%	8,830	85.31%	18,402	85.33%	27,239	83.42%
Households in Multi-Family HH.	0	0.00%	475	4.59%	999	4.63%	3,403	10.42%
Families in Multi-Family HH.	0	0.00%	1,046	10.11%	999	4.63%	843	2.58%
Other Family Classification	0	0.00%	0	0.00%	1,166	5.41%	1,123	3.44%
Missing	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	26,247	100.00%	10,351	100.00%	21,566	100.00%	32,653	100.00%
Check hours = 1	26,200	99.82%	9,312	89.96%	18,837	87.35%	17,367	53.19%
Check hours = 0	47	0.18%	403	3.89%	790	3.66%	675	2.07%
Missing Values	0	0.00%	636	6.14%	1,939	8.99%	14,611	44.75%
Total	26,247	100.00%	10,351	100.00%	21,566	100.00%	32,653	100.00%
Head Aged 21 to 65	21,336	81.29%	8,605	83.13%	17,634	81.77%	26,459	81.03%
Head Not Aged 21 to 66	4,911	18.71%	1,746	16.87%	3,932	18.23%	6,194	18.97%
Missing Values	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	26,247	100.00%	10,351	100.00%	21,566	100.00%	32,653	100.00%
Disposable Income ≥ Zero	26,210	99.86%	10,315	99.65%	21,480	99.60%	32,565	99.73%
Disposable Income Less Than Zero	37	0.14%	36	0.35%	86	0.40%	88	0.27%
Missing	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	26,247	100.00%	10,351	100.00%	21,566	100.00%	32,653	100.00%
Spouse Present	16,816	64.07%	6,104	58.97%	12,052	55.88%	19,089	58.46%
Spouse Not Present	9,431	35.93%	4,247	41.03%	9,514	44.12%	13,564	41.54%
Missing Value	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	26,247	100.00%	10,351	100.00%	21,566	100.00%	32,653	100.00%
Male Household Head	20,632	78.61%	7,895	76.27%	16,068	74.50%	24,844	76.09%
Female Household Head	5,615	21.39%	2,455	23.72%	5,498	25.50%	7,809	23.91%
Missing	0	0.00%	1	0.01%	0	0.00%	0	0.00%
Total	26,247	100.00%	10,351	100.00%	21,566	100.00%	32,653	100.00%
Zero Earnings; HH Head			3,203	30.94%	11,269	52.25%	11,992	36.73%
Positive Earnings; HH			7,148	69.06%	10,297	47.75%	20,661	63.27%
Negative Earnings; HH			0	0.00%	0	0.00%	0	0.00%
Missing			0	0.00%	0	0.00%	0	0.00%
Total			10,351	100.00%	21,566	100.00%	32,653	100.00%
Zero Earnings; Spouse			6,692	64.65%	13,991	64.87%	7,533	23.07%
Positive Earnings; Spouse			3,658	35.34%	7,575	35.13%	11,556	35.39%
Negative Earnings; Spouse			0	0.00%	0	0.00%	0	0.00%
Missing			1	0.01%	0	0.00%	13,564	41.54%
Total			10,351	100.00%	21,566	100.00%	32,653	100.00%

*Note: Earnings in 1975 data file are not split into earnings of head and spouse; earnings are total earnings of household. This data file contained negative household earnings, (9.03% of the sample files contained negative total earnings).

Table A-5			
Sources of Data; LIS Country Data Files			
Country	Original Data Set	Survey Year	Observation Year
Australia	Income and Housing Survey	1990	1989
Canada	Survey of Consumer finances	1992	1991
Netherlands	Survey of Income and Program Users	1992	1991
United States	March Current Population Survey	1992	1991
Finland	Income and Expenditure Survey	1992	1991

Source: de Tombeur, Caroline et al. (1993), "Luxembourg Income Study (LIS): Information Guide", LIS CEPS Working Paper No. 7.

Table A-6
Cross comparison of Weighted Sample Affected by Sample Selection Criteria

	Australia		US		Canada		NL		Finland	
	1989	Percentage	1991	Percentage	1991	Percentage	1991	Percentage	1991	Percentage
Total Sample:	16,244		15,910		21,566		4,326		11,740	
Single Family Households	12,359	76.1%	13,979	87.9%	18,402	85.3%	4,326	100.0%	11,740	100.0%
Households in Multi-Family HH.	803	4.9%	605	3.8%	999	4.6%	0	0.0%	0	0.0%
Families in Multi-Family HH.	1,776	10.9%	1,326	8.3%	999	4.6%	0	0.0%	0	0.0%
Other Family Classification	0	0.0%	0	0.0%	1,166	5.4%	0	0.0%	0	0.0%
Missing	1,306	8.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%
Hours $\square$ zero and Earnings $\square$ zero	13,166	81.1%	15,234	95.7%	18,837	87.3%	2,724	63.0%	10,678	91.0%
Not Hours $\square$ 0 and Earnings $\square$ 0	951	5.9%	675	4.2%	790	3.7%	1,602	37.0%	4	0.0%
Missing Values	2,126	13.1%	1	0.0%	1,939	9.0%	0	0.0%	1,058	9.0%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%
Head Aged 21 to 65	11,731	72.2%	12,587	79.1%	17,634	81.8%	3,396	78.5%	9,352	79.7%
Head Not Aged 21 to 66	3,205	19.7%	3,323	20.9%	3,932	18.2%	930	21.5%	2,388	20.3%
Missing Values	1,308	8.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%
Disposable Income > Zero	14,859	91.5%	15,781	99.2%	21,480	99.6%	4,277	98.9%	11,735	100.0%
Disposable Income < Zero	79	0.5%	128	0.8%	86	0.4%	49	1.1%	5	0.0%
Missing	1,306	8.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%
Spouse Present	8,823	54.3%	8,616	54.2%	12,052	55.9%	2,732	63.2%	6,378	54.3%
Spouse Not Present	6,113	37.6%	7,290	45.8%	9,514	44.1%	1,594	36.8%	5,362	45.7%
Missing Value	1,308	8.1%	5	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%
Male Household Head	11,345	69.8%	11,363	71.4%	16,068	74.5%	3,304	76.4%	8,267	70.4%
Female Household Head	3,591	22.1%	4,547	28.6%	5,498	25.5%	1,022	23.6%	3,473	29.6%
Missing	1,308	8.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%
Zero Earnings; Household Head	7,745	47.7%	6,460	40.6%	11,269	52.3%	2,205	51.0%	5,837	49.7%
Positive Earnings; Household Head	8,499	52.3%	9,450	59.4%	10,297	47.7%	2,121	49.0%	5,903	50.3%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%
Zero Earnings; Spouse	10,445	64.3%	10,759	67.6%	13,991	64.9%	1,449	33.5%	6,992	59.6%
Positive Earnings; Spouse	5,799	35.7%	5,150	32.4%	7,575	35.1%	2,868	66.3%	4,748	40.4%
Missing Values	0	0.0%	0	0.0%	0	0.0%	9	0.2%	0	0.0%
Total	16,244	100.0%	15,910	100.0%	21,566	100.0%	4,326	100.0%	11,740	100.0%

Table A-7

Reported and Computed Variables Used in the
Distribution of Annual Earnings and Average Hours Worked

Variable ID	Reported/Computed	Variable Description
V39	Reported	Gross annual pre-tax earnings, household head.
V41	Reported	Gross annual pre-tax earnings, spouse
Hrshd	Reported	Average number of hours worked per week, household head
Hrssp	Reported	Average number of hours worked per week, spouse
Weekhdft	Reported	Total number of weeks worked full-time per year, household head
Weekhdpt	Reported	Total number of weeks worked part-time per year, Household head
Weekspft	Reported	Total number of weeks worked full-time per year, spouse
Weeksppt	Reported	Total number of weeks worked part-time per year, spouse
Wktothd	Computed	Total number of weeks worked (ft + pt) per year, household head
Wktotsp	Computed	Total number of weeks worked (ft + pt) per year, spouse
Hrstothe	Computed	Total number of hours worked per year, (Wktothd X Hrstothe), HH head
Hrstotsp	Computed	Total number of hours worked per year, (Wktotsp X Hrstothe), Spouse

Table A-8 Annual Household Pre-Tax Earnings Standardized For Prices and Family Size; Actual Earnings Distribution; Canada 1975-1994; (Valued in 1994 Dollars)				
Vingtile	CN75	CN87	CN91	CN94
1	2,150	0	0	0
2	5,340	31	138	6
3	7,482	1,764	2,233	1,825
4	9,284	3,959	4,591	4,640
5	10,744	6,035	6,926	7,179
6	11,875	8,444	9,116	9,774
7	13,177	10,768	11,108	11,980
8	14,615	12,111	12,902	13,789
9	15,127	13,465	14,028	15,429
10	16,204	15,687	16,317	17,328
11	17,500	16,270	17,432	19,140
12	18,441	18,457	19,323	20,669
13	19,572	19,364	20,619	22,252
14	20,629	20,795	23,106	24,098
15	22,234	22,641	24,001	26,870
16	23,566	24,960	25,712	27,963
17	25,128	27,846	28,666	31,189
18	27,391	30,006	32,480	34,754
19	30,475	36,125	38,230	39,919
20	42,390	49,359	58,521	54,566

Table A-9 Annual Household Earnings Standardized For Differences in Prices, Family size, and Hours of Paid Labour; Hours Worked Standardized to 1975 Hours Worked in Each Vintile of the Earnings Distribution Proportional Hours Standardization; Canada; 1975-1994, (Valued in 1994 Dollars)				
Vintile	CN75	CN87	CN91	CN94
1	616	0	0	0
2	3,915	1,008	1,012	809
3	6,608	3,125	3,671	3,303
4	8,507	4,732	5,563	5,407
5	10,344	7,645	7,801	8,133
6	11,364	9,028	9,313	9,440
7	12,806	9,738	10,376	10,639
8	13,929	12,075	11,937	12,671
9	14,867	12,886	13,606	13,846
10	16,003	14,661	15,003	15,362
11	17,087	15,514	16,448	15,861
12	18,330	17,270	17,795	17,665
13	19,248	17,519	19,426	18,744
14	20,616	19,645	19,779	21,307
15	21,949	21,060	21,729	22,422
16	23,435	24,031	22,869	24,759
17	25,042	25,968	26,178	27,123
18	27,420	27,142	28,341	29,087
19	30,262	30,196	31,225	32,678
20	42,571	40,851	45,872	42,627

Table A-10 Annual Household Earnings Standardized for Differences in Prices, Family Size and and Hours of Paid Labour; Proportional Hours Standardization; (2,000 Hours) Canada 1975-1994 (Valued in 1994 Dollars)				
Vingtile	CN75	CN87	CN91	CN94
1	2,273	0	0	0
2	5,874	1,512	1,519	14
3	7,341	3,471	4,078	1,708
4	9,235	5,137	6,039	3,865
5	9,893	7,311	7,461	5,695
6	10,558	8,387	8,652	7,138
7	11,800	8,973	9,560	8,522
8	11,943	10,353	10,236	9,702
9	12,978	11,249	11,878	10,796
10	12,802	11,728	12,002	11,386
11	13,838	12,564	13,320	12,130
12	13,913	13,108	13,506	12,746
13	14,476	13,176	14,611	13,394
14	14,832	14,133	14,229	14,298
15	15,263	14,644	15,110	15,545
16	15,825	16,227	15,442	15,951
17	16,310	16,913	17,050	17,276
18	18,057	17,875	18,664	18,510
19	19,261	19,220	19,874	20,350
20	27,489	26,379	29,621	27,103

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
niveaux de vie*

Paying Taxes and Using Health Care Services: The Distributional Consequences of Tax Financed Universal Health Insurance in a Canadian Province

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(4) Population Health Program
Canadian Institute for Advanced Research

(5) Institute for Work & Health

Session 6B: Trends in Inequality in Canada

October 31 8:30 AM - 11:00 AM

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Paper presented to the Conference on the State of Living Standards and the Quality of
Life in Canada, October 30-31, 1998, Ottawa, Canada

Funding for this research was provided in part by grants 6607-1730-302 and 6607-1697-
302 from the National Health Research and Development Program, Health Canada.

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Word Count
October 19, 1998: 3,354

Abstract

Limited information is available on the distribution effects of the financing mechanism of the Canadian health care system, where revenues derived from tax sources are allocated to the provision of health care to those with medical needs. The progressivity profile of the various tax sources which are used to finance publicly insured health care services are well described in Canada. What is less well understood is the very significant inequality in the incidence of health care benefits in relation to income, with use of health care services generally varying inversely with household income. The combination of a tax system with overall progressivity and a 'pro-poor' incidence of health care benefits results in potentially large redistributive impact of tax-financed universal health insurance programs in this country.

This paper provides a detailed empirical estimate of the redistributive consequences of the finance and delivery of health care services by public programs in the province of Manitoba at two points in time: 1986 and 1994. The methodology applied in this work has two principal components: 1) the estimation of the incidence of taxes paid by economic families and 2) the estimation of health care resources consumed by economic families. The estimation of economic family taxation incidence was based on information contained in Statistics Canada's Social Policy Simulation Database and Model, which simulates household demographic characteristics, labour force participation, income sources and taxation payments for a representative sample of Canadian households. Four sources of household tax liability were estimated: federal and provincial income taxes and federal and provincial consumption taxes. From this database economic family income

(combining market income and transfer income) and tax incidence were estimated for 1986 and 1994. The use of publicly insured physician services, acute care hospital services and institutional long term care services were estimated from a stratified random 5% sample of Manitoba households for which micro-level 1986 census records have been linked to computerized records of individual health care encounters maintained by the Manitoba Health Services Insurance Plan for fiscal year 1986/87. This sample provides detailed information on the use of health sources by economic family income. For each time period, the incidence of taxation and the incidence of health care benefits (valued in dollars) were calculated for ten equal sized population groups, ranked from lowest to highest economic family income. Observed use of health care resources by income decile in 1986 was projected to the 1994 population.

In 1986, total earned income by Manitoba households was estimated to be \$11.739 billion. These households paid \$1.961 billion in federal income and consumption taxes and \$1,463 billion in provincial income and consumption taxes and used an estimated \$1.269 billion in publicly insured health care services. In 1994, total earned income by Manitoba households was estimated to be \$15.354 billion. These households paid \$2.750 billion in federal income and consumption taxes and \$1.997 billion in provincial income and consumption taxes and used an estimated \$1.756 billion in publicly insured health care services.

In 1986, the ratio of market income earned by the top decile to the ratio earned by the bottom decile (90:10) was 12.3:1. The ratio of the top to bottom decile on total income,

which includes transfer income, was 4.54:1. The top decile to bottom decile ratio for consumable income, defined as total income less income taxes, consumption taxes and payroll taxes, was 3.49:1. After incorporating the dollar value of non-cash health benefits, this ratio was reduced to 2.82:1. The results for 1994 were similar.

The Gini coefficients for the 1986 period for market income, total income and consumable income were, respectively, 0.3361, 0.2523 and 0.2152. After incorporating the value of non-cash health benefits received by each income decile, the estimated Gini coefficient was 0.1978. The respective Gini coefficients in 1994 for market income, total income, consumable income and consumable income plus non-cash health benefits were 0.3428, 0.2502, 0.2139 and 0.1980.

This study documents a progressive redistributive effect on household economic well-being in the incidence of non-cash health care benefits financed by taxation sources in a Canadian province. In describing this redistribution, the study has not specifically described the magnitude of intergenerational transfer from tax-paying labour force participants to elderly economic families with a high incidence of health care use. However, this intergenerational transfer is understood to be substantial. The results of this work also suggest that the combined incidence of taxation and health care benefits had similar redistributive effects in 1986 and 1994.

INTRODUCTION

Limited information is available on the distribution effects of the financing mechanism of the Canadian health care system, where revenues derived from tax sources are allocated to the provision of health care for those in medical need. In part, the relative absence of information on the distribution effects of public health insurance is due to the complexity involved in resolving both macro and micro level allocation issues in the incidence of taxation (1-3). However, a second obstacle has been the absence of household-level data which combine comprehensive and longitudinal information on the use of insured health care services with detailed information on household structure and income sources.

While the goals of the publicly-financed health insurance system in Canada are not explicit (4), some commentators have suggested that they can be represented by two objectives: the reduction of risk and the transfer of wealth (5-6). Risk reduction is the traditional function of insurance, where the pooled contributions from all persons at risk of an adverse event indemnify the minority of the pool who experience the adverse event. The wealth transfer objective is not an inherent principle of private insurance markets; instead it is a social policy welfare principle, where public programs are financed by proportional or progressive taxation. In fulfilling this welfare principle, publicly financed health insurance redistributes resources, in the form of non-cash health benefits, from higher income households to lower income households. This paper focuses on estimating the magnitude of this redistribution.

The Public Finance of Health Care

While provincial governments are the principal payers of health care in Canada, it is ultimately individuals and families that pay the large majority of health care costs, through three mechanisms: out-of-pocket expenditures, insurance premiums, or federal and provincial taxes. In Manitoba, there are no insurance premiums and the sources of tax revenue relevant to this study derive from two flows: personal and corporate income taxes, and sales and excise taxes levied on consumption. Income and consumption taxes have different distribution consequences (7). Income taxation policy in Canada is marginally progressive, while consumption taxes are generally viewed as regressive (8). In the study of expenditure incidence, the distribution effects at a given income level will reflect the relative role of income and consumption taxes in the net tax paid by the household.

Estimating the true incidence of taxation on household economies is a complex and uncertain procedure (7-9). While the incidence of personal income taxation is relatively transparent, accounting for the household incidence of consumption taxes such as sales taxes, fuel taxes and excise taxes on alcohol and tobacco is approximate. In addition, controversies surround a number of tax allocation issues concerning the distinction between the individual legally responsible for paying taxes and the individual who actually bears the tax burden. For example, competing perspectives argue that the burden of corporate income tax is borne by the owners of capital, and conversely, that this tax is

actually shifted to consumers through higher prices and to workers in the form of lower wages (4,7,10). Finally, as has been recently shown by Gillespie and colleagues, estimates of tax incidence and the distribution of taxes across income classes is very sensitive to the specific definition of household income (8).

The conceptual framework of tax incidence analysis is well established, and involves: 1) a definition of household income sources, 2) the identification of specific government tax revenue sources, 3) a set of explicit assumptions concerning the shifting of taxes, and 4) the explicit approach to adjusting household income or taxation estimates such that tax incidence estimates at the household level aggregate to equal total government revenues from taxation (8). Three general approaches to measuring household economic well-being have emerged in the public finance literature: pre-fisc income, broad income and post-fisc income (11). Pre-fisc income includes earnings from employment and investment of capital, while excluding sources of income received from government transfers. Broad income is pre-fisc income, plus government transfers. Post-fisc income adds to broad income an estimate of resources received by households in the form of government goods and services, imputed as in-kind non-money income (8).

The income distribution structure in Canada has remained relatively unchanged in the post-World War II period, with the poorest 20% of households receiving approximately 4% of total income (after accounting for government transfers) and the wealthiest 20% of

households receiving 40% of total income (12,28-29,30). Over this same period, the share of GNP devoted to social, education and health expenditures by governments has increased dramatically, from 6.5% in 1951 to 18.4% in 1981 (12). Based on work completed in the early years of Medicare, most researchers have concluded that the incidence of benefits associated with these program expenditures have produced a very slight reduction in income inequality (13-15). For example, Morreale has estimated that the introduction of medicare in Quebec resulted in a reduction in the percentage of household income spend on health care in the lowest income group from 3.7% before medicare to 2.7% following the program's introduction (15).

STUDY OBJECTIVE

The objective of this study, based on data describing the use of health care services and household income for a sample of Manitoba households in FY86/87 was to estimate the net transfer effects of the public health care insurance program across income deciles, calculated from estimates of the incidence of household tax payments and the use of publicly insured health care services. The study has used a unique research resource created through the collaboration of Statistics Canada, the Government of Manitoba and the Manitoba Centre for Health Policy and Evaluation, University of Manitoba. In brief outline, the study is a cross-sectional analysis of a stratified random 5% sample of Manitoba households, grouped into deciles on the basis of income. The analysis estimates the incidence of household tax payments and the dollar value of household use of

publicly insured health care services. Information on household income and structure was derived from the 1986 census. Health care was enumerated directly from computerized records of individual health care encounters maintained by the Manitoba Health Services Insurance (MHSIP) Plan for the period April 1, 1986 to March 31, 1987.

The benefit incidence analysis in this study focuses exclusively on publicly insured health care services, which is defined to include forms of publicly financed health care expenditures, such as hospital capital programs, health care research or the training of health care personnel which may conceptually be deemed expenditures to improve access to services, rather than the consumption of services (16). The study will not attempt to estimate direct private expenditures on health care services. While estimated to represent approximately 25-28% of total health expenditures in Canada during the study period (17), estimating direct expenditures across income deciles requires household survey data not available to this study.

METHODS

Study Design

This study is a cross-sectional analysis of a stratified random sample of Manitoba households estimating the use of publicly insured hospital and medical services by income decile. The analysis is comprehensive for all disorders presenting for insured medical and hospital care.

Sources of Data

The study is based on a database which has linked electronic records of the use of insured hospital services, institutional long term care and medical services with 1986 census records at the individual level, for a stratified random sample of 16,627 Manitoba households which completed the 2B census questionnaire in 1986. Records describing use of services include physician claims for reimbursement of ambulatory and inpatient care, laboratory tests and diagnostic imaging exams in private facilities, and hospital separation abstracts for inpatient and outpatient services in acute care hospitals in the province. For each person represented in the sample, records of health care utilization have been linked to the complete 1986 census record of information reported on the 2A and 2B census forms, which includes data on sources and amounts of income, attained education, occupation and labour force participation for all residents of private dwellings over the age of fifteen.

Sample

The sample unit in this study is the census economic family which includes residents of private dwellings, non-institutional collective dwellings and institutions. The methodology and results of the record linkage process are described in detail elsewhere (18-19,27). In summary, all individuals in the 82,728 Manitoba households which completed the 2B questionnaire were eligible for linkage to a file containing person-level demographic information for all known registrants with MHSIP in June 1986.

Deterministic and probabilistic record linkage procedures were performed by Statistics Canada personnel. No actual names or dwelling addresses were used in the linkage. A total of 74% of individual records in the census sample were successfully linked to an identity in the MHSIP insurance registry with 95.5% accuracy. From the pool of linked records, a stratified sample of 16,627 households was drawn (N=47,935 individuals), representing an approximate 5% sample of the Manitoba population.

Measures

Health Care Expenditures: In this study, the consumption of insured health care is measured in dollars. The public administration of insured physician services includes the detailed accounting of payment of fees, and this financial information is included in the computerized records of medical service claims. Estimating the cost of an episode of hospital care, however, has historically been a challenge in the Canadian system, where hospital care is funded globally on an institutional basis, rather than on the basis of direct payment for each service encounter (20).

Physician Services: All fee-for-service physician services used by individuals in the sample were enumerated for this study. At the time of this study, approximately 3.0% of total physician services were provided by salaried physicians in provincial mental health institutions, community based clinics and some hospital emergency and radiology departments. Diagnostic and laboratory services provided by fee-for-service private

facilities are included in the enumeration of insured medical services.

Hospital Care: Accurate cost information for individual hospital admissions is generally unavailable in Canada, a legacy of the administrative practice of globally funding institutional budgets. Because the cost of hospital care attributable to differing illness and severity profiles may differ across income deciles in ways that are not captured by the use of crude hospital per diems, this study applied an adaptation of the RDRG case costing methodology which accounts for the severity or complexity of illness (21). In outline, this method groups hospital admissions into clinically meaningful categories, called diagnosis-related groups (DRGs) on the basis of diagnoses, procedures and similarity of length of stay and resource use. Each DRG is assigned a case weight, which reflects the costliness of care relative to the mean hospital admission.

Despite shortcomings, this approach remains the most appropriate method available for accounting for the costs of inpatient hospital care on a case basis. In this application, hospital charge information from the regulated hospital system in the state of Maryland in 1992 has been used (21). The US hospital charge data are used only to establish the relative cost of care: for example, to quantify the relative cost difference between a gastrointestinal surgical procedure and an open heart procedure. While there is some evidence the Canadian hospital system is more efficient than American hospitals in the use of technology (22), we know of no work which has demonstrated that the relative

distribution of health care resources across RDRG groups differs substantially between the two countries, and it is on this basis that we use the US hospital charge data for the purposes of this study.

This method is applicable only to the assignment of the cost of inpatient services. No satisfactory methodology currently exists for costing the diverse range of outpatient services provided by Canadian hospitals, which are estimated to represent approximately 21% of total hospital expenditures in Manitoba in this period (21,23). These services range from high cost procedures such as dialysis and diagnostic imaging, to lower cost programs in antenatal care and outpatient mental health care services. The estimated \$128 million of outpatient resource use has been allocated to income deciles proportionate to observed inpatient use, as has approximately \$69 million of services provided in facilities which are not defined as acute care hospitals and \$99.9 million in other costs associated with education and research programs, interest and depreciation charges and non-patient costs (21).

Household Income: A measure of total economic family income was derived from census responses provided by each household member over the age of 15. In this study, there are 17,210 economic family units described in this study, which group kinship-related individuals occupying a common private dwelling. Total family monetary income was calculated to include gross wages and salaries from employment, net income from

self-employment, pension income and government transfers which includes family allowances, unemployment insurance, child tax credits, workers compensation payments and other disability benefits. This definition is equivalent to Gillespie's broad income concept (8).

Families were grouped into income deciles, ranked from the poorest 10% to the wealthiest 10% of families, with approximately 5,000 individual observations per decile. The census does not collect income information for residents of institutional facilities. Individuals resident in institutions on census day have been retained in the analysis of health care utilization, but have not been classified to an income decile.

Household Tax Incidence: The methodology for estimating household tax incidence used in this study has been described in detail elsewhere (8), and has been used to apply a set of tax rates to a representative sample of household profiles in Statistics Canada's Social Policy Simulation Database and Model (24). In this model, the consolidated tax rate (combining income and consumption taxes) is approximately proportional over the income distribution, ranging from 30% of poorest households to 33-35% for highest income households. The SPSDM was also the source of information for three measures of economic family income: market income, representing earnings from labour market participation and interest income, total income, which combines labour market income

with cash transfers from government and consumable income, which is defined as total income less all income and consumption taxes.

RESULTS

Figure 1 portrays the distribution of total public and private health care expenditures (\$1.889.5 billion) in Manitoba in 1986 by sector. The public share of expenditures ranged from 100% of physician services to less than 15% of expenditures on non-physician health professionals. In 1986, the public share of total expenditures was 75.4%, declining to 72.2% by 1994 (17).

The distribution of health care resource use by economic family income decile in 1986 is reported in Figure 2, adjusted for age and sex. This figure reports the distribution of directly observed resource use in the hospital and medical services sectors (\$590.5 million, 64.2% of total public expenditures in these two sectors). As noted previously in the description of the study methods, the distribution profile of directly observed health care use has been used to allocate total public expenditures, with the exception of approximately \$205 million in institutional long term care services, which have been allocated directly to the institutionalized population.

Figure 2 documents the pro-poor profile of health care resource use in Canada, a response

to socioeconomic inequalities in the distribution of health and disease (30). As has been observed in many Canadian studies, the patterns of hospital use and physician service use in relation to household income are not concordant. In this setting, per capita consumption of physician services are not differential by economic family income decile.

The incidence of taxation and the incidence of non-cash health care benefits across income deciles in 1986 is reported in Table 1a. In 1986, total earned income by Manitoba households was estimated to be \$11.739 billion. These households paid \$1.961 billion in federal income and consumption taxes and \$1,463 billion in provincial income and consumption taxes and used an estimated \$1.269 billion in publicly insured health care services. For the purposes of this study, we have assumed that the financing of these publicly funded services is fully borne by household taxation sources. In 1986, the federal share of publicly funded health care expenditures in Manitoba was 39.7%. Household taxation by federal and provincial sources has been allocated to health care financing on this basis (see Column A, Table 1a, Total tax contribution to health).

In 1986, 42.4% and 6.4% of public health expenditures were contributed by tax revenues received, respectively, from the top and bottom income quintiles (Income deciles 9-10 vs Income deciles 1-2). The use of health care services was distributed inversely to this pattern: 11.7% and 24.6% of health care service expenditures were received, respectively by the top and bottom income quintiles.

Table 2a reports income distribution characteristics for the Manitoba population in 1986 using three measures of economic family income: market income, representing earnings from labour market participation and interest income, total income, which combines labour market and interest income with cash transfers from government, and consumable income, which is defined as total income less all income and consumption taxes. In addition, the table reports a fourth measure of economic family income, which is the estimated distribution of economic resources when consumable income is combined with the dollar value of non-cash health benefits.

In 1986, the ratio of market income earned by the top decile to the ratio earned by the bottom decile (90:10) was 12.3:1. The ratio of the top to bottom decile on total income, which includes transfer income, was 4.54:1. The top decile to bottom decile ratio for consumable income, defined as total income less income taxes, consumption taxes and payroll taxes, was 3.49:1. After incorporating the dollar value of non-cash health benefits, this ratio was reduced to 2.82:1.

The Gini coefficients for the 1986 period for market income, total income and consumable income were, respectively, 0.3361, 0.2523 and 0.2152. After incorporating the value of non-cash health benefits received by each income decile, the estimated Gini coefficient was 0.1978.

The distribution profile of tax incidence and the incidence of health care benefits in 1994 is reported in Tables 1b and 2b. The results are broadly similar to the findings for 1986.

DISCUSSION

This study documents a progressive redistributive effect on household economic well-being in the incidence of non-cash health care benefits financed by taxation sources in a Canadian province. The results of this work also suggest that the combined incidence of taxation and health care benefits had similar redistributive effects in 1986 and 1994.

The magnitude of the redistributive effect is significant and the results of this study are consistent with those provided by an earlier Canadian study which used different methods for estimating household use of health care services (29). In estimating this redistributive effect, we have chosen to provide a series of comparisons with alternate measure of household income, prior to and following the incidence of taxes and transfers. It is of some importance to note that a comparison between a purely private health care finance mechanism, in which everyone pays his or her own costs, and a system financed on the basis of taxation, would produce even stronger redistributive consequences.

In describing this redistribution, the study has not specifically described the magnitude of intergenerational transfer from tax-paying labour force participants to elderly economic

families with a high incidence of health care use (This work is in progress). However, this intergenerational transfer is understood to be substantial. This study has examined the distribution effects of the publicly-financed insurance mechanism on a cross-sectional rather than a life course basis. While cross-sectional analyses can be used to produce a simulation of life course benefit incidence using an approach similar to the estimation of a total fertility rate in demographic studies, the validity of this methodology is critically dependent on an assumption of constant age-specific health care utilization over time. Empirical evidence suggests this assumption is untenable in the case of health care services (25-26).

This description of the incidence of benefits under the insurance mechanism of the Canadian health care system is relevant for a number of reasons. First, the majority of previous studies of benefit incidence in Canada date from the first decade of universally insured services. In the following two decades, health expenditures have climbed from 7.1% of GNP in 1975 to a current share of 10.1% in 1993, from an estimated 5% of GNP in 1960. As the health share of GNP has increased, the distribution of benefits across income groups may have changed. Second, the current public policy debate concerning the scale and structure of the publicly financed health care sector will potentially benefit from explicit information on income-related patterns of the consumption of health care. For example, the proposition that user fees may be an appropriate mechanism for the partial financing of health care services persists without a clear understanding of the existing income distribution in the consumption of health services.

In summary, strong income-related differences in hospital utilization, previously described in earlier Canadian studies, persist after 25 years of universal health insurance in this setting. Given that the system is financed by tax revenues which are, on balance, marginally progressive, non-cash health care benefits represent a substantial income redistribution mechanism in this setting.

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Figure 1
Public Expenditure by Health Care Sector,
Manitoba 1986
Public Share of Total Expenditures: 74.6%

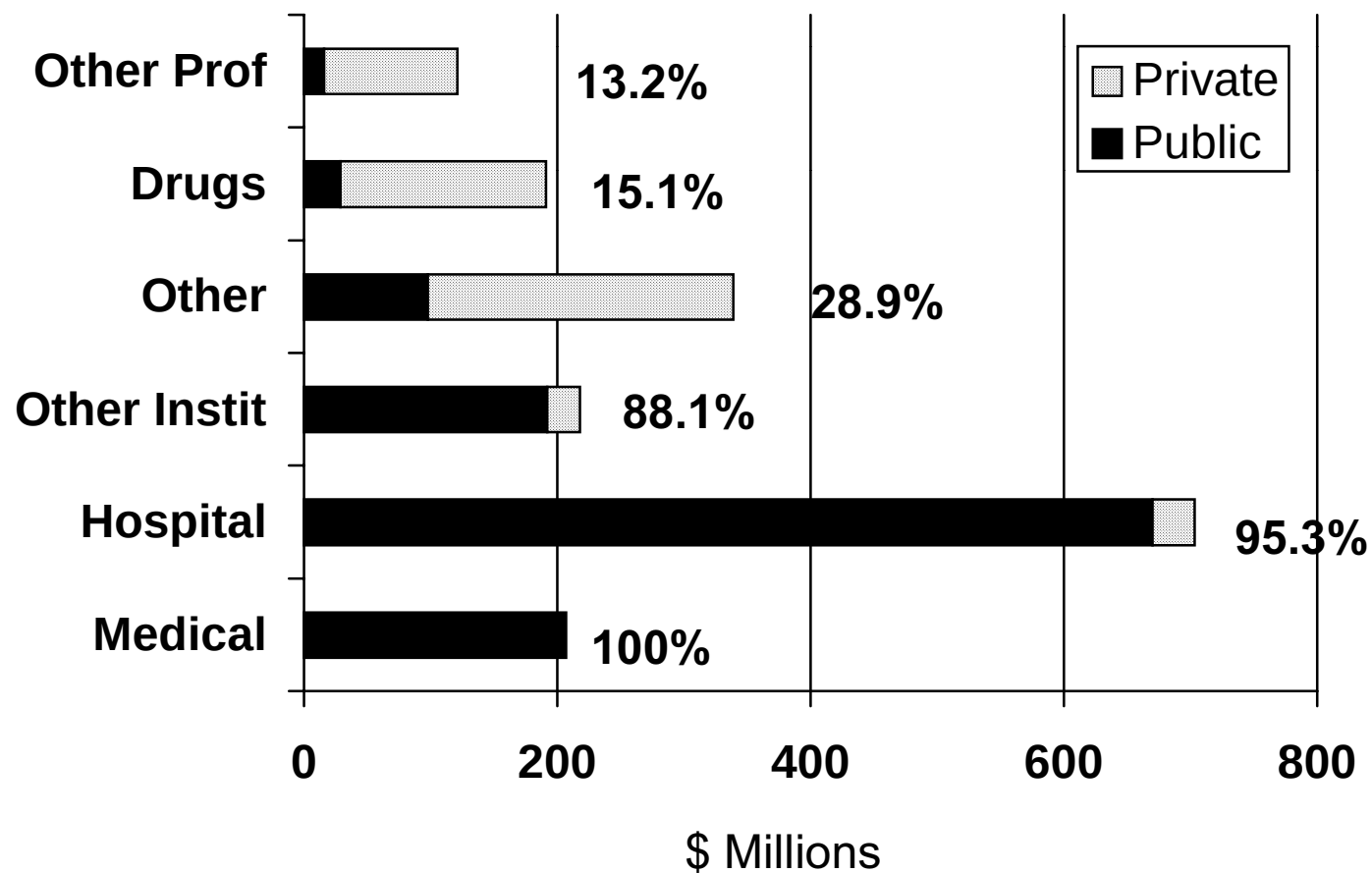


Figure 2
Use of Health Care Resources
By Income Decile, Age and Sex Adjusted
Manitoba 1986

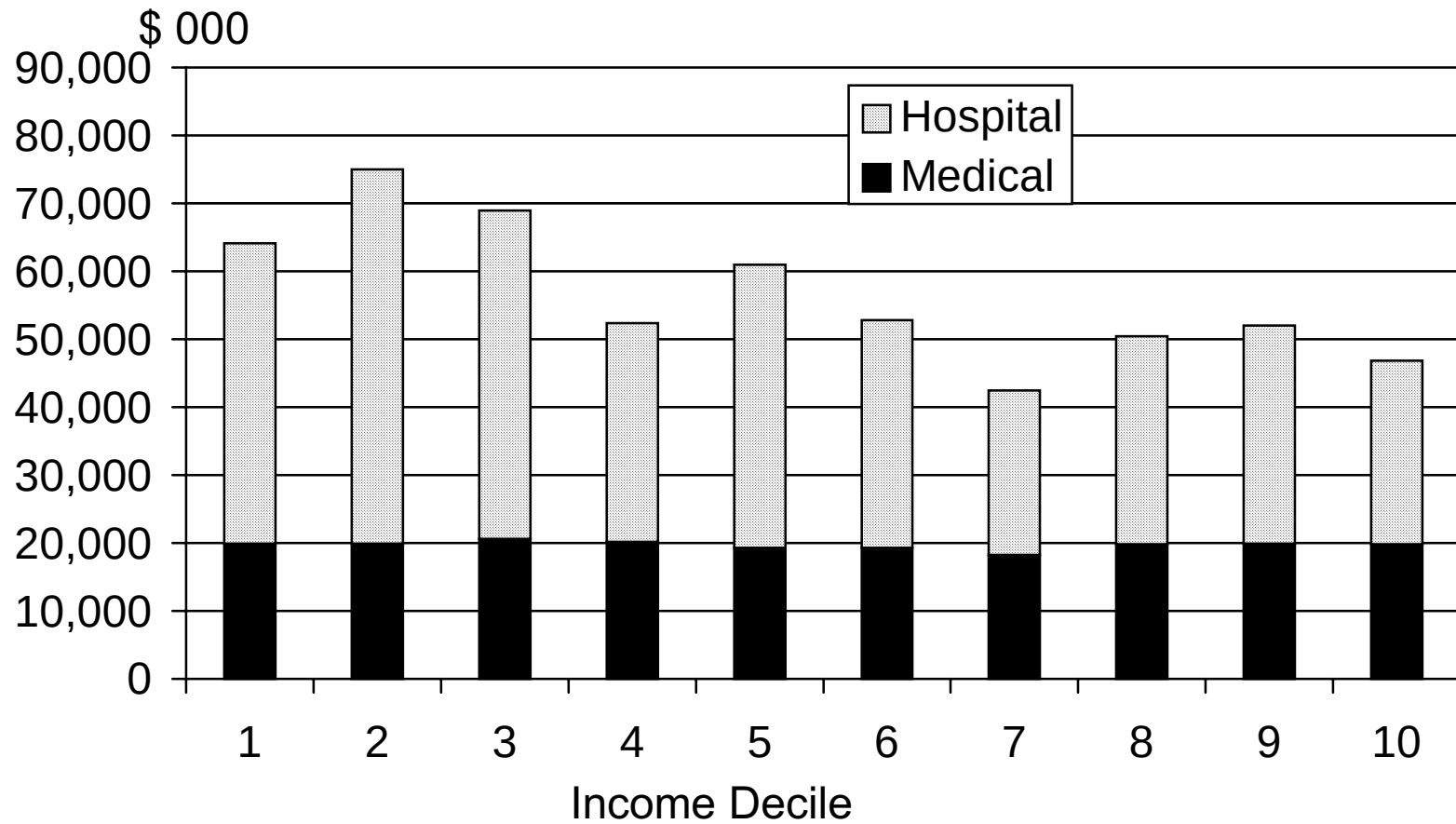


Figure 3

Incidence of Taxation and Incidence of Health Care Benefits, By
Economic Family Income Decile,
Manitoba 1994

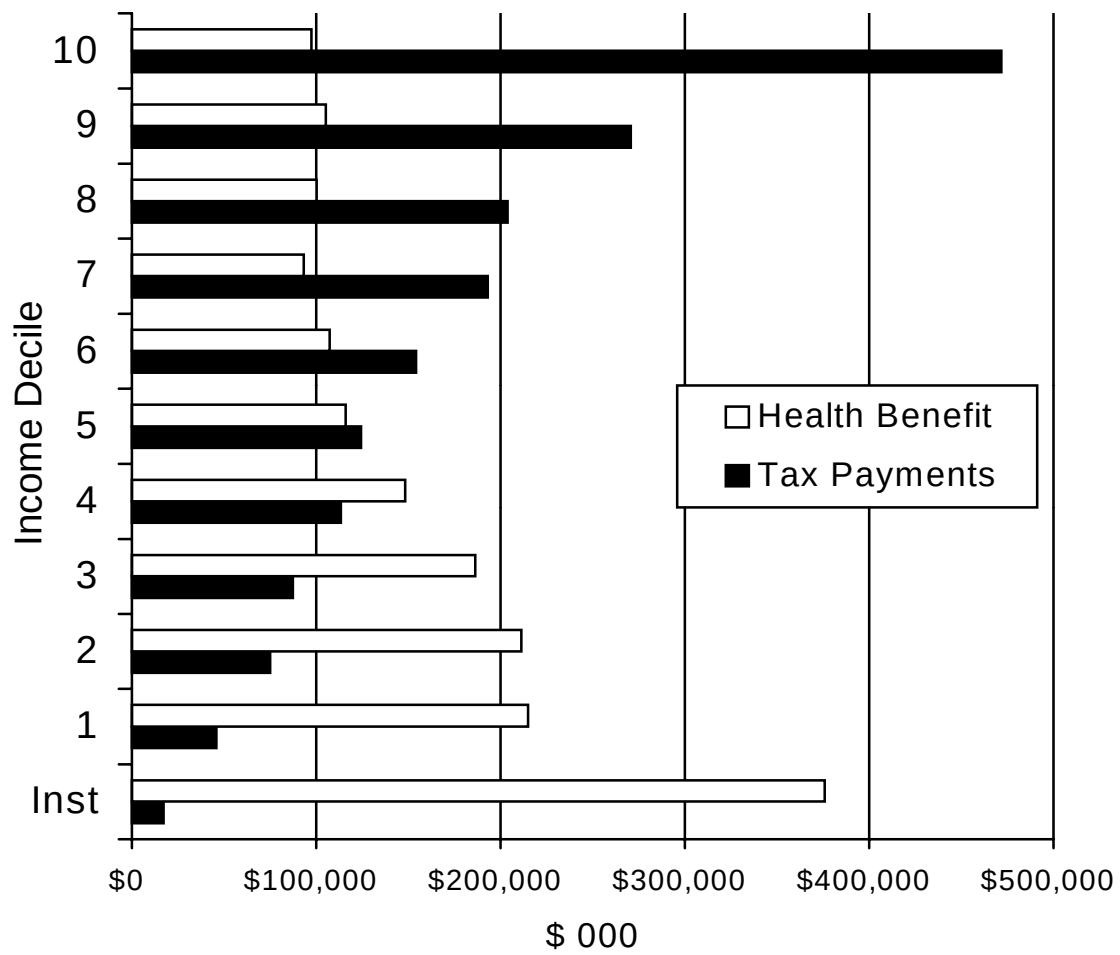


Figure 4
Net Benefit as a % of Household Income
By Economic Family Income Decile,
Manitoba 1994

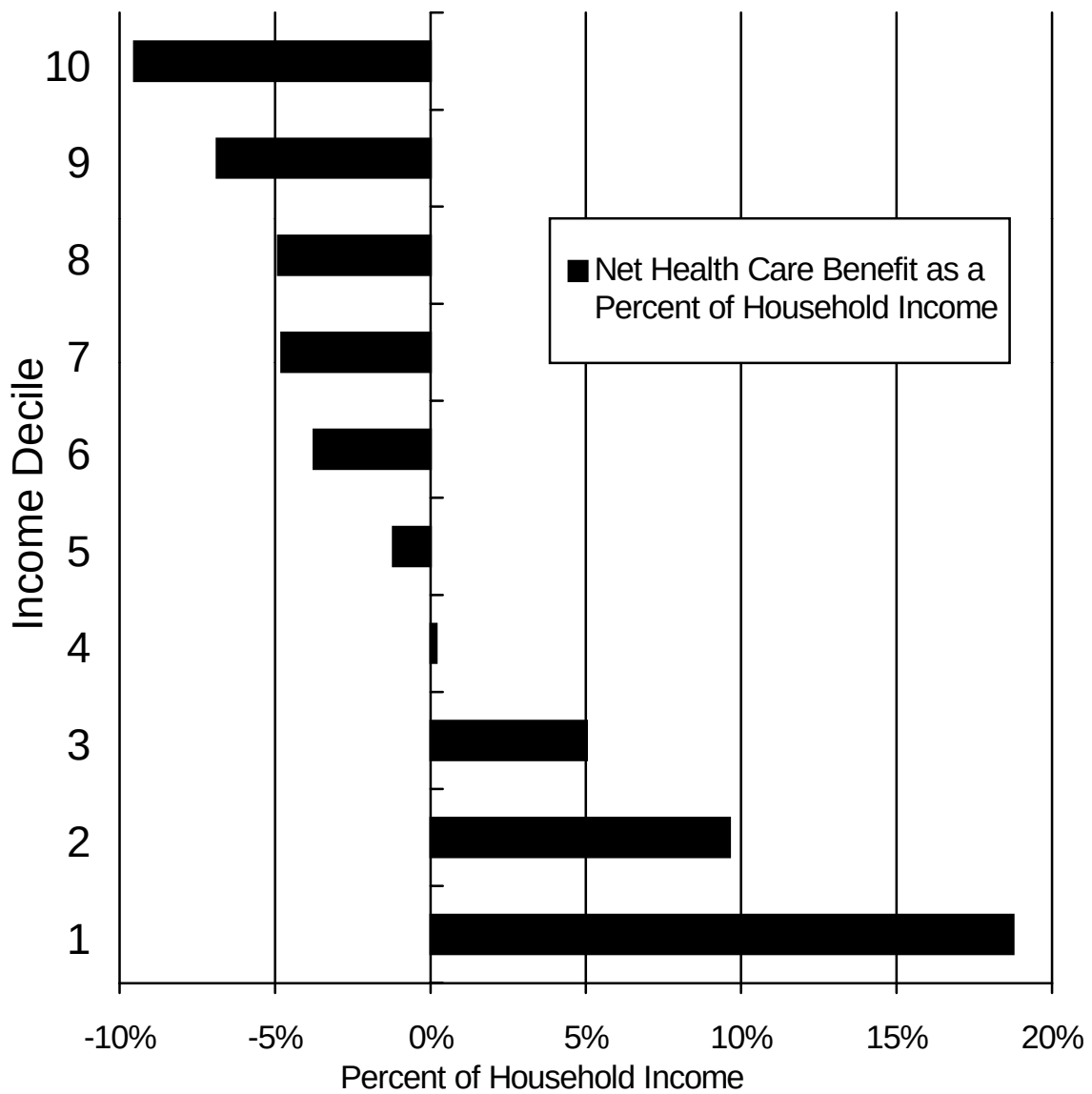


Table 1a
Incidence of Taxation and Incidence of Non-Cash Health Benefits, By Economic Family Income Decile
1986

Income Decile	Number of Economic Families	Number of Persons	Taxes		A		B	
			Total Tax (2)	Total Tax as a Percent of Total Income	Total Tax Contribution to Health (5)	Share of Total	Estimated Total Insured Health Care Use (Including Nursing Homes)	Share of Total
			\$ 000		\$ 000		\$ 000	
Institutional Population	12,943	12,943	18,366.1	11.54	7,112.9	0.56	255,200.7	20.1
Household Population								
1: \$0-\$12,900	78,618	102,247	89,467.3	13.55	33,476.0	2.64	158,025.3	12.4
2: \$12,900-\$17,800	48,619	101,876	133,799.5	17.74	47,839.0	3.77	155,285.7	12.2
3: \$17,800-\$23,600	47,067	101,983	213,354.7	22.21	72,890.2	5.74	136,887.9	10.8
4: \$23,600-\$29,200	39,920	102,150	256,725.5	24.36	86,388.4	6.80	109,003.8	8.6
5: \$29,200-\$34,000	33,164	102,128	272,608.1	26.09	90,803.1	7.15	85,208.6	6.7
6: \$34,000-\$40,100	33,361	101,532	340,949.4	27.61	115,022.6	9.06	78,807.7	6.2
7: \$40,100-\$47,500	32,189	102,311	392,223.0	27.89	130,587.9	10.29	68,560.3	5.4
8: \$47,500-\$55,200	29,098	101,630	440,485.5	29.60	146,871.6	11.57	73,677.4	5.8
9: \$55,200-\$70,500	30,269	102,090	560,975.4	29.88	188,000.9	14.81	77,374.3	6.1
10: \$70,500 +	29,298	102,169	1,012,714.7	33.71	350,607.4	27.62	71,567.9	5.6
Total	414,546	1,033,059	3,731,669.2	27.35	1,269,600.0	100.00	1,269,599.6	100.0

(2) Total taxes include federal income and consumption taxes and Manitoba income and consumption taxes

(5) In this model, household tax contributions are assumed to finance 100% of health care expenditures

Table 1b
Incidence of Taxation and Incidence of Non-Cash Health Benefits, By Economic Family Income Decile
1994

Income Decile	Number of Economic Families	Number of Persons	Taxes		A		B	
			Total Tax (2)	Total Tax as a Percent of Total Income	Total Tax Contribution to Health (5)	Share of Total	Estimated Total Insured Health Care Use (Including Nursing Homes)	Share of Total
			\$ 000		\$ 000		\$ 000	
Institutional Population	18,677	18,677	46,318.9	14.43	17,158.1	0.98	375,892.4	21.4
Household Population								
1: \$0-\$15,600	81,093	105,838	125,694.1	14.25	45,867.3	2.61	215,089.7	12.2
2: \$15,600-\$23,300	57,861	105,582	221,318.3	19.17	75,099.2	4.28	211,360.7	12.0
3: \$23,300-\$29,800	45,950	105,797	265,223.4	21.89	87,393.8	4.98	186,319.4	10.6
4: \$29,800-\$36,200	41,887	105,753	348,918.7	25.23	113,322.4	6.45	148,366.1	8.4
5: \$36,200-\$42,300	36,090	105,468	387,967.5	27.46	124,325.3	7.08	115,978.1	6.6
6: \$42,300-\$50,100	35,240	105,902	475,880.9	29.39	154,149.3	8.78	107,265.8	6.1
7: \$50,100-\$58,800	35,807	106,036	595,291.3	30.70	193,178.0	11.00	93,318.0	5.3
8: \$58,800-\$68,100	31,753	105,715	627,820.3	31.22	203,804.8	11.60	100,282.9	5.7
9: \$68,100-\$86,200	33,071	105,215	824,559.2	32.70	270,588.2	15.40	105,314.8	6.0
10: \$86,200+	31,741	105,767	1,394,509.1	35.59	471,713.6	26.85	97,411.7	5.5
Total	449,170	1,075,750	5,313,502.0	28.92	1,756,600.0	100.00	1,756,599.7	100.0

(2) Total taxes include federal income and consumption taxes and Manitoba income and consumption taxes

(5) In this model, household tax contributions are assumed to finance 100% of health care expenditures

Table 2a
Redistributive Effects of Non-Cash Health Care Benefits
Manitoba 1986 (includes Long term Care resources)

Income Decile	Share of Market Income	Share of Total Income	Share of Consumable Income	Share of Consumable Income Plus Health Benefit
Institutional Population	0.53	1.17	1.42	3.54
Household Population				
1: \$0-\$12,900	2.03	4.84	5.76	6.52
2: \$12,900-\$17,800	3.37	5.53	6.26	6.94
3: \$17,800-\$23,600	6.21	7.04	7.54	7.91
4: \$23,600-\$29,200	7.46	7.72	8.04	8.10
5: \$29,200-\$34,000	7.79	7.66	7.79	7.67
6: \$34,000-\$40,100	9.35	9.05	9.02	8.70
7: \$40,100-\$47,500	11.07	10.31	10.23	9.68
8: \$47,500-\$55,200	12.03	10.91	10.57	10.03
9: \$55,200-\$70,500	15.16	13.76	13.28	12.47
10: \$70,500 +	25.00	22.02	20.09	18.45
Total	100.00	100.00	100.00	100.00
Ratio 90:10	12.30	4.54	3.49	2.82
Gini	0.3361	0.2523	0.2152	0.1978

Table 2b
Redistributive Effects of Non-Cash Health Care Benefits
Manitoba 1994 (includes Long term Care resources)

Income Decile	Share of Market Income	Share of Total Income	Share of Consumable Income	Share of Consumable Income Plus Health Benefit
Institutional Population	0.75	1.75	2.12	4.36
Household Population				
1: \$0-\$15,600	1.90	4.80	5.70	6.46
2: \$15,600-\$23,300	4.04	6.28	7.10	7.67
3: \$23,300-\$29,800	5.32	6.59	7.04	7.46
4: \$29,800-\$36,200	7.06	7.53	7.82	7.89
5: \$36,200-\$42,300	7.79	7.69	7.80	7.66
6: \$42,300-\$50,100	9.24	8.81	8.76	8.45
7: \$50,100-\$58,800	11.51	10.56	10.45	9.86
8: \$58,800-\$68,100	12.09	10.94	10.58	10.01
9: \$68,100-\$86,200	15.41	13.72	13.22	12.38
10: \$86,200+	24.90	21.32	19.41	17.80
Total	100.00	100.00	100.00	100.00
Ratio 90:10	13.08	4.44	3.40	2.76
Gini Coefficient	0.3428	0.2502	0.2139	0.198

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



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What Makes a Good Job? Evidence From OECD Countries

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Session 7: Well-being and Quality of Working Life
October 31 11:15 AM - 12:45 PM

WHAT MAKES A GOOD JOB? EVIDENCE FROM OECD COUNTRIES

**Report Prepared for Working Party 7 of the OECD
(Employment and Unemployment Statistics)**

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Revised Version

January 1998

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WHAT MAKES A GOOD JOB? EVIDENCE FROM OECD COUNTRIES

Andrew E. Clark

1. Introduction

Consideration of the worker's lot has until recently been concentrated on his/her remuneration. A recent literature, driven in part by the observed disparity between North American and European hours of work, has introduced an additional emphasis on the length of the working week; a related strand has looked at involuntary part-time work. The current report uses comparable survey data across nine different OECD countries to extend the above to a number of other job characteristics which workers say they value.

This report examines the distribution of "good jobs" and "bad jobs", not as defined by an outside observer but as experienced and reported by workers themselves. A (partial) taxonomy of six components of a good job, as viewed by workers, is presented: pay; hours of work (both overwork and underwork); future prospects (promotion and job security); how hard or difficult the job is; job content (interest, prestige and independence); and interpersonal relationships. These are all argued to be important correlates of a good job, from the worker's point of view, or of job satisfaction.

Job satisfaction is important in its own right as a part of social welfare, and this (simple) taxonomy allows a start to be made on such questions as "In what respects are older workers' jobs better than those of younger workers?" (and vice-versa), "Who has the good jobs?" and "Are good jobs being replaced by bad jobs?". In addition, measures of job quality seem to be useful predictors of future labour market behaviour. Workers' decisions about whether to work or not, what kind of job to accept or stay in, and how hard to work are all likely to depend in part upon the worker's subjective evaluation of their work, in other words on their job satisfaction.

A small body of research in economics and psychology has considered these questions by relating satisfaction scores to subsequent observable labour market behaviour. Perhaps the most obvious expected correlation is with quits: workers who are dissatisfied should be more likely to quit (if satisfaction can be compared between individuals). Freeman (1978) uses American panel data to show that job satisfaction is a significant predictor of quits, with an effect which is, in two

of the three datasets examined, at least as powerful as that of wages. Similar results using American data are found in Akerlof, Rose and Yellen (1988) and McEvoy and Cascio (1985), and by Clark, Georgellis and Sanfey (1998) using ten waves of German panel data. Other research has found that job satisfaction is negatively correlated with absenteeism (Clegg, 1983) and non-productive and counter-productive work (Mangione and Quinn, 1975)¹. Last, Clark (1997) concludes that potential job satisfaction may help to explain the decision to work itself: dissatisfying and/or unpleasant jobs discourage labour force participation. An implication is that we only observe a sub-sample of potential workers - there are some who don't find the jobs on offer attractive enough to participate. One can argue that this phenomenon will be more important for women than for men, and for older rather than for middle-aged individuals. It may also be relevant for younger age-groups where some can choose to stay on in school.

This report suggests that there are more aspects of a good or satisfying job than just pay and hours. Concentration on only one or two of these aspects is likely to give a misleading picture both of where the good jobs are² and of workers' behaviour.

2. What makes a good job?

Analysis of the labour market typically emphasises pay and hours of work. For example, studies of differences in labour market outcomes between different groups (males and females; blacks and whites) focus almost exclusively on wages, with a subsidiary interest in hours of work. However, it seems likely that many different aspects of a job, in addition to wages and hours of work, are valuable to workers.

Some supporting evidence for this view comes from the 1989 International Social Survey Programme (ISSP) dataset. The ISSP is a continuing program of cross-national collaboration carried out by a group of national research institutes. Each year the ISSP surveys focus on a different area. The most useful for the analysis of the different components of job quality is that of 1989 on "Work Orientation", in which workers provide information on a wide range of job attributes. The 1989 survey contains information on nine OECD countries³. Restricting the sample to those aged between 16 and 65 years old, the numbers of workers interviewed in each country is as follows:

Number of workers interviewed in OECD countries: 1989 International Social Survey Programme (ISSP) dataset.

Austria	864
Hungary	596
Ireland	467
Italy	576
Netherlands	691
Norway	1175
United Kingdom	1051
USA	846
West Germany	636
Total	6902

Workers in the 1989 ISSP were asked to evaluate nine different aspects of a job, using five rankings from "Not at all important" to "Very Important". The job aspects presented were: High income; Leaves a lot of leisure time; Flexible working hours; Good opportunities for advancement; Job security; Interesting job; Allows to work independently; Allows to help other people; and Useful to society. Table 1 shows the percentage of workers across all countries who ranked the aspect in question as "Very Important". As for most of the data presented here, figures are presented separately for men and women, for three age-groups (16 to 29, 30 to 44, and 45 to 65), and for the USA, Hungary, and Western Europe (the latter being the weighted average of the seven Western European countries above)⁴. The *'s to the right of the figures for women indicate whether there is a significant difference in the percentage saying a job aspect is very important between men and women. Similarly, the *'s to the right of the figures for 16-29 year olds indicate whether there is a significant difference in the percentage saying a job aspect is very important across the three age groups. Last, the *'s to the right of the figures for Western Europe indicate whether there is a significant difference in the percentage saying a job aspect is very important between Western Europe, Hungary and the United States.

Table 1 shows that, with the exception of Hungary, pay is ranked as one of the least important aspects of a job. In addition, the two job aspects pertaining to hours of work (flexible hours and leaves a lot of leisure time) are the lowest-rated of the nine characteristics considered. The highest-ranked aspects (across all countries) are job security and job interest, then promotion opportunities and the ability to work independently. There is remarkable consistency between

men and women and across age groups with respect to what is important in a job⁵. There is some evidence that American workers are more interested in promotion opportunities than are Western Europeans, and less interested in job security and leisure time.

Based partly on the job aspects listed in Table 1, and partly on standard categories of job quality used in Management and Work Psychology (see Warr, 1998, for example), the six following broad groups of job attributes have been identified:

- Pay.
- Hours of work.
- Future Prospects.
- How hard or difficult the job is.
- Job content: interest, prestige and independence.
- Interpersonal relationships.

These categories are not exhaustive, but serve to summarise many of the job characteristics that workers find important⁶.

The key question is what information we have about these attributes. A general point is that some of these characteristics are not measurable in the way that income and hours are. This applies to interpersonal relationships, job interest and job difficulty, among others. For these types of items, we have to pass via the worker herself to have any idea of their level and distribution. In addition, many of them do not appear in the kind of large-scale surveys upon which economists (and governments) depend for much of their statistical information. Another point is that other items in the list can be measured, but it is not clear that they have a linear relationship with job quality. Most would agree that, *ceteris paribus*, a higher-paid job is a better job (at least up to a certain point), but the situation with respect to hours, for example, is less clear-cut. A 35 hour per week job may be too long for some people and too short for others. There is no way of knowing without asking workers how many hours they would prefer to work. Thinking of job security, which is one of the components of future prospects, the same qualification can be applied to temporary jobs: some workers want them and others don't⁷.

The approach used in this report is to complement the cross-national information obtained from national statistical agencies with a wide range of measures reported by workers in the 1989 ISSP data⁸. The full details of the ISSP questions used below, and of the variables constructed

from them, are contained in Annex A. The remainder of this section discusses each of the six job quality categories listed above in turn.

2.1 Pay

Income is typically found to be positively correlated with overall job satisfaction (see Blanchflower, Oswald and Warr, 1993, for example). There is probably more information available about pay than about any other job characteristic, and no attempt at a synthesis will be made here. In the OECD, some countries, such as Canada, Switzerland and the United States, are considered to have (on average) higher wages than others, such as the Czech Republic, Hungary, Mexico, Poland and Turkey (see OECD *National Accounts* data). The contentious issue of the distribution of low pay between countries and between groups of workers was treated in OECD (1996b).

One strand of research has suggested that relative, as well as absolute, income matters to workers. In this formulation, workers care about their rank or relative position in some income distribution, as well as about the dollar amount of their paycheck (see Frank, 1985 and 1993). Attempts to find supporting empirical evidence have had to tackle the thorny question of "Relative to whom?", *i.e.* Who is in the reference group? Some recent work has considered the reference group as those with the same characteristics as the individual and who do the same type of job. Workers' job satisfaction has been shown to fall as the pay of this reference group rises: see Clark and Oswald (1996), Lévy-Garboua and Montmarquette (1997) and Donohue and Heywood (1997) for results using British, Canadian and American data respectively.

The ISSP data contain a measure of workers' income which may pick up both absolute and relative components: the response to the question "Is your income high?". The percentage who evaluate their income as high is presented in the first panel of Table 2. Overall, less than a quarter of workers agree with this statement. The figures in Annex B show that workers in Austria, Italy, the USA and West Germany are most likely to consider their income as high, with the lowest figure being found in Hungary. Men are more likely than women to rate their income as high, and there is a positive correlation with age.

The wage is typically only part of a job's financial rewards. A complete picture of the remuneration received by the employee would have to take into account non-pecuniary or fringe benefits. Unfortunately, no information on these benefits is available in the current dataset.

2.2 *Hours of work*

Hours of work have recently become an important policy issue, figuring in debates over both potential cures for Europe's high unemployment and discussions of overwork. OECD figures show that the highest average hours figures are found in the Czech Republic, Ireland, Japan, Mexico, Turkey and the USA, while Northern European countries (France, Germany, Netherlands, Norway and Sweden) post the lowest. OECD (1997b) provides information about both cross-country differences in average hours worked and developments over time (downward in almost all countries, except for the USA). Men work longer hours than women, and younger workers work longer hours than older workers.

An alternative approach is to consider the percentage working part-time. In OECD countries in 1996, this reached a maximum of 37 per cent of workers in the Netherlands (where two-thirds of women work part-time) and was 25 per cent or more in Australia, Ireland, Norway and Switzerland. At the other end of the scale, this figure was 6 per cent in the Czech Republic and Hungary, and 7 per cent in Italy. Only 3 per cent of Czech, Italian and Spanish men work part-time. In general, the percentage working part-time is much higher for women than for men.

It is important to bear in mind the caveat evoked above when considering this information: actual hours have to be considered in terms of their relation to workers' desired hours. At the same time as average hours have been falling in most countries, the percentage of workers classified as involuntary part-time has risen from its trough level in 1990. The figures in OECD (1995) show that involuntary part-time work is more common for women than for men (affecting over eight per cent of female workers in Australia, Canada, the Netherlands and New Zealand, compared to figures of around two per cent for men in most countries), and reaches its highest level for younger workers. There is some evidence of a U-shaped relationship with age for men, with a higher incidence of involuntary part-time work being found for workers nearing retirement age.

On the opposite side of the coin from involuntary part-time work (which might be considered as underwork) is overwork⁹. Here we have a relevant question in the ISSP data: the percentage of workers who would like to spend less time in their job. The single country numbers show that 40 per cent of all workers in the United Kingdom wish to reduce their hours of work. At the other end of the scale, a desire for fewer hours is expressed by less than 20 per cent of workers in Austria. Within countries, the desire for fewer hours is strongly negatively correlated

with the worker's actual hours of work. However, across countries there is no such relationship. The average figure for the percentage wishing to work fewer hours is low for the countries with the lowest actual average hours worked in the 1989 ISSP (the Netherlands and Norway), as might be imagined, but is also low for the countries with the highest hours worked figures (Austria and Ireland). In Table 2, women and younger workers are less likely to want to work fewer hours. Overall, a somewhat higher percentage of American workers than European workers wish to reduce their hours of work.

Another aspect which falls under the general rubric of hours of work, but for which no numbers are presented here, is the time taken to travel to work (and the public transport available, number of changes etc.). This question sometimes appears in surveys, of the labour force or otherwise¹⁰.

2.3 *Future prospects - promotion and job security*

Income and hours provide (as, indeed, do job difficulty, job content and interpersonal relationships) a snapshot of a job at a point in time. As Table 1 made clear, of interest also are the job's future prospects. Broadly speaking, these may be summarised as "What is the job going to be like in the future?" and "What are my chances of still being in this job in the future?".

Regarding promotion, workers in the ISSP are asked to rate their opportunities for advancement in their current job; the third panel of Table 2 shows the percentage of workers who say that these opportunities are high. Overall, less than a quarter of workers find that their promotion opportunities are high (which is very close to the figure saying that their income is high). Women are less likely than men to report high promotion opportunities, perhaps reflecting their perception of the "Glass ceiling"; promotion opportunities seem to decline with age. This is one of the few aspects of a good job presented in this report for which younger workers do better than older workers.

With respect to job security, there has recently been a great deal of interest in the question of whether jobs have become less stable; job security is also the aspect of a job which the highest percentage of workers rate as very important in Table 1. Although evidence is mixed at best regarding recent developments in the likelihood of job loss, one possibility is that the consequences of separation have become more unpleasant (see OECD, 1997a). A related issue is that of temporary employment. OECD (1996a) presents figures showing that temporary

employment is more widespread for men than for women, and that its incidence falls sharply with age. In OECD countries, the largest figures for temporary employment incidence are in Spain (34 per cent) and Australia (24 per cent); the lowest figures are in the USA (2 per cent), Belgium (5 per cent), and Italy and the UK (both 7 per cent). Over the period 1983 to 1994 there was a noticeable rise in temporary employment in Australia, France, Spain and the Netherlands, but little evidence of a generalised increase in incidence across all OECD countries.

In the ISSP survey, workers are asked whether their job is secure. The percentage agreeing with this statement is shown in the fourth panel of Table 2. It is noticeable that over seventy per cent of workers agree or strongly agree that their job is secure. There is little variation by sex or by age in this measure of workers' reported job security, nor is there much difference in its level between the United States and Western Europe¹¹.

Another element which could enter into this rubric of future prospects, but about which the ISSP does not contain any information, is the training that the worker receives at their current job.

2.4 *How difficult is the job?*

The second half of the list of six attributes of a good job moves into territory that has been less-well studied. The next indicator is that of the difficulty or "toughness" of a job. This is something which would be very difficult for an outside observer to measure, except in the most rigorous of case-studies; again, it becomes almost essential to obtain information from the workers themselves. An additional argument for doing so is that certain jobs may be considered difficult by some workers, but not by others; or difficult in some combination of work conditions, but not in others. We cannot know unless we ask those who are doing the jobs.

The ISSP contains information concerning exhaustion, hard physical work, stress, dangerous conditions of work, unhealthy conditions, and physically unpleasant conditions. For example, 31 per cent of the sample report stress at work always or often, and 77 per cent report it at least sometimes. The figures for physically unpleasant conditions of work are 15 per cent and 35 per cent respectively. Both stress and physically unpleasant work conditions are reported more often by men than by women, and the incidence of stressful work rises with age, whereas that in physically unpleasant conditions declines with age.

Information regarding the six measures above has been combined to construct a (1, 0) dummy variable for "hard work" (see Annex A for details). This measure turns out to be that for which there is the greatest difference between the sexes. Just under half of women report hard work (according to the definition used here), compared to nearly two-thirds of men, with the overall average figure being 56 per cent. There is also a strong negative correlation between the incidence of hard work and age. Last, workers in Hungary are more likely to report hard work than workers in the other European countries in this sample or workers in the United States.

2.5 *Job content: interest, prestige and independence*

The next composite indicator is one which concentrates more on the psychological aspects of the job, rather than on its mechanics. As above, a single (1,0) measure, of "good job content" (for want of a better expression) has been created from disparate information regarding boredom at work, whether the job is interesting, whether the job helps other people, whether it is useful to society, if the respondent can work independently, and if the respondent is free to plan their own work. These last two items measure the job's autonomy, often considered by Psychologists to be one of the key aspects of a job's attractiveness. Some of these six measures pick up the extent to which the job contributes to the worker's personal development.

Fifty five per cent of workers in the ISSP sample report good job content. For this measure, there is no appreciable difference by sex. There is a strong positive correlation with age: it is again the younger workers who do worst on this measure. The country figures show little sharp differences, although it is noticeable that, for this measure, the highest percentage reporting good job content is found amongst Hungarian workers.

2.6 *Interpersonal relationships*

The last attribute of the job on which information is available in the ISSP dataset concerns relations at work, both with co-workers and with management. Unfortunately, workers were not asked how important relations at work are (in the battery of questions whose responses are summarised in Table 1), but casual observation suggests that how well the individual "gets on" with the other people at work is a key part of how that job is perceived.

Workers were asked to evaluate both relations between management and employees, and relations between workmates / colleagues. A job was characterised as having "good relations" if

the worker reported that both were either quite or very good. Overall, two-thirds of workers in this dataset have jobs characterised by good relations. Women are slightly more likely to report good relations than are men, and there is a noticeable positive correlation with age. Workers in the United States have the lowest figure for this measure of job quality.

2.7 Values and Outcomes

It is of interest to ask whether those who say that a certain characteristic of a job is very important are more likely to have a job displaying that characteristic. Such a relationship might be taken as evidence of self-selection of workers into jobs which suit their preferences. Table 3 presents the results for those job characteristics where we have information on both workers' values and job outcomes.

The numbers in Table 3 should be read as follows. In the first row, 24.9 per cent of those who said that income was very important (see Table 1) had jobs in which they said their income was high, as opposed to 21.5 per cent of those who did not say that income was very important. As it turns out, this is one of the smallest percentage point differences in the table. Very large differences are found between the percentages with jobs which are interesting/offer independence/useful/helpful, as a function of whether the worker said that the job characteristic in question was very important. All of these differences are statistically significant at the one per cent level. As one might expect, workers seem to have a tendency to sort themselves into the jobs which offer the rewards that they value highly.

3. The distribution of good jobs

Having the above information on many different job characteristics available simultaneously for a large number of individuals allows us to say something about different types of dissatisfying jobs. For example, across the nine OECD countries in the 1989 ISSP, 37 per cent of workers report, according to the definitions in section 2, both low income and low job content. This percentage is almost identical for males and females, but shows a strong negative correlation with age: 46 per cent of 16 to 29 year olds report such a combination, as opposed to 36 per cent of those aged 30 to 44 and 31 per cent of those aged 45 to 65. Similarly, 45 per cent of workers report both hard work and poor job content. This is split up into 39 per cent of female workers but 49 per cent of male workers, and there is again a negative correlation with age.

One way of bringing all of this information together is to ask workers to do it for us. A summary measure available in the 1989 ISSP is that of overall job satisfaction. The last row of Table 2 shows the percentage of workers who report that they are completely or very satisfied in their current job (respondents choose between seven possible answers, ranging from completely satisfied to completely dissatisfied). The numbers show that a somewhat higher percentage of women than men report high job satisfaction, and that there is a positive correlation with age, workers in the 45 to 65 age group being the most likely to have satisfying jobs. Workers in the United States are more likely than those in Western Europe to report satisfying work, whereas by far the lowest percentage of satisfied workers is to be found in Hungary¹².

Relating this summary measure to the individual components identified in Section 2, it can be seen from Table 2 that, on a broad canvas, more women than men do worse on the financial rewards of a job (income and promotion), but that women are more likely to report better jobs in terms of how hard the job is and relations at work. With respect to age, 16 to 29 year olds do worse than 45 to 65 year olds on five measures out of seven in the first seven panels of Table 2, coming out better only in terms of hours worked and promotion prospects.

The country distribution of good jobs is also somewhat mixed. Workers in the United States do better than their Western European counterparts in terms of income, promotion and job security; worse in terms of hours worked and relations at work. The differences here are generally rather small though. The largest differences are found between Hungary and all other countries for the measures of income, promotion opportunities and hard work. However, Hungarian workers do roughly as well as those in other countries in terms of their hours, job security and relations at work, and better in terms of job content, which shows to what extent generalisations can cover up more complex patterns at the more disaggregated level.

4. Regression Analysis

To formalise the relationship of overall job satisfaction to the constituent parts described above, we can use regression analysis. Table 4 presents the results of a regression of the overall job satisfaction measure on the seven dummy variables described in Section 2. As the dependent variable takes on ordinal values from one to seven (*i.e.* someone with job satisfaction of four is not twice as satisfied as someone with job satisfaction of two), ordered probit regression

techniques have been used¹³. Results are presented for all workers (for whom information on all of Section 2's measures is available), and separately by sex and by age group¹⁴.

The estimated coefficients show that all seven measures of job quality are significantly correlated with overall job satisfaction. As all of the right-hand side variables are (1,0) dummies, we can directly compare the size of their estimated coefficients. The largest impact on overall job satisfaction comes from having good relations at work, followed by good job content. High income and good promotion opportunities have roughly the same effect on satisfaction, while the smallest (although still significant) effect comes from job security.

It is not possible to compare the estimated coefficients across the equations for men and women, as the underlying distributions of the dependent variable are not the same. However, we can note that the effect of high income on job satisfaction is more significant for men than for women, while the effect of hours is more significant for women. These tie in with men's higher evaluation of income, and lower evaluation of hours, as an important aspect of the job in Table 1. With respect to age, the importance of income seems to rise with age, while that of promotion opportunities falls. Hard work is not correlated with overall job satisfaction for workers aged under thirty, whereas it is for older workers. Across all age groups and both sexes, good relations at work remains the most important predictor of overall job satisfaction.

To aid with the interpretation of Table 4's Ordered Probit estimates, the predicted probabilities of an individual replying "Completely satisfied" (the highest score) or either "Completely satisfied" or "Very satisfied" have been calculated. These are presented in Annex C both for the overall regression in column one of Table 4 and for the separate regressions for men and women. The first row of Annex C shows the predicted probabilities for a "baseline" individual, here defined as having a job with low income, in which do not want to work less, low promotion opportunities, high job security, which is difficult, but with good job content and good relations at work¹⁵. An individual with this type of job has a 16 per cent probability of being completely satisfied and a 52 per cent chance of being completely or very satisfied. A woman with this baseline job has somewhat higher probability of being satisfied than a man, as can be seen from the separate results by sex.

The effect of the different job quality measures on job satisfaction can then be calculated by changing one of the job's characteristics and seeing how these predicted probabilities change. The largest effects come from giving the job poor job content or bad relations at work. Both of

these cut the probability of being completely or very satisfied from over fifty per cent to just over twenty five per cent. Their effect is of the same magnitude for women and for men. Giving this baseline job high income or high promotion opportunities raises the probability that a worker will be satisfied with it, although the impact is smaller than those for job content or relations at work. Here there is a noticeable difference by sex. Men have a lower probability than women of being satisfied with the baseline job. However, if we add high income, men and women now have an equal probability of being satisfied.

One natural experiment here is to continue with the analysis presented in Table 3 and ask whether income, for example, has a greater effect on job satisfaction when the worker values it highly. This interpretation of job satisfaction as a weighted sum of various different job characteristics, with the weights being provided by the importance which the worker attaches to the aspect in question, comes directly from the definition of job satisfaction proposed by Locke (1976).

Pairs of values and outcomes were tested on a one-by-one basis in Table 4's job satisfaction regression. For example, concerning income, an additional dummy variable was entered representing high income when the worker says income is very important. The dummies for thinking that an interesting job, a job with independence, a helpful job and a useful job are very important are interacted with the Table 4's dummy variable for "Good Job Content", which summarises a number of such job characteristics (see Annex A).

The estimated coefficients from the interaction terms in these eight separate equations are presented in Annex D. The coefficients on the other variables in the regression are unchanged by the introduction of interactions and remain very significant. Five out of the eight interactions tested yield significant results. For example, in the second panel, wanting to work fewer hours is much more strongly associated with lower job satisfaction when the individual says that having a lot of leisure time is very important. Similarly, having a secure job is more strongly associated with higher job satisfaction when the individual values job security as very important. Significant results are also found for having good job content and valuing either of an interesting job, a helpful job or a useful job as very important. These results are consistent with a model where job satisfaction results from a combination of what the job is like, in terms of the characteristics listed in Section 2, and of how much the worker cares about these characteristics.

5. Multiple Deprivation

The previous sections have considered the separate components of a good job and their relation to overall job satisfaction. The current section changes the focus slightly by asking whether an individual who does badly on one aspect of a job is more likely to do badly on another. In other words, are there certain types of workers who experience "multiple deprivation"?

It turns out that the measures of job quality are correlated amongst themselves. For example, from Table 2, across all countries 22 per cent of workers say that their income is high. However, this figure is 46 per cent for those who also say that they have good opportunities for promotion, compared to 15 per cent for those who do not. One way of summarising the relationships between the individual job quality measures is to look at the coefficient of correlation between them. This is presented in Table 5.

The numbers in Table 5 show significant relationships between the seven individual measures: only two out of the twenty one correlation coefficients are not significant at the one per cent level. The odd man out, to some extent, is the desire to work fewer hours, which is correlated somewhat less strongly with the other measures. This may show that the desire to work fewer hours is more a function of the individual than of the job's other qualities. In particular, there is no correlation between wanting to reduce work hours and saying that the job is well-paid.

Although most correlations are significant, they are not noticeably high. The largest correlation coefficient is 0.31 between high income and high promotion, and over two-thirds are less than 0.15 in absolute value. One interpretation is that there may well be a trade-off between certain characteristics, in the manner of a compensating differential. A job might be difficult or boring, but pay well, whereas another might be both easy and boring. This will tend to reduce the correlation between the job quality components.

6. Overall Measures of Job Quality

This last section presents another approach to answering the question "Who's got the good jobs?", taking into account the correlations between the different constituent parts of job quality discussed above.

Two measures of overall Job Quality are presented here. The first is overall job satisfaction, as already discussed in Section 3. The second is based on the seven dummy variables for income, promotion, hard work etc. presented in Section 2. To calculate a composite measure of job quality, the information contained in these seven needs to be combined. One simple way of doing so is to count the number of aspects, out of the seven above, for which an individual has a "good job". The resulting scale runs from zero, for someone whose job is dissatisfying on all seven of the measures listed in Section 2 (*i.e.* in the first seven panels of Table 2), to seven for someone whose job is of "good quality" on all seven measures. Intermediate scores represent the varying degrees of job quality. For want of a better term, this has been called the Job Quality Count. Over the 5 600 individuals for whom all of the relevant information is available, the distribution of this indicator is as follows.

The Distribution of the Job Quality Count

<u>Value</u>	<u>Frequency</u>	<u>Percentage</u>	<u>Cumulative Percentage</u>
0	135	2.41	2.41
1	446	7.96	10.37
2	905	16.15	26.52
3	1272	22.70	49.21
4	1305	23.29	72.50
5	946	16.88	89.38
6	460	8.21	97.59
7	135	2.41	100.00
Total	5604	100.00	

Both the median and the modal value of this variable are four, and its mean is 3.5. The average worker in this dataset has a job that is of good quality on between three and four of the criteria listed in the first seven panels of Table 2. Minorities of ten per cent have jobs that are of high quality on less than two criteria or more than five criteria out of the seven.

Table 6 reports the results of a regression of these two measures of overall job quality on sex, three age dummies, and country dummies (the omitted category for the latter is West

Germany). This table can be seen as the multivariate equivalent of Table 2. Ordered Probit techniques are used to estimate the Overall Job Satisfaction and Job Quality Count equations¹⁶ (although an argument can be made that the latter variable is cardinal).

The results are consistent across the regressions. For both measures of job quality, males have worse jobs than do women, and workers aged 45 to 65 have jobs of significantly higher quality than do younger workers¹⁷. The worst jobs, holding the sex- and age-mix of workers constant, are found in Hungary, whereas the best ones are found in Austria and Ireland¹⁸. It is notable how much worse (in terms of the pseudo- R^2) these regressions of job quality measures on sex, age and country do compared to the regression of overall job satisfaction on the constituent parts of a good job presented in Table 4.

Using the same methodology as in Section 4, a "baseline" worker who is female, aged between 16 and 29 and lives in West Germany, has a predicted probability of 12 per cent of being completely satisfied and 39 per cent of being completely or very satisfied. Changing the baseline person to a male reduces these probabilities slightly to 10 and 35 per cent respectively, whereas increasing her age to between 45 and 65 raises the probabilities to 18 and 50 per cent respectively. Last, the predicted satisfaction probabilities of the baseline worker in Hungary are 5 and 22 per cent, whereas in Ireland they are 17 and 50 per cent.

There are some notable differences in country estimates between the two equations. Ireland, the Netherlands, Norway, the United Kingdom and the United States all do worse on the Job Quality Count than in terms of overall job satisfaction. This could well result from aspects of the job that matter to workers (and which therefore affect job satisfaction) but for which we do not have separate measures in the ISSP data (and which thus do not appear in the Job Quality Count).

7. Conclusion

Nearly twenty five years ago, Flanagan *et al.* (1974) argued persuasively that, to avoid worker discontent, firms need to provide the right mix of wages and non-pecuniary job characteristics. They also noted that the preferred mix likely differs between workers and may change as income rises.

Much of the analysis of the labour market that has appeared since Flanagan *et al.* seems to have paid only scarce attention to the non-wage aspects of a job. One of the findings of this

report is that, on the contrary, nearly seven thousand workers in OECD countries say that the monetary rewards from working come a long way behind other aspects of the job such as job security, job interest, promotion opportunities and autonomy.

Turning from values to outcomes, six broad groups of attributes characterising good jobs were identified: pay; hours of work; future prospects; how hard or difficult the job is; job content; and interpersonal relationships. It was shown that there is a tendency for workers to be in jobs that exhibit qualities the worker thinks are very important; to this extent, there is self-sorting of workers into jobs. All of these outcome variables are shown to be significant components of workers' job satisfaction. One implication is that job satisfaction seems to summarise a great deal of information about jobs that is only rarely measured in surveys. The analysis of job satisfaction information therefore likely provides a useful complement to the standard analysis of wages and worker behaviour.

As these six job attributes are correlated amongst themselves (those doing badly on one measure of job quality being more likely to do badly on others too), two summary job quality measures were proposed. These provided consistent pictures with respect to the distribution of good jobs in the dataset analysed: males have worse jobs than do women, and workers aged 45 to 65 have jobs of significantly higher quality than do younger workers. Workers in Hungary have worse jobs than workers in Austria and Ireland.

One advantage of the approach taken here, which consists in identifying the constituent parts of good jobs, is that it allows us to say which aspects of work are dissatisfying for different groups of workers. This is of importance if, as has been suggested above, (potentially) dissatisfied workers are less likely to participate in the labour market, to stay in their job, and to be productive. In particular, we can use some of the above results to the phenomenon of women's increasing labour force participation: what was satisfying for a largely male workforce may become less so as more women become active in the labour market. Table 2 showed that women are less likely to report high pay and promotion opportunities, but are also less likely to consider their job as difficult. One way of improving women's jobs is thus to make their pay and promotion more like men's. However, Table 1 shows that this is not the whole story. Women attach less importance than men to pay, but more importance to the social aspects of the job (whether it is useful or helps others), and to flexible working hours. The mix of wages and non-pecuniary aspects of the job may need to be revised to reflect women's increasing participation.

A second policy implication concerns the encouragement of continuing participation by older workers (in the context of ageing populations). The differences in job values and outcomes between workers over the age of 45 and those under 45 can be read off from Tables 1 and 2 (the same differences are found comparing the over-55's to the under-55's). Older workers, as is true for all age groups, care the most about job security. Relative to younger workers, they think that leisure time is less important, but that job security and the social aspects of the job are more important. With respect to job outcomes, older workers do relatively badly with respect to promotion opportunities (only 13 per cent of 55-65 year olds rank these as high), but better with respect to hard work and good job content (reported by 47 and 70 per cent of 55-65 year olds respectively). Continued participation by older workers will depend crucially on the individuals concerned finding the jobs on offer attractive; and there is evidence that this attraction may well depend upon a great deal more than wages and hours of work.

Footnotes

¹ A recent summary of the literature linking job satisfaction to behaviour is provided in Warr (1998); an interesting investigation using both individual and national time series data can be found in Flanagan *et al.* (1974).

² Some evidence is presented that overall job satisfaction acts as a summary measure of these different aspects of job quality, a number of which are difficult to observe or measure. As such, the use of such satisfaction information may help to explain workers' behaviour better than data on, for example, pay and hours. It is likely that there are trade-offs between wages and some of the other job quality components, which implies omitted variable biases in the estimation of wages.

³ Israel was also surveyed in 1989, but this data is not used in the current analysis.

⁴ The separate job values figures for each of the nine individual countries are presented in Annex B, as are their figures for the job outcome variables which will be discussed in Section 2. The figures by sex and by age within each country turn out to be rather similar, which reduces worries about pooling data from the different countries.

⁵ The same similarity in responses is found if we look at the percentage saying a job aspect is very important or important (Table 1 reports the percentage saying "very important" only).

⁶ Two characteristics which do not immediately fall into the above taxonomy, but which would seem important are the local environment in which job is located (not of the workplace, but of the region/town/local area), and the degree of work-family conflict, although this may be partly picked up in the different measures of hours of work.

⁷ In British data there is no difference in overall job satisfaction between workers with temporary jobs and those with permanent job (see Clark, 1996).

⁸ The Eurobarometer survey 44.3 (carried out in February 1996) asked workers in 15 European countries a broad set of questions about which parts of their job they liked and disliked. The data are unfortunately not yet available.

⁹ Clark (1996) uses British Household Panel Survey (BHPS) data to show that those who wish to change their hours of work (given their current hourly wage) are, *ceteris paribus*, far less satisfied than are those who are content with their current hours. This is equally true whether the desired change is upward or downward.

¹⁰ Information on time taken to travel to work is contained in the BHPS dataset. It is negatively correlated with several measures of job satisfaction; see Clark (1997).

¹¹ Some more recent data, in Table 5.1 of OECD (1997a), does find higher reported job insecurity in the United States than in most European countries.

¹² More detail on inter-country differences in job satisfaction scores using this dataset can be found in Blanchflower and Freeman (1997).

¹³ For ease of representation, the estimated "cut points" (which are used to calculate the probabilities that each individual, as a function of his or her characteristics, will give the answers one through seven) are not presented. The Ordered Probit technique is presented in Zavoina and McKelvey (1975).

¹⁴ The log-likelihood is a measure of how well the model explains the data. The "likelihood" is usually considered to be between zero (for a model which explains nothing) and one (for perfect prediction); the log of the likelihood thus varies from minus infinity to zero. The log-likelihood at zero (or L_0) is that from a model with no explanatory variables (only a constant), whereas the log-likelihood of the model with the explanatory variables included (or L_1) is less negative (*i.e.* the likelihood of the model explaining the data is higher). The pseudo- R^2 is just $1-L_1/L_0$. If the model explains none of the variation in the data then $L_1=L_0$ and the pseudo- R^2 is 0, whereas in the case of perfect prediction $L_1=0$ and the pseudo- R^2 equals 1.

¹⁵ As can be seen from the last column of Table 2, these are the mean characteristics for the sample, in the sense that each of them describes more than fifty per cent of respondents.

¹⁶ For ease of representation, the estimated cut-points for the Ordered Probit equations have been left out of this table.

¹⁷ Most of the econometric work on job satisfaction has found that women report higher levels of job satisfaction than men (for example, Blanchflower and Oswald, 1998; Meng, 1990; Kalleberg and Loscocco, 1983; and Clark, 1997). Older workers are typically more satisfied than younger workers (Warr, 1992 and Kalleberg and Loscocco, 1983), with evidence in the BHPS dataset of a U-shaped relationship between job satisfaction and age, minimising in the mid-thirties (Clark, Oswald and Warr, 1996).

¹⁸ It would obviously be of interest to introduce other variables, such as income and education, here. There are, however, significant problems of inter-country comparability with these variables, rendering such an investigation problematic.

Annex A. Variable Definitions

1) Pay

Income is High. Statements about the respondent's job: My income is high - strongly agree or agree.

2) Hours of work

Would Like to Spend Less Time in Job. Suppose you could change the way you spend your time, spending more time on some things and less time on others. Which of the things on the following list would you like to spend more time on, which would you like to spend less time on and which would you like to spend the same amount of time on as now?

Q.1a Change the way to spend the time: Time in a paid job?

- A bit less time or Much less time

3) Future prospects- promotion and job security

Opportunities for Advancement are High: Statements about the respondent's job: My opportunities for advancement are high - strongly agree or agree.

Job Secure. My job is secure - strongly agree or agree.

4) How difficult is the job?

Hard Work. Based on answers to the six following questions.

How often do you come home from work exhausted?

How often do you have to do hard physical work?

How often do you find your work stressful?

How often do you work in dangerous conditions?

How often do you work in unhealthy conditions?

How often do you work in physically unpleasant conditions?

All of these are coded as:

1. Always
2. Often
3. Sometimes
4. Hardly ever
5. Never

Dichotomous variables were created, with 1 representing Always, Often or Sometimes, and 0 representing Hardly ever or Never. Then the sum of these six dummies was calculated. The resulting variable (which is analogous to the Caseness scale of individual well-being in Psychology) counts the number of times (out of six) the respondent reports a 'bad' outcome with respect to job unpleasantness or difficulty. This variable runs from zero, for those with no such outcomes, to six, for those whose jobs are at least sometimes unpleasant on all of the six criteria above. This method allows six separate, but related, job measures to be combined into one². The distribution of this variable is as follows:

<u>Value</u>	<u>Frequency</u>	<u>Percentage</u>	<u>Cumulative</u> <u>Percentage</u>
0	242	3.64	3.64
1	704	10.59	14.23
2	1986	29.88	44.11
3	1470	22.12	66.23
4	941	14.16	80.38
5	679	10.22	90.60
6	625	9.40	100.00
Total	6647	100.00	

The majority of workers report jobs which are hard on 2 or 3 measures out of the six. Twenty per cent have jobs which are hard on four or more measures.

Last, a dummy variable was created from this summary measure for those workers reporting three or more such bad outcomes. This dummy hence achieves a value of one for 56 per cent of the sample.

² If factor analysis is used to create the first principal component, which is a linear combination of the six measures, all six measures are given almost equal weighting. This supports the simple adding-up inherent in the calculation of the Caseness-type measure. In addition, the results with the individual components were always consistent with those using the summary measure.

5) Job content: interest, prestige and independence

Good Job Content. Based on answers to the six following questions.

How often are you bored at work? This variable has been recoded as follows:

1. Never
2. Hardly ever
3. Sometimes
4. Often
5. Always

Statements about the respondent's job: My job is interesting

Statements about the respondent's job: In my job I can help other people

Statements about the respondent's job: My job is useful to society

Statements about the respondent's job: I can work independently

All coded as:

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

And which of the following statements about your work is most true?

1. My job allows me to design or plan most of my daily work
2. My job allows me to design or plan parts of my daily work
3. My job does not really allow me to design or plan my daily work

As above, dichotomous variables were created, with 1 representing (for bored at work) Never or Hardly ever, (for the four statement questions) Strongly Agree or Agree, and (for the design of daily work) the designing of most or part of daily work. The sum of these six dummies, which runs from zero to six, is a positive measure of job content. The distribution of this variable is as follows:

<u>Value</u>	<u>Frequency</u>	<u>Percentage</u>	<u>Cumulative</u> <u>Percentage</u>
0	99	1.49	1.49
1	308	4.64	6.13
2	460	6.93	13.06
3	751	11.31	24.37
4	1349	20.32	44.70
5	1747	26.32	71.02
6	1924	28.98	100.00
Total	6638	100.00	

Almost thirty per cent of workers have jobs which are satisfying on all six content measures; on the other hand a quarter have jobs which are satisfying on three or less measures.

A dummy variable was created from this summary measure for those workers reporting more than four positive personal control, interest and usefulness aspects of their job. This dummy has a value of one for 55 per cent of the sample.

6) **Interpersonal relationships**

Good Relations at Work. The sum of two dichotomous variables based on answers to the following two questions:

Relations at the respondent's workplace: Between management and employees

Relations at the respondent's workplace: Between workmates / colleagues

Both of these are coded as:

1. Very good
2. Quite good
3. Neither good nor bad
4. Quite bad
5. Very bad

A dummy variable was created for those reporting Very Good or Quite Good relations with both management and with colleagues (68 per cent of the sample). Nine per cent of the sample reported worse than quite good relations with both management and with colleagues, and 23 per cent reported worse than quite good relations with either management or with colleagues but not with both.

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Measuring and Monitoring the Quality of Jobs and the Work Environment in Canada

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Canadian Labour Congress

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Session 7: Well-being and Quality of Working Life
October 31 11:15 AM - 12:45 PM

MEASURING AND MONITORING THE QUALITY OF JOBS AND THE WORK ENVIRONMENT IN CANADA

Paper prepared
for the
Centre for the Study of
Living Standards Conference
on the
State of Living Standards and
Quality of Life in Canada

October 30-31, 1998
Ottawa

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MEASURING AND MONITORING THE QUALITY OF JOBS AND THE WORK ENVIRONMENT IN CANADA

by

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Part I: Introduction

The quality of the jobs held by paid workers is clearly an absolutely central determinant of living standards in a market or capitalist society. Certainly this is true of income. The great majority of the working age population derive the great majority of their income from paid work. Changes in the labour market — changes in employment, unemployment, hours worked, and the distribution of earnings — are key drivers of changes in the level and distribution of market income. Accordingly, key labour market trends have been measured and well studied, particularly here in Canada where Statistics Canada has provided comprehensive data, notably through the Labour Force Survey and the Census. Information on compensation is also comprehensively collected from surveys of employers and tax returns, and is a key building block of the national economic accounts. As a result, we know a great deal about the links between employment and compensation by sector, by occupation, by gender, by age group, by union status, and so on. Canadians are particularly fortunate that Statistics Canada has published a number of important analytical studies on key labour market and compensation trends, exploring earnings trends as well as trends in earnings inequality and insecurity in the 1980's and 1990's.¹

It is important to note that most regularly cited labour market data — employment, unemployment, hours worked — bears upon the labour market experiences of **individuals** rather than the characteristics of **jobs**. To give a salient example, about 1 in 4 jobs in Canada are part-time while fewer than 1 in 5 workers work part-time hours. The difference is explained by multiple job holding. To give another example, the unemployment rate of persons is not necessarily a reliable indicator of the stability or instability of jobs, since a given rate of unemployment can represent different combinations of workers on short-term lay-off, workers permanently displaced from jobs, new entrants to the labour force, and those unemployed for short or long periods of time. The Survey of Labour and Income Dynamics (SLID) now provides comprehensive data on jobs which has only recently

¹That said, there are still major gaps in our understanding of the labour market experiences and earnings of different groups of the population (such as visible minorities), and reliable data on earnings has only recently been comprehensively linked in an ongoing fashion to other labour market information with the inclusion of earnings in the Labour Force Survey.

supplemented labour market data for individuals, and Statistics Canada has provided data on temporary and permanent lay-offs from jobs.

Most of us would agree that a “good job” is defined in large part by levels of pay and, as noted, the level of pay is the major systematically monitored dimension of job quality. However, from the perspective of workers, other dimensions of the job may be more important. For example, prospects for promotion and learning are likely to be particularly important to younger workers, and lower paid jobs may be taken in preference to higher paid jobs by workers if they provide greater security, more acceptable hours, better working conditions, and so on. International survey evidence suggests that job security, having an interesting job, opportunities for advancement and being allowed to work independently — cited by 59%, 49%, 34%, and 30% of respondents respectively, rank well ahead of high pay (Andrew Clark, *What Makes A Good Job?* Data from the 1989 International Social Survey Program).

Jencks, Perman and Rainwater developed an Index of Job Desirability for the U.S. in 1988, based upon the weights given to different characteristics of jobs by workers. Non monetary characteristics of jobs were, in combination, found to be twice as important as earnings, with access to training, low risk of job loss, and characteristics of the job (non repetitiveness and autonomy) ranking particularly highly and in that order. Other characteristics of jobs examined were hours of work, control of hours, and whether the job was “dirty.” The ranking of desirable job characteristics was found to differ little between men and women or by age. A striking finding of this study was that occupational status is a very limited indicator of job desirability, since variation within occupational groupings was found to be as great as that between groupings. It was also found that use of the index doubled the level of labour market inequality compared to earnings inequality, that men’s jobs were significantly better than those of women’s with respect to non compensation items, and that unionization was associated with higher job desirability (though also with low autonomy, and repetitive jobs). (Jencks, C, Perman, L. and Rainwater, L. *What is a Good Job? A New Measure of Labor Market Success*. American Journal of Sociology, 93 May, 1998.pp. 1322-57.)

Data and, as a result, analysis are much more limited for those dimensions of job quality other than pay which are desired by workers. While most people want to work stable and predictable hours, and prefer a “standard” daytime/weekday work week, detailed information on work schedules and their relationship to worker preferences has become available only in the 1990's. While most of us want to work in jobs which are safe and healthy, information on the incidence of physical hazards at work is surprisingly limited. Perhaps most strikingly, remarkably little is known about the characteristics of jobs in terms of meeting the needs and desires of workers to develop and exercise their skills and capacities, to work at a reasonable pace, to derive interest and satisfaction from their work, and to participate in a non stressful work environment. As will be detailed below, only very preliminary evidence is available regarding the quality of jobs in terms of these basic human and social needs. In short, while we know quite a lot about the **labour market**, we

know rather little about the **work environment**. While it can be suggested that this reflects a lack of sufficient attention to work environment issues, Statistics Canada must be given credit for increased work in this area in recent years.

The purpose of this paper is to provide some data and analysis of the changing quality of jobs in Canada as a very preliminary step towards the development of indices which could be used to supplement GDP and be integrated into wider measures of economic welfare and social well-being, in accordance with the overall goals of the CSLS project. Part II of the paper proposes seven key dimensions of job quality, and notes the availability of indicators for each. The focus is empirical rather than theoretical. This part provides a summary overview of trends in the quality of jobs of both men and women from 1981 to 1993, on the basis of available data. Part III examines the same dimensions in the 1990's paying particular attention to non compensation related trends in job quality and the work environment. Some attention is paid to the relative position of men and women, and union and non union workers. This section draws, in part, on the Survey of Work Arrangements (SWA), unpublished data from the General Social Survey (GSS), and the National Population Health Survey. The focus throughout the paper is upon sources of data which allow for analysis of major trends. It is recognized that numerous case studies exist of changes in job quality and the work environment: the point is that only aggregate data allow us to draw broad conclusions. The paper also pays only selective attention to analysis of trends by occupation. Part IV makes reference to data sources in Europe. The Summaries at the end of Parts II and III describe major trends. The Conclusions propose increased statistical attention to job quality and work environment issues.

It lies well beyond the scope of this paper to link changes in the quality of jobs and the work environment to underlying causal factors. There is a voluminous literature on the impacts of globalization, increased international competition, slow growth, high unemployment, and of technological and organizational change upon Canadian workers and workplaces. The phenomena of stagnation and decline of real pay, increased inequality of pay, increased insecurity, and increased work intensity and stress have been widely noted and debated by Canadians. The recent report of the *Collective Reflection on the Changing Workplace* drew particular attention to the rise of non standard work arrangements and their implications for workers, while the report of labour representative Alexandra Dagg drew particular attention to the simultaneous development of worker insecurity and work intensification, viewing contingent work and stressful lean production techniques as the closely related consequences of employer strategies to achieve greater competitiveness. More benign interpretations of the forces at work in the modern workplace have been put forward — with some seeing non standard forms of work and reorganization of production as a shift allowing more flexibility for individuals, opening up potential for greater work satisfaction. The paper demonstrates that job quality overall has been deteriorating significantly in the 1980's and 1990's, suggesting that the former view is better founded.

Part II: Dimensions and Indicators of Job Quality, 1981 1993

Table 1 provides some indices of changes in job quality from 1981 through 1993 for women and men on the basis of available data. The data from which the indices are calculated are to be found in the attached Appendices. The indices are constructed so that any increase (decrease) represents an increase (decrease) in job quality. The most cyclically neutral comparison is between 1984 and 1993, but the focus of discussion is on changes over the 1981 to 1993 period.

TABLE 1

Summary Time-Series Indices of Job Quality									
		1981		1984		1989		1993	
		Men	Women	Men	Women	Men	Women	Men	Women
A	(i) Pay Real Median Weekly Earnings	100	100	95.4	100	93.0	104.9	92.7	103.7
	(ii) Distribution of Pay Not Low Paid	100	100	105.4	104.9	104.5	110.3	104.6	117.0
	Polarization (DIO/DI)	100	100	85.9	94.1	77.7	96.5	80.3	98.7
	Sub Index	100	100	95.6	99.5	91.1	103.4	92.4	107.8
B	Benefits Pension Plan Coverage	100	100	100	100	93.8	105.1	93.4	117.7
	Other Benefits	Not available until General Social Survey (GSS) and Survey of Work Arrangements (SWA).							
C	Satisfaction with Hours of Work Reported Satisfaction	No time series available.							
	Voluntary Part-time as % Part-time	100	100	86.0	87.2	97.5	94.5	80.0	71.5
	“Standard” Work Week	100	100	96.8	97.1	94.7	98.3	88.5	95.0
	Sub Index	100	100	91.4	92.1	96.1	96.4	84.2	83.2

TABLE 1 (continued)		1981		1984		1989		1993	
		Men	Women	Men	Women	Men	Women	Men	Women
D	Work Schedules Shift Schedules, Unsocial Hours, Flextime, Paid Vacation	No data available until GSS and SWA..							
E	Job Security Permanent Lay-off Rate	100	100	84.9	76.4	105.8	104.7	90.7	86.0
	Temporary Lay-off Rate	100	100	79.0	75.4	105.3	101.7	80.3	75.4
	Probability of New Job Lasting More than Six Months	100	100	86.9	88.3	87.8	83.1	78.0	74.2
	Permanent (vs. Temporary) Jobs	No series available until 1991.							
	Stress from Threat of Lay-off	No data until 1991 (GSS).							
	Sub Index	100	100	83.6	80.0	99.6	96.5	83.0	78.5
F	Physical Well-being Incidence of Occupational Injuries (no data by gender except for 1991)	100	100	108.5	108.5	108.5	108.5	137.3	137.3
	Exposure to/damage From Workplace Health Hazards (dust, chemicals, loud noise, poor air)	No data except for 1991.							
G	Human/Social/Work Environment Representation - Union Density - Grievance Procedure	100	100	100.3	117.6	96.0	121.0	93.3	127.9
	Skill Development - Access to Training - Promotion in Jobs	No data until 1994-95 (GSS, NPHS, WES).							
	Work Satisfaction	“							
	Work Autonomy/ Participation	“							
	Work Stress - Demands of Work - Social Support - Harassment/ Discrimination	“							

II (A) Pay

The best single measure of pay for a job is hourly earnings, since these are independent of hours worked. Picot (Picot, G. *Working Time, Wages and Earnings Inequality Among Men and Women in Canada, 1981-93*. Paper presented to the Labour Market Institutions and Outcomes Conference, 1996.) has shown that evaluations of real earnings trends and the level of earnings inequality among workers in Canada in the 1980's and 1990's differ depending upon whether the analysis is of hourly, weekly or annual earnings. Stagnating or declining real earnings and increasing inequality have been driven more by changes in hours worked, particularly hours in the year due to the level of unemployment, than by relative changes in hourly pay. Changes in the work week, such as the trend to more part-time and long hour jobs, have also played a role in the evolution of weekly and annual earnings. Earnings differences between men and women are much more dramatic in annual than hourly terms, since just 52% of Canadian women work on a full year, full-time basis compared to 66% of men. (Statistics Canada, Cat. 13-217, Earnings of Men and Women.)

Unfortunately, reliable time series data on hourly pay are limited due to the fact that workers are not consistently paid on an hourly basis, so weekly or annual earnings of salaried workers have to be divided by hours worked. The divisor may or may not be contractual hours or paid hours (including paid overtime) or total hours (including unpaid overtime). In practice, then, weekly earnings, which do vary to some degree with hours worked, are the most reliable single indicator of pay rates in jobs.

Table 1 incorporates an index of real median weekly earnings for men and for women for 1981, 1984, 1989, and 1993. The decline of real earnings for men over this period has been a continuing one. The modest improvement in the real earnings of women has to be qualified by recognition of the fact that this reflects in large part an increase in hours worked as opposed to hourly pay rates.

The degree of inequality or dispersion of earnings among jobs is also an important aspect of job quality. As is well known, earnings inequality and polarization have grown in the 1980's and 1990's, particularly among men. Available indices are the decile distribution of weekly earnings and the incidence of low pay jobs, defined as jobs which pay less than two-thirds the median hourly wage.

With respect to real pay, there has been a small increase in the average quality of jobs held by women, and a significant decline in the average quality of jobs held by men. The pay index falls to 92.7 for men while it rises to 103.7 for women. This is the now familiar story of the closing pay gap, which has been most pronounced between full-year, full-time earners. It is important to emphasize, however, that the pay gap between the jobs of men and women remains large with women earning 22% less than men in 1993.

With respect to the distribution of pay, the index for men falls to 92.4 while it rises to 107.8 for women. Polarization between "good jobs" and "bad jobs" in terms of pay has been

apparent between men, but not among women because of the fall in the incidence of low pay jobs. Again, however, it is important to emphasize that large absolute differences remain. For example, 31% of women are low paid, defined as earning less than two-thirds the median wage, double the proportion of men. Inequality of earnings is more marked among women than men, reflecting the concentration of women's jobs in relatively well-paid professional and administrative jobs, particularly in non market services, and in relatively low paid clerical, sales, and services jobs in the private service sector.

II (B) Benefits

Employer provided benefits such as an employer sponsored pension and health (medical/dental/drug benefits) are an important element of compensation, accounting for up to 20% of total wage costs. Access to such benefits is important to workers in the context of limited public pension plans and gaps in publicly provided health care. Yet little was known about the characteristics of jobs which provided benefits other than pensions before 1989, when data became available from the General Social Survey. Information on benefits is now also available from the Survey of Work Arrangements. Such data are still limited in that the extent of employer contributions to pensions and benefits can vary widely, while these sources provide only the information that a plan exists. Again, more information is available on the extent of employer contributions to pension plans, but this data is not linked to information on the characteristics of covered jobs.

Recent analysis has shown that pension and other benefits coverage is significantly higher in the public than in the private sector, in larger firms, and among unionized workers, and is higher for men than for women. (See Lipsett, B. and Reesor, M. *Employer Sponsored Pension Plans Who Benefits?* Applied Research Branch. Department of Human Resources Development, 1997.). While benefits coverage is closely related to the level of pay, unionization tends to shift the composition of total composition towards benefits.

With respect to the benefits index, since 1984 pension coverage has declined modestly for men and increased for women (though coverage for women workers has declined since 1993 and remains below that for men).

II (C) Satisfaction with Hours of Work

The work hours provided by a job are a key element of compensation and hours are generally set by the employer rather than by the worker. Jobs obviously differ in terms of the number of paid hours offered per week or year, and in the variability of hours per week or year. Part-time jobs are not necessarily "bad jobs" to the extent that workers want to work the hours offered, and overtime is not necessarily good or bad from the perspective of the worker. Unfortunately, while data has long been available from the Labour Force Survey and the Survey of Employment, Earnings and Hours on actual hours and usual

hours worked, little is known about the relationship between hours worked in a job and the preferences of workers. One long-standing indicator which is available is the proportion of part-time workers who work part-time only because of the inability to find full-time work (involuntary part-time workers). Little or no systematic evidence is available on the extent to which the increased incidence of overtime and long hours in the 1980's and 1990's is in accordance with worker preferences, though an increase due to employer demands is suggested by the fact that relatively few workers have a right to refuse overtime, and by the fact that the increase in hours worked has been led by unpaid rather than paid overtime. There is some evidence of growing opposition to compulsory overtime and evidence that many workers will choose to take part of an increase in compensation in the form of shorter hours as opposed to more total pay. (See Andrew Jackson, *Creating More and Better Jobs Through Redirection and Redistribution of Working Time*. Canadian Labour Congress. 1998)

The 1995 Survey of Work Arrangements provided limited data on satisfaction with hours worked. However, different survey questions on tradeoffs between hours and pay tend to bring different responses depending upon whether the question is with respect to current or future pay, and whether the reduced hours are linked to job creation.

Data from the Labour Force Survey show an increasing polarization of hours worked (usual hours in a job) between short and long hours, with a shrinking over time of jobs offering a "standard" work week of 35 - 40 hours. While worker preferences are unclear, this can be taken as a rough index of job quality on the assumption that much of the trend to long and short hours has been driven by the decisions of employers which, in turn, require many workers to work longer or shorter hours than desired.

With respect to satisfaction with hours of work, the sub index falls to 84.2 for men, slightly greater than the fall to 83.2 for women. The change in the index reflects the increasing proportion of part-time jobs which are held only because jobs offering full-time hours are unavailable, particularly marked for women (who are much more likely to be working part-time) and the increase in the proportion of men's jobs which are not "standard" hours jobs, in turn mainly reflecting the shift to long hours.

II (D) Work Schedules

Most workers prefer jobs with predictable hours and, all things being equal, most would also choose to work during the day and on week-days, as opposed to unsocial hours at night and on week-ends. Time for leisure, family, civic, and educational pursuits is clearly valued by most, and activities other than work can be constrained by both variable shift schedules and unsocial hours. Data has become available for the 1990's on these aspects of work from the General Social Survey and the Survey of Work Arrangements, but little or no earlier data are available. The same is true for entitlements to paid vacation, which can be considered as either a benefit or part of the work schedule. Information on the

ability of workers to vary hours in accordance with their own needs through flextime and compressed work weeks has also only recently become available.

II (E) Job Security

Clark reports that job security is the single most desired characteristic of a job among choices offered on an international social survey. Likely many workers would take a job which provides stability — particularly a low chance of permanent job loss — over a job which does not, even at a significant cost in terms of pay. Statistics Canada has provided data on permanent and temporary job lay-off rates, based on administrative files, which provide an indicator of changing job quality with respect to this dimension. The incidence of temporary as opposed to permanent employment contracts has become known only for the 1990's.

With respect to job security, the sub index for women falls more for women than for men, to 78.5 compared to 83.0. This reflects a larger increase in both the permanent and temporary lay-off rate, particularly the latter, and a reduced probability of a new job lasting for longer than six months. While women's jobs have become somewhat more insecure, women's jobs still tend to be significantly more secure than those of men. This reflects the greater concentration of men in sectors such as construction, primary industries and manufacturing which tend to experience regular lay-offs.

II (F) Physical Well-Being at Work

A "good" job is one which does not give rise to occupational injuries or diseases, and is not excessively demanding in terms of physical effort. Some data has long been available on the incidence of time loss injuries, workplace fatalities, and occupational diseases, but only as based upon the administrative records of Workers Compensation Boards. These data are a better indicator of the incidence of physical injuries than of occupational diseases, and are limited by the fact that many health conditions linked to workplace conditions (e.g. stress, repetitive strain injuries) may not be eligible for compensation. Time-loss injury incidence data — as indicated in Table 1 — are not available by gender, but the administrative data show that the proportion of time-loss injuries experienced by women rose from about 20% in the early 1980's to more than 25% in the early 1990's. The lower incidence reflects the heavy concentration of time-loss injuries in male dominated blue collar occupations. (Statistics Canada. Cat. 72-208. Work Injuries)

Data on exposure to physical hazards at work became available only with the 1991 General Social Survey, which has not been repeated. Little or no data are available on the physical demands of jobs, in terms of physical stress, degree of effort, degree of exhaustion etc.

With respect to the incidence of time-loss injuries — a very narrow measure of physical well-being at work — there has been a significant improvement in job quality. There has also been a marked reduction in workplace fatalities over the same period.

II (G) The Human/Social Work Environment

A large literature on the sociology of work has discussed dimensions of job quality in terms of the extent of the use of skills and the degree of worker involvement in the job. Thus analysis and criticism of “Taylorist” work practices points to the separation of conception and execution of tasks, and the de-skilling of many jobs with the shift of control of the pace and content of work from workers to management. Some have argued that jobs have been redesigned to make them more interesting and to give workers more responsibility and control in “post Taylorist/post Fordist” work environments. There is a large literature on the implications of new technology, automation, and so on for the exercise of skills, the pace and stress of work, and so on. Some case studies have been undertaken on these issues — though few of these incorporate worker perspectives — but little or no comprehensive time series data are available. The same is true of issues relating to work pace and stress, and worker participation. Neglect of these issues has been very partially remedied in the General Social Survey and in two recent surveys. However, no long time series is available

Unionization is one key work environment variable since, almost by definition, it establishes a rules based system for workplace governance and a grievance/arbitration system to resolve disputes between workers and management. Accordingly, the rate of unionization can be taken as one indicator of job quality. This indicates increased job quality for women, and a decline in job quality for men.

II Summary

The overall pattern which emerges from the indicators as shown in Table 1 is one of significantly decreased job quality for men from 1981 to 1993 by all measures except physical well-being, and a modest improvement in the quality of women’s jobs, with the key exception of satisfaction with hours worked and declining job security. This is, of course, a very summary overview which pays no attention to trends at the occupational or industrial level and is limited by the unavailability of data for key dimensions of the work environment. It is striking, however, that deterioration in apparent job quality has been so widespread.

Part III: Quality of Jobs and Work Environment Trends in the 1990's

This section of the paper reviews trends in the 1990's on the basis of the dimensions specified above, drawing upon new sources of data. While it is not possible to provide a detailed decomposition of changes by occupation and sector, some attention is paid to these variables and some attention is paid to different trends between women and men, and between union and non union workers ("Union workers" generally means those covered by a collective agreement).

III (A) Pay

Data from the Survey of Work Arrangements show that between November 1991 and November 1995, real hourly earnings (deflated by the consumer price index) fell by 1.7%. The trend of the 1980's was reversed in that real earnings of men fell by 1.2%, compared to a 2.5% fall among women. The wages of union members rose by 1.4%, while the wages of non union members fell by 6.1%.

III (B) Benefits

Data on access to benefits is available from the General Social Survey (very limited data for 1989) and from the 1995 Survey of Work Arrangements. Table II shows the extent of coverage in 1989, 1991, and 1994, using the GSS data for the sake of consistency. The data refer to coverage in the main job. Information on disability insurance coverage is available only for 1991.

In terms of overall coverage, GSS data show that pension coverage has been about constant, medical benefits coverage has declined slightly, and dental coverage has increased. Likely, the overall pattern is of little change. Other data on pension plan coverage (see Appendix 4) shown a small decline in coverage for both men and women between 1993 and 1995.

In terms of the extent of coverage by sex in 1994, pension coverage was slightly higher for men than women at a little above 50% for both, but coverage for other benefits was significantly higher for men, e.g., 64% compared to 55% in the case of dental coverage. There is some indication that any decline in coverage may have been more concentrated among women than men in the 1990's.

Clearly apparent are major differences between union and non union workers in terms of the extent of coverage, with pension coverage more than doubled in union jobs. The difference between union and non union jobs is far greater than the differences between major occupational groups, indicating that unionization is indeed a major independent factor behind high levels of coverage. The difference between union and non union jobs appears to have widened between 1991 and 1994, with union coverage rising fairly significantly, while remaining constant in non union jobs. Again, these differences are more marked than changes within major occupational categories, suggesting the independent impact of unionization.

III (C) Satisfaction with Hours Worked

As indicated in the data appendix to Table 1, involuntary part-time working increased among women in the early to mid 1990's and polarization between jobs with long hours and short hours continued.

Data from the Survey of Work Arrangements for 1995 (see Table 3) show that relatively few workers — 5% of men and 7% of women — were working more hours than they wished in that year, very narrowly defined as those who would work fewer hours with a proportionate reduction in pay. A much higher proportion of workers — 28% of men and 27% of women — wanted to work more hours for a proportionate increase in pay. About 1 in 3 workers were, then, dissatisfied with the hours of work provided by their jobs, though the real dissatisfaction may be with stagnant and declining hourly wages and the need for overtime pay to increase take home pay, rather than hours *per se*.

SWA data show that the incidence of paid overtime approximately doubled between 1991 and 1995, from 7.0% to 14.0% overall, with significant increases for men and women, and union and non union workers. However, the question posed differed in 1991 and 1995. The SWA data also show that substantial amounts of unpaid overtime are being worked — with about 1 in 20 workers working an extra 10 unpaid hours per week. No time series is available, but the high incidence of unpaid overtime hours among professional and managerial workers appears to be a growing and relatively recent phenomenon. In short, the indication is of declining job quality in terms of an increase in involuntary long hours.

III (D) Work Schedules

Data on work schedules are now available from the 1991 and 1995 SWA and from the GSS. As shown in Table 4, drawn from SWA data, there was a modest shift from regular daytime jobs between 1991 and 1995, which affected men somewhat more than women and affected union and non union jobs equally. In 1995, 68% of jobs provided a regular daytime schedule, down from 70% in 1991. There was correspondingly a modest increase in regular shift working — night working and rotating/split shifts — and irregular hours.

The same trend is apparent from analysis of data from the 1991 and 1994 GSS, which show an even greater incidence and increase of rotating/split shifts than the SWA. (GSS data show the incidence of rotating/split shifts rose from 12.4% in 1991 to 14.0% in 1994, with the increase concentrated among women and unskilled workers.)

It is notable that significantly more union than non union jobs require unsocial hours — with 24% of union jobs requiring a regular shift schedule compared to 14% of non union jobs. This reflects, in part, a higher incidence of shift work among blue collar workers (e.g. 28% of processing, machining, and fabricating jobs) and in health and social services jobs (26%). There is, however, also a high level of regular shift work in the predominantly non union accommodation, food and beverage services sector (38%), and personal services (21%). Irregular hours tend to be very high among non union workers in these sectors.

The period 1991-1995 also saw a marked increase from 11% to 15% in regular weekend work among both men and women. The incidence of weekend work is very high in private services — accommodation and food, personal services — and is markedly higher for non union jobs.

The shift to service work and the growth of long hours operations in particular service industries appear to be leading to an increased incidence of unsocial hours. The incidence of unpredictable hours is much lower among unionized workers — with 10% of union jobs provided irregular hours compared to 17% of non union jobs in 1995.

On a more positive note, the 1991-1995 period saw an increased proportion of jobs with flexitime provisions, that is provisions which gave workers some ability to vary hours in accordance with their own preferences. SWA data show that flexitime provisions were available in 24% of jobs in 1995, up from 17% in 1991, with about equal availability for men and women. Flexitime is more prevalent in non union than union workplaces (27% vs. 19%) but the rate of increase has been greater in union workplaces — rising from 12% to 18% between 1991 and 1995.

Table 5 provides data from the 1995 SWA on access to paid vacation (the first available). Like benefits, access to paid vacation is somewhat higher for men than women, and availability of paid vacation entitlements of more than 20 days is twice as great in union jobs as in non union jobs — 36% vs. 16%.

III (E) Job Security and Insecurity

As shown in Table 6, the incidence of both temporary and permanent lay-offs — the indicator used to examine trends from 1981 to 1993 above — fell slightly from 1991 to 1994, though the decline was much more marked for men than for women. Data from the General Social Survey, however, show that there was a very marked increase in the proportion of workers who reported that they had experienced stress from the threat of lay-

off or job loss. As shown, levels of stress about doubled for both men and women and union and non union workers, rose mostly for women, and were pervasive across broad occupational groups with about 1 in 4 workers reporting anxiety over potential job loss in 1994 compared to 1 in 10 workers in 1991.

This trend may be partly explained by the greatly increased incidence of temporary jobs between 1991 and 1995, with the large increase from 5% to 12% over a short period of time seemingly representing an increase in jobs with short term contract durations (assuming the incidence of seasonal jobs has not greatly changed). SWA data show this increase was to be seen across occupational groups, particularly in professional, sales and service occupations, and was greatest in the public sector (rising from 5% to 14%). The increase was lowest for managers/administrators and blue collar industrial occupations. Outside of seasonal industries, the incidence of temporary jobs is particularly high and has grown strongly in educational and health services. Likely reflecting the growth of temporary jobs in public services, the proportion of temporary union jobs grew even more strongly than the proportion of non union temporary jobs, though it remained slightly lower.

III (F) Physical Well-Being at Work

The 1991 General Social Survey concentrated upon health issues, and provided data on physical hazards of work which has not been subsequently available. In effect, then, we have a one-time snapshot of exposure to such hazards. As shown in Table 7, overall, 34.1% of respondents — 36.0% of men and 31.3% of women — reported negative health impacts from workplace health hazard exposure. It is striking that the reported impact on men and women is so equal given that 3 out of 4 time loss injuries are reported by men. Negative health impacts are evenly spread across major occupational groups. They are higher in union jobs — 41.2% vs. 30.0% — which may indicate high rates of unionization in particularly hazardous jobs, a greater sensitivity to health and safety issues on the part of unionized workers, a greater propensity to unionize on the part of workers in unhealthy jobs or other factors. Studies generally show that unionization is associated with reduced accident incidence.

As shown, workplace injuries affected 9.2% of workers, with double the incidence among men and a low incidence among managerial/ professional workers. It is notable that while women are relatively less likely to have experienced a workplace injury, the difference in rates is not as large as that in the administrative data. One in five (18.8%) of all workers were exposed to dust in the air most of the time, 45% of whom reported that this had a negative impact on their health; 7.5% of workers reported exposure to dangerous chemicals most of the time, 48% of whom reported that this had a negative impact on health; 15.7% of workers reported exposure to loud noise most of the time, 42% of whom reported negative impacts on health. Exposure to all of these hazards was much higher for men and for unionized workers, and non managerial/professional workers, reflecting

the obvious link between such exposure and blue collar industrial and construction jobs. By contrast, exposure to poor quality air most of the time was higher among women, with 15.3% of all workers reporting such exposure, a very large 71% of whom reported negative health impacts. Reports of negative health impacts from exposure to computer screens were also higher for women.

These data underline the significant level of exposure to physical health hazards in the workplace, with the relative incidence between women and men and union and non union workers likely reflecting different occupational and industrial distributions.

As shown in Table 8, there was a very sharp increase — from 7.5% to 13.9% — between 1991 and 1994 in the proportion of workers reporting that they experienced stress from the risk of accident or injury. The increase was somewhat greater among women than men, and among non union workers, and was pervasive across the broad occupational groups. Again, there is a clear discrepancy between reported accident rates (low and falling incidence), and workers perceptions of physical hazards at work.

III (G) The Human/Social Work Environment

Overall reported rates of ostensible job satisfaction are very high, with only 10.0% of men and 8.8% of women reporting themselves to be “very dissatisfied” in the 1994 GSS. Similarly, in the 1994 GSS, 43.1% of workers — 40.7% of men and 45.8% of women — reported having a strong personal interest in their work. By both measures, non union workers seem to have been modestly more content than unionized workers. Reported high levels of job satisfaction may reflect relief at having a job in an uncertain labour market environment, since narrower indicators show a high and rising level of stress in the workplace, and reduced work satisfaction.

As shown in Table 9, between 1989 and 1994, the proportion of workers reporting that their job required a high level of skill remained essentially unchanged between 1989 and 1994 at 46%. The 1994 data indicate some modest concentration of jobs described as skilled among men and in union jobs, with the expected strong relationship with broad occupational categories. However, there was a very major decline over this period in the proportion of workers reporting that they had “a lot off freedom” in how to work. Overall, this fell from 54% to 40%, with a steeper decline among women than men. A union/non union difference exists, with holders of union jobs reporting themselves to have somewhat less freedom. The expected relationship with broad occupational categories exists, though it is notable that just half of managerial/professional jobs seemingly offer a lot of freedom on how to work.

Table 10 provides data on stress in the work environment for 1991 and 1994, supplementing data on stress due to risk of accident/injury as reported above. Stress due to too many demands/hours — two dimensions which could usefully have been separated

in the survey — rose over this period, with 32.8% of workers reporting stress from this source in 1994 compared to 27.5% in 1991. Again, the increase was significantly greater in jobs held by women, and was to be seen in all of the major occupational groups. Stress from too many demands/hours appears to be somewhat greater in union jobs, though change in union and non union jobs is similar.

Stress from poor interpersonal relations at work also rose sharply from 1991 to 1994, with a slightly higher rate of increase to be seen among women and in unionized jobs. Again, the increase was across the broad occupational groups. Responses to this question may indicate increased intensity of work due to pressures from managers and supervisors.

The Table also shows stress from harassment and/or discrimination in 1991, indicating that 7.3% of all and 8.0% of women workers experienced stress from this source.

The National Population Health Survey of 1994-95 posed questions relating to work stress in order to link work stress variables to health outcomes. A paper is forthcoming in National Health Reports from Marie Beaudet and Kathryn Wilkins of Statistics Canada which links work stress variables from the NPHS to health outcomes such as high blood pressure and overweight. The questionnaire for the survey was based in significant part on the work of Karasek (see Robert Karasek and Tores Theorell. *Healthy Work: Stress, Productivity and the Reconstruction of Working Life*) who has linked work stress to heart disease and other health outcomes. Karasek deems to be particularly stressful “high strain” jobs which combine a low level of decision latitude and high psychological demands, with decision latitude or job control being particularly crucial in terms of minimisation of unhealthy stress. Jobs with high psychological demands are those which impose stress due to the nature of job tasks and responsibilities, and due to social relations at work. An important finding of Karasek’s work has been that the jobs of women, holding occupation constant, tend to be more stressful in large part because women have less decision latitude and less discretion in the use of skills.

Micro data made available from the NPHS give “mean work stress” scores for skill discretion, decision latitude, and psychological demands. Skill discretion, based on a scale of 1 to 12 (minimum to maximum) is determined by responses to questions on whether a job requires “learning new things,” a “high level of skill,” and “having to do things over.” Decision latitude (scaled 0 to 8) is based on questions regarding “freedom to decide how to do the job,” and “having a lot of say about what happens” in the job. Psychological demands are scaled from 0 to 8 based on questions regarding whether the job is “very hectic,” and “free from the conflicting demands of others.”

Table 11 provides the mean work stress scores for these three dimensions for men and for women, by major occupational groups. It is apparent that women tend to experience more stress from low skill discretion (outside the clerical occupations which are, in any case, dominated by women) and more stress due to low decision latitude. Psychological demands also tend to cause more stress in jobs held by women. As would be expected,

clerical, service, and processing jobs tend to have higher levels of stress due to limited skills discretion and decision latitude. Psychological demands appear to differ rather little between occupations. Unfortunately, only the scales and not the raw data are currently available, though the Beaudet and Wilkins paper will provide some data and make an important contribution to understanding of health consequences of work stress. The NPHS data serve to underline how limited our knowledge is of the overall incidence and trends in stress in the workplace due to increased intensification of work, speed-up, re-skilling, and de-skilling.

Another recent Statistics Canada survey which provides some limited information on the workplace environment is the pilot Workplace and Employer Survey or WES. It is important to note that this was a pilot survey, and that the sample was representative of a number of selected sectors (all but one in the private sector) and not of the job market as a whole. The major new feature of the survey was that it surveyed workers in establishments which were also the subject of a twinned establishment survey. Questions in both surveys were designed to gather information on workplace organization and reorganization. Table 12 provides some unpublished data from the worker survey on worker participation. While they cannot be taken as nationally representative, the data do suggest a high level of exclusion from even minimal forms of participation such as access to information on the part of unskilled production and technical/trade workers.

It is to be hoped that future linked surveys will be designed so as to measure the level and changes in work pressures in work pace, work stress, use of skills, and so on which result from the introduction of new work practices by employers. One significant finding of the survey was that access to formal grievance systems exists for a surprisingly high 50% of non union workers, though there is no information re. the nature of the process which exists.

As noted in Part II, access to opportunities for advancement and skills development is an important aspect of job quality. Data has only recently become available on access to employer sponsored education and training. As shown in Table 13, the overall incidence is low, at 21%, and there is a significant concentration of access in managerial/professional jobs. Access is significantly greater in unionized jobs. David Livingstone has recently drawn attention to a rising gap between the education and skills of workers, and the knowledge needs of jobs. (David Livingstone. *The Limits of Human Capital Theory. Policy Options*. July - August, 1997.) A recent survey found that 22% of workers with a university degree or community college diploma feel overqualified for the jobs they currently hold, with the proportion rising to 27% for those with post graduate qualifications. In short, for many, the workplace underutilizes rather than develops worker skills and capacities. However, data are again very limited.

III Summary

Overall, there was a clear trend towards deteriorating job quality in the first half of the 1990's, with this deterioration to be seen in both union and non union jobs, and affecting women more than men. In terms of pay, the decline in real hourly pay was greater for women, a change from the earlier trend, and unionization appears to have had a cushioning impact. Access to benefits appears to have been subject to a small decline. Satisfaction with hours of work has apparently deteriorated in all jobs due to the growth of involuntary part-time jobs (disproportionately held by women) and to involuntary long hours. There has been a small shift from regular daytime jobs to shift working, and a marked increase in week-end working for both men and women. Job security has declined, particularly in jobs held by women, as indicated by a sharp increase in temporary jobs and reported stress from the threat of lay off. Deteriorating physical well-being in jobs is suggested by increased stress from risk of accident or injury, though data on the physical work environment are extremely limited. There are clear indications of a deterioration in the quality of jobs in terms of the human and social work environment, as indicated by a decline in freedom in how to work and increased stress due to too many demands or hours, and due to poor interpersonal relationships. This deterioration has affected women more than men. In terms of the difference between union and non union jobs, some of the indicators suggest that the union wage premium may reflect more stressful and hazardous working conditions, a theme which has been little examined in the literature.

Part IV: Working Conditions in the European Union

The European Foundation for the Improvement of Living and Working Conditions, a European Union institution, recently released a second European Survey on Working Conditions, making possible some analysis of changes between 1991, when a prototype survey was undertaken, and 1995-96. Based on a representative sample in all EU member states, the survey is of a wide range of work conditions as perceived by workers. It is an extremely comprehensive survey in terms of content, covering exposure to physical hazards at work, the physical intensity level of jobs, working time, the pace of work, the degree of job control and autonomy, the content of jobs, payment systems, participation and consultation at work, access to equal opportunities at work, violence at work, health risks associated with work, and job satisfaction. Table 13 provides reported exposure to various working conditions in 1995-96 by gender, indicating the scope of the survey and providing some basic data of interest. It can be noted that comparable data for Canada on virtually all of the dimensions covered, with the exception of working time, are simply not available.

Analysis based on the two European surveys is still limited, but it is apparent that physically demanding work and exposure to physical hazards remain very common, that the pace of work is increasing, that repetitive and monotonous work is extremely common while autonomy in work is still rare, and that violence at work is not marginal. It is also apparent that conditions vary significantly between member countries. (See Working Conditions in the European Union. European Foundation for the Improvement of Living and Working Conditions. 1998.)

Part V: Conclusions

This paper has been highly empirical in focus, seeking to summarily analyze trends in job quality and the work environment on the basis of available large data sets. As summarized above, the overall trend in the 1980's and 1990's has been a significant decline in job quality as measured through seven broad dimensions. Jobs held by women have been most adversely impacted in the 1990's. While few serious analysts would claim that the quality of Canadian jobs has been improving over this period, the evidence does suggest a rather grim picture. This should be the starting point for serious analysis of the driving forces of change, and available remedies.

As noted above, we lack data for many dimensions of job quality and the work environment, particularly data relating to the human and social work environment and the physical work environment. The much wider range of information available for Europe is striking. It is to be hoped that Statistics Canada and government departments which support special Statistics Canada surveys will actively consider a regular survey on broadly the same basis as the European Survey on Working Conditions, perhaps as an annual attachment to the Labour Force Survey. This would allow for analysis of a wide range of characteristics of jobs, by gender, occupation, union/union status, age, sector and other key variables. We also need surveys which links the characteristics of jobs to the characteristics of employers, and particularly to the work restructuring strategies being implemented by employers. The increase in precarious and contingent forms of work and the decline in job security are clearly driven by changes in the kinds of employment offered, and increased stress and intensity of work are clearly driven by changes in management of the workplace. Yet, we lack firm evidence of the linkages between particular changes, such as "team" systems, and physical and mental stress, even though strong linkages have certainly been demonstrated in case studies. In short, the work environment is a critical important dimension of the lives of working Canadians, but we have devoted far too little effort to monitoring and assessing changes as a basis for policy and action.

A Note on Sources ...

Statistics Canada Cat. 71-535 - MPB #8 provides data from the 1991 and 1995 Survey of Work Arrangements. In some cases, this has been supplemented for this study by tables produced from the microdata file of the 1995 SWA by the Centre for International Statistics at the Canadian Council for Social Development. Data from the 1991 and 1994 General Social Survey has generally been obtained from the microdata files. Some data have been published in special GSS studies, notably the pioneering study by Harvey Krahn Quality of Work in the Service Sector (Statistics Canada. Cat. 11-612E #6) which provides data from the 1989 GSS and Statistics Canada Cat. 11-612E #8 Health Status of Canadians which provides data and analysis on work and health drawn based on the 1991 GSS.

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TABLE 2

Access to Workplace Benefits

		Employer Pension Plan	Disability Insurance	Medical Benefits	Dental	Drug	Counselling Services
All	1989	52.0	-	63.0	53.0	-	-
	1991	51.0	61.8	57.9	57.9	-	34.7
	1994	52.3	-	60.1	57.1	56.5	42.0
Men	1989	54.0	-	68.0	57.0	-	-
	1991	55.1	68.8	63.9	63.7	-	35.8
	1994	55.0	-	64.1	61.2	61.3	43.9
Women	1989	50.0	-	58.0	49.0	-	-
	1991	46.1	53.3	50.8	51.1	-	33.3
	1994	49.2	-	55.4	52.6	51.1	39.7
Union	1991	77.9	83.1	78.2	80.1	-	56.3
	1994	85.3	-	84.0	79.8	81.8	69.1
Non Union	1991	36.8	50.6	47.3	46.4	-	23.3
	1994	36.8	-	49.1	46.7	44.8	29.2
Managerial/ Professional	1991	67.0	77.0	72.1	74.2	-	51.2
	1994	66.1	-	74.6	71.6	70.7	56.3
Skilled/ Semi-skilled	1991	42.8	54.2	52.6	51.0	-	27.8
	1994	44.2	-	52.7	50.0	49.9	34.1
Unskilled	1991	43.6	54.7	48.0	48.3	-	23.2
	1994	44.0	-	47.9	45.1	44.3	31.6

Source: General Social Survey, 1989, 1998, and 1994 re coverage in main job. % is % responding "yes," i.e. excludes "don't know."

TABLE 3

Long Hours

	Usually Work Paid Overtime*	Average Hours/Paid Overtime	Worked Unpaid Hours	Average Unpaid Hours	Would Prefer to Work Less Hours
All	14.0% (7.7%)	4.7	5.3%	10.2	6.0%
Men	18.4% (9.7%)	5.5	5.8%	11.1	5.0%
Women	9.4% (5.6%)	3.2	4.7%	9.1	7.0%
Union	17.7% (10.0%)	4.4	4.4%	9.7	7.7%
Non Union	11.7% (7.0%)	5.0	5.8%	10.4	5.0%

Source: 1995 Survey of Work Arrangements.

* figure in brackets is % reporting that they worked overtime in the reference week in 1991, not that they usually worked paid overtime

TABLE 4

Work Schedules

			Regular Shift Schedule				
		Regular Daytime	Evening	Night/ Graveyard	Rotating/ Split	Irregular	Usually Worked Weekend
All	1991	70	5	1	10	14	11
	1995	68	5	2	11	14	15
Men	1991	70	5	2	11	12	11
	1995	67	5	2	14	12	16
Women	1991	70	5	1	8	16	10
	1995	69	5	1	9	15	14
Union	1991	68	5	2	17	9	5
	1995	66	5	3	17	10	10
Non Union	1991	71	5	1	6	16	13
	1995	69	5	1	8	17	18

Source: Statistics Canada, Survey of Work Arrangements.

TABLE 5

Paid Vacation Leave 1995

	10 days or less	11-15 days	16-20 days	More than 20 days
All	28	28	19	25
Men	27	27	18	28
Women	29	30	20	22
Union	16	23	24	36
Non Union	37	32	15	16

Source: Statistics Canada, Survey of Work Arrangements (1995).

TABLE 6**Job Security / Insecurity**

		Experienced Stress from Threat of Lay-off/Job Loss	Permanent Lay-off	Temporary Lay-off	Temporary Job
All	1991	10.9	7.6	9.3	5.0
	1994	23.5	7.3	8.4	12.0
Men	1991	12.5	9.4	11.1	5.0
	1994	23.8	8.9	10.1	11.0
Women	1991	9.0	5.0	7.0	5.0
	1994	23.1	4.9	7.1	13.0
Union	1991	15.3	-	-	4.0
	1994	34.2	-	-	11.0
Non Union	1991	8.7	-	-	6.0
	1994	18.5	-	-	12.0
Managerial/ Professional	1991	10.6	-	-	-
	1994	26.3	-	-	-
Skilled/Semi-Skilled	1991	10.7	-	-	-
	1994	21.4	-	-	-
Unskilled	1991	12.3	-	-	-
	1994	22.8	-	-	-

Source: General Social Survey 1991, 1994, and Statistics Canada, Cat. 71-539.

TABLE 7

Physical Work Environment								
	Experienced Negative Health Impact from Workplace Health Hazard Exposure	Experienced Workplace Injury in Past Year	Risk of Injury Caused Worry	Exposure to Dust in Air Most of the Time	Exposure to Dangerous Chemicals Most of the Time	Exposure to Loud Noise Most of the Time	Exposure to Poor Quality Air Most of the Time	Negative Health Impacts from Exposure to Computer Screen
All	34.1	9.2	7.6	18.8 (45.0)*	7.5 (48.4)*	15.7 (42.1)*	15.3 (70.7)*	8.5
Men	36.0	11.9	9.6	23.0	10.6	22.9	14.0	6.7
Women	31.3	5.9	5.1	13.8	3.8	7.1	16.8	10.6
Union	41.2	11.5	12.7	24.4	9.7	23.1	20.8	9.1
Non Union	30.0	8.0	4.8	15.9	6.4	11.8	12.5	8.1
Managerial/ Professional	35.4	5.8	5.9	14.0	5.0	8.3	17.6	12.0
Skilled/Semi-skilled	33.1	10.5	7.8	20.9	8.8	20.4	14.6	6.7
Unskilled	34.0	11.1	10.2	21.5	9.4	17.7	14.0	6.8
* Figure in brackets is % of those exposed (most of the time or sometimes) reporting a negative impact on health.								

Source: General Social Survey 1991.

TABLE 8

**Percentage Reporting Stress in the Work
Environment from Risk of Accident / Injury**

	1991	1994
All	7.5	13.9
Men	9.6	16.8
Women	5.1	10.7
Union	12.7	20.8
Non Union	4.8	10.8
Managerial/Professional	5.9	9.7
Skilled/Semi-skilled	7.8	15.0
Unskilled	10.2	19.7

Source: General Social Survey.

TABLE 9

Work Satisfaction
(Strongly Agree)

		Job Requires High Level of Skill	Lot of Freedom on How to Work	Strong Personal Interest in Work
All	1989	46.0	54.0	NA
	1994	46.3	40.4	43.1
Men	1989	50.0	56.0	NA
	1994	49.5	42.7	40.7
Women	1989	40.0	52.0	NA
	1994	42.7	37.9	45.8
Union	1989	NA	NA	NA
	1994	51.9	34.8	37.3
Non Union	1989	NA	NA	NA
	1994	44.1	43.5	46.2
Managerial/ Professional	1989	NA	NA	NA
	1994	68.6	51.4	47.5
Skilled/Semi-Skilled	1989	NA	NA	NA
	1994	37.4	34.8	41.0
Unskilled	1989	NA	NA	NA
	1994	20.9	31.1	39.1

Source: General Social Survey 1989 and 1994. 1989 data as reported by Krahn.

TABLE 10**Stress in Work Environment (%)**

		Too Many Demands/Hours	Poor Inter-Personal Relations	Harassment/ Discrimination
All	1991	27.5	12.8	7.3
	1994	32.8	18.5	-
Men	1991	27.6	12.7	6.7
	1994	31.0	17.7	-
Women	1991	27.4	13.1	8.0
	1994	34.7	19.4	-
Union	1991	29.1	14.8	8.9
	1994	35.8	23.9	-
Non Union	1991	26.8	11.9	6.4
	1994	31.5	16.1	-
Managerial/ Professional	1991	40.1	16.6	7.1
	1994	44.6	22.5	-
Skilled/Semi-Skilled	1991	21.1	11.0	7.3
	1994	26.8	17.3	-
Unskilled	1991	19.9	11.3	8.1
	1994	22.2	13.4	-

Source: General Social Survey 1991, 1994.

TABLE 11

Mean Work Stress
(Low Stress — High Stress)

	Skill Discretion (0 - 12)		Decision Latitude (0 - 8)		Psychological Demands (0 - 8)	
	Men	Women	Men	Women	Men	Women
Managerial/ Administration	3.6	4.0	1.6	1.9	5.1	5.2
Professional	3.4	3.7	1.8	2.5	4.9	5.1
Clerical	5.8	5.5	2.9	3.3	4.4	4.5
Service	5.8	6.5	2.7	2.8	4.3	4.6
Processing	4.5	6.4	2.6	4.1	4.2	4.1

Source: National Population Health Survey 1994-95.

TABLE 12

Worker Participation

	No Participation in Meetings with Managers/Supervisors	No Access to Information	No Participation in Self-Directed Workgroup	Access to Formal Grievance System
Adult Men	25.3	18.8	59.6	68.0
Adult Women	29.9	16.1	72.1	62.5
Union	30.4	17.4	80.2	88.7
Non Union	27.8	20.7	60.3	50.5
Managers	17.3	11.9	43.9	68.9
Professionals	20.5	13.1	61.1	66.4
Technical/Trade	39.1	33.8	75.4	58.6
Sales/Clerical	28.9	13.1	73.0	61.9
Unskilled Production	44.1	39.5	82.1	53.4

Source: Workplace and Employer Survey

TABLE 13

**Participation in Employer-Sponsored
Jobs Related to Education & Training**

All	21%
Men	20%
Women	21%
Union	28%
Non Union	20%
Managerial/Professional	34%
Clerical/Sales/Service	15%
Blue Collar	14%

Source: Statistics Canada, 1994 Adult Education and Training Survey.

TABLE 14

Working Conditions in the European Union (1995) (Percentages by Gender)		
AMBIENTAL FACTORS¹	Male	Female
Exposed to:		
noise	34	20
vibrations	32	13
radiation	7	3
high temperatures	23	15
low temperatures	30	16
Breathing in vapours	30	15
Handling dangerous substances	18	10
Wearing protective equipment	32	14
DESIGN OF WORK STATIONS	Male	Female
Working in painful positions ¹	45	46
Moving heavy loads ¹	38	26
Able to adjust to their own comfort ² :		
temperature	40	45
lighting	45	50
ventilation	41	43
position of desk/work station	32	34
position of seat	43	50
instruments/equipment	46	38
INFORMATION ON RISKS	Male	Female
Well informed ¹	77	67
PLACE OF WORK	Male	Female
Working at home ¹	16	18
WORKING TIME	Male	Female
Weekly hours:		
less than 30	5	26
30 - 39	34	38
more than 40	60	35
Average working hours per week (in hours)	43	35
Working shifts and irregular hours	37	28
Working shifts	14	11
Working at night (at least once a month)	27	14
Permanent nightwork (more than 16 nights a month)	3	1

Working Saturdays (at least once a month)	59	49
Working Sundays (at least once a month)	33	24
Average commuting time per day (in minutes)	41	35
WORK RHYTHMS	Male	Female
Working at very high speed ¹	56	52
Working to tight deadlines ¹	61	50
Not having enough time to do the job ²	22	21
Remuneration on piece rate basis ²	15	10
Work rate dependent on ² :		
colleagues	39	36
customers, clients, etc.	64	72
production norms	41	28
automatic speed of machine	25	18
direct control of boss	35	34
JOB CONTROL AND AUTONOMY²	Male	Female
Not able to choose or change:		
rate of work	28	28
methods of work	28	29
order to tasks	35	35
Not able to take a break when wanted	34	42
Not free to decide when to take holidays or days off	40	46
On flexitime	61	72
JOB CONTENT	Male	Female
Job involving:		
complex tasks ²	63	51
monotonous tasks ²	45	46
assessing the quality of own work ²	79	76
precise quality standards ²	76	68
problem solving ²	85	80
short repetitive tasks (less than 10 minutes) ¹	36	38
repetitive hand/arm movements ¹	56	58
rotating tasks ²	55	55
Possible assistance from colleagues ²	85	83
Dealing directly with outside people ¹	64	74
Demands too high in relation to skills	7	8
Demands too low in relation to skills	10	11
Job involving learning new things ²	77	73
Having undergone training in the last 12 months	29	29
Working with computers ¹	37	41

PAYMENT SYSTEMS	Male	Female
Remuneration includes:		
basic fixed salary	79	85
piece rate/productivity payment	15	10
payment for overtime	25	19
payment for special working hours	16	12
payment compensating poor working conditions	5	2
PARTICIPATION AND CONSULTATION²	Male	Female
Consultation about changes (over the last 12 months)	46	46
Job involving deciding on departmental issues	49	44
Discussion of work related issues (over the last 12 months)		
with staff representatives	24	19
with boss	56	58
with colleagues	70	67
Work appraisal with boss (over the last 12 months)	42	40
EQUAL OPPORTUNITIES	Male	Female
The boss is a man	75	54
The boss is a woman	6	32
Consider that ² :		
men and women have equal opportunities	53	65
men have more opportunities	41	18
women have more opportunities	3	15
Subjected to ² :		
sexual discrimination	1	4
nationality discrimination	1	1
disability discrimination	1	0
racial discrimination	1	1
age discrimination	3	3
VIOLENCE AT WORK²	Male	Female
Subjected to:		
physical violence	3	4
unwanted sexual attention	1	4
intimidation	7	9
FACILITIES PROVIDED BY COMPANIES²	Male	Female
Maternity leave	35	54
Sick child leave	32	41
Parental leave	32	43
Child day care	7	10

OCCUPATIONAL RISKS AND HEALTH PROBLEMS	Male	Female
Work affects health	58	55
Stress	28	27
Backache	29	30
Overall fatigue	20	20
Headaches	11	15
Muscular pains in arms or legs	17	16
Sleeping problems	7	6
Allergies	3	4
Heart disease	1	1
Anxiety	7	8
Irritability	11	11
Personal problems	3	4
Respiratory difficulties	5	3
Stomach ache	5	4
Skin problems	6	6
Eye problems	10	9
Ear problems	9	3
Work improves my health	1	1
Job made more difficult because of health problems	10	8
HEALTH RELATED ABSENTEEISM (over the last 12 months)	Male	Female
No absence	76	78
Less than 5 days	6	6
5 - 20 days	12	11
More than 20 days	6	5
PERCEPTION OF RISK²	Male	Female
Think their health at risk because of work	33	22
Think their job is secure	69	71
JOB SATISFACTION	Male	Female
Satisfied with their job	84	84
In the last 5 years:		
changed job for a healthier job	13	13
tried, but unsuccessfully	8	8
did not try	78	79

¹ exposure for more than a quarter of the time

² yes/no question

APPENDIX 1

Real Median Weekly Earnings

*average of 5th and 6th decile

	Year	Data (\$)	Index
Men	1981	589	100
	1984	562	95.4
	1989	553	93.0
	1993	546	92.7
Women	1981	410	100
	1984	410	100
	1989	430	104.9
	1993	425	103.7

Source: Garnett Picot (1996), *Working Time, Wages and Earnings Inequality Among Men and Women in Canada*, 1981-1993, Appendix Table 1. Data are for workers aged 25-54.

APPENDIX 2

% Not Low Paid in Main Job

	Year	Data (%)	Index
Men	1981	81.5	100
	1984	85.9	105.4
	1989	85.2	104.5
	1993	85.3	104.6
Women	1981	59.3	100
	1984	62.2	104.9
	1989	65.4	110.3
	1993	69.4	117.0

Source: Low Pay is < \$10.80/hour in constant 1993 dollars or roughly below two-thirds of the economy wide median wage. Picot (1996), Table 2.

APPENDIX 3

Polarization: Ratio of Top to Bottom Deciles, Average Weekly Earnings

	Year	Data	Index
Men	1981	4.26	100
	1984	4.86	85.9
	1989	5.21	77.7
	1993	5.10	80.3
Women	1981	6.26	100
	1984	6.63	94.1
	1989	6.48	96.5
	1993	6.18	98.7

Source: Picot (1996).

APPENDIX 4

Pension Plan Coverage (% Paid Workers)

	Year	Data (%)	Index
Men	1981	NA	100
	1985	50.1	100
	1989	47.0	93.8
	1993	46.8	93.4
	1995	44.0	87.8
Women	1981	NA	100
	1985	35.6	100
	1989	37.4	105.1
	1993	41.9	117.7
	1995	40.6	114.0

Source: Statistics Canada, Cat. 74-401-XPB, *Pension Plans in Canada*.

APPENDIX 5

Voluntary Part-Time as % Part-Time Workers

	Year	Data (%)	Index
Men	1981	82.5	100
	1984	70.9	86.0
	1989	80.4	97.5
	1993	66.0	80.0
	1995	67.8	82.2
Women	1981	84.2	100
	1984	73.4	87.2
	1989	79.6	94.5
	1993	68.6	71.5
	1995	69.6	82.7

Source: Statistics Canada, Labour Force Survey.

APPENDIX 6

% Adult Paid Workers Working Standard Usual Work Week (35-40 Hours)

	Year	Data (%)	Index
Men	1980	77.5	100
	1985	75.0	96.8
	1989	73.4	94.7
	1995	68.6	88.5
Women	1981	64.5	100
	1984	62.6	97.1
	1989	63.4	98.3
	1995	61.3	95.0

Source: Mike Sheridan, Deborah Sunter, and Brent Diverty, *The Changing Work Week: Trends in Weekly Hours of Work*, Canadian Economic Observer, September 1996. Data are from Labour Force Survey for 1980, 1985, 1989, 1995.

APPENDIX 7

Permanent Lay-Off Rate

	Year	Date	Index
Men	1981	8.6	100
	1984	9.9	84.9
	1989	8.1	105.8
	1993	9.4	90.7
Women	1981	4.3	100
	1984	5.4	76.4
	1989	4.1	104.7
	1993	4.9	86.0

Source: G. Picot and Z. Lin, *Are Canadians More Likely to Lose their Jobs in the 1990s?* *Canadian Economic Observer*, September 1997. Statistics Canada, Cat. 11-010-XPB, Table 2.

APPENDIX 8

Temporary Lay-Off Rate			
	Year	Data	Index
Men	1981	7.6	100
	1984	9.2	79.0
	1989	7.2	105.3
	1993	9.1	80.3
	1994	8.4	110.5
Women	1981	5.7	100
	1984	7.1	75.4
	1989	5.6	101.7
	1993	7.1	75.4
	1994	5.6	101.7

Source: Statistics Canada, Cat. 71-539-XPB, *Permanent Layoffs, Quits and Hirings in the Canadian Economy*, 1978-1995, Table 5.

APPENDIX 9

Probability of New Job Lasting More Than 6 Months

	Year	Data	Index
Men	1981	.564	100
	1984	.490	86.9
	1989	.495	87.8
	1993	.440	78.0
	1994	.487	86.4
Women	1981	.643	100
	1985	.568	88.3
	1989	.534	83.1
	1993	.477	74.2
	1994	.485	75.4

Source: Data provided by Heisz, see Andrew Heisz, *Changes in Job Tenure and Job Stability in Canada*, Statistics Canada, 11 F0019MPE #95, 1996.

APPENDIX 10

Incidence of Occupational Time-Loss Injuries*

Year	Data	Index
1981	5.9	100
1984	5.4	108.5
1989	5.4	108.5
1993	3.7	137.3
1995	3.4	142.4

Source: Human Resources Development Canada, *Data Base on Occupational Safety and Health*.

Data not separately available for men and women. 1995 Data preliminary.

*Incidence is per 100 workers.

APPENDIX 11

Union Density

	Year	Data (%)	Index
Men	1981	37.5	100
	1984	37.6	100.3
	1989	36.0	96.0
	1993	35.0	93.3
	1996	32.9	87.7
Women	1981	23.3	100
	1984	27.4	117.6
	1989	28.2	121.0
	1993	29.8	127.9
	1996	30.0	128.8

Source: Union Members as % Paid Non-Agricultural Workers, Diane Galarneau, *Unionized Workers, Perspectives on Labour and Income*. Spring, 1996. Cat. 75-001XPE. 1996 is data from the Labour Force Survey for the first six months of 1997.

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
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niveaux de vie*

The Healthy Workplace Index: The Canadian Automotive Industry

Wayne Lewchuk
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David Robertson
CAW

Session 7: Well-being and Quality of Working Life
October 31 11:15 AM - 12:45 PM

THE HEALTHY WORKPLACE INDEX
AND
THE CANADIAN AUTOMOBILE INDUSTRY¹

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prepared for a conference on
The State of Living Standards and the Quality of Life in Canada
October 30-31, 1998

¹The initial stage of this research was funded by the Ontario Government through its Sectoral Partnership Fund and the Technology Adjustment Research Programme as well as a Social Sciences and Humanities Research grant. The authors would like to thank the numerous people who have taken time to comment on our work as well as Delia Hutchinson, Kim Sardella and Sonia Lowe. Bruce Roberts, Cara Macdonald, Jim Duerr and Dale Brown assisted in various phases of the project.

SECTION ONE: INTRODUCTION

Has the quality of life at work improved in the last decade? Have workplaces become healthier places to work? The reality is we do not know. The purpose of this paper is to develop a Healthy Workplace Index which will permit us to answer these questions by measuring the quality of life at work. In what follows, an index will be proposed, its validity will be tested against a set of data drawn from a 1996 survey of workers employed by Chrysler, Ford, General Motors and CAMI in Canada, and finally the index will be used to rank the quality of life at work of companies employing different systems of work organization. The index is constructed using a methodology employed by the United Nations in their Human Development Index.²

The Human Development Index was first proposed by the United Nations in the 1990 Human Development Report. There was concern that existing measures of economic development such as GNP per capita were poorly correlated with improvements in the quality of life. The authors were looking for a broader index which would recognize that:

People are the real wealth of a nation. The basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives. This may appear to be a simple truth. But it is often forgotten in the immediate concern with the accumulation of commodities and financial wealth.³

While meant to inform the debate regarding the development of a broad social index, this statement could easily be altered to apply to indices of quality of life at work. Thanks to groups such as the International Competitiveness Forum and the researchers attached to MIT's International Motor Vehicle Project much attention has been paid in the last ten years to the productivity and competitiveness of workplaces.⁴ There has been an implicit assumption that what is good for competitiveness is good for workers. Such has been the faith in the overall benefits of competitiveness that certain researchers have made stunning claims of how systems such as lean production will lead to empowered workers, claims now largely ridiculed by serious research. The fact of the matter is that little attention has been paid to how work reorganization is affecting workers, of its impact on their health at work, or their quality of life at work.

There are a growing number of attempts to collect data from workers about their work experience. Much of this work has been stimulated by the path breaking work of

² United Nations, Human Development Report 1990, (New York, 1990), pp. 9-16.

³ *ibid.* p. 9.

⁴ James P. Womack, Daniel Jones and Daniel Roos, *The Machine That Changed the World: The Story of Lean Production*, (New York, 1990); Nick Oliver et al., *Worldwide Manufacturing Competitiveness Study: The Second Lean Enterprise Report*, (Anderson Consulting, 1994); Nick Oliver et al., *Inside the Chinese Automotive Industry: The Third Lean Enterprise Report*, (Anderson Consulting, 1998.)

Karasek and Theorell which linked the organization of work and workers' health.⁵ In Europe, a major research project has been launched by the European Foundation for the Improvement of Living and Working Standards. In their Second European Survey on Working Conditions conducted in 1996, they collected data from just under 16,000 European workers employed in the 15 member states of the European Union on various dimension of the quality of life at work. The summary results suggest that many European workers are working harder with little evidence of the empowerment discussed in much of the management literature.⁶ In Canada, some data on working conditions has been collected as part of the Workplace and Employee Survey sponsored by Human Resources Development Canada, but the range of questions on working conditions is limited and is unlikely to yield a detailed picture of the quality of life at work. None of these studies has led to an index which would allow researches to economically and accurately measure the quality of life at work or the healthiness of different workplaces.

⁵ Robert Karasek and Tores Theorell, *Healthy Work: Stress, Productivity and the Reconstruction of Working Life*, (New York: Basic Books, 1990).

⁶ European Foundation for the Improvement of Living and Working Conditions, *Second European Survey on Working Conditions*, (Dublin, 1996).

The index being proposed in this paper is the next step in an ongoing research project which was initiated in the mid-1990s, by the Canadian Automobile Workers (CAW) who were becoming increasingly concerned that management sponsored surveys were giving an incomplete picture of the changes occurring at the workplace and their impact on workers. A partnership was formed with researchers at McMaster University to design a survey instrument which would focus specifically on the health of workers and how new models of work organization were affecting the quality of life at work.⁷ The survey is comprised of 45 closed ended questions and examines topics such as workload, physical and emotional health, job control, relations with management, and relations between home and work. It was designed to be filled out by the workers themselves in their own time. Between 1995 and 1997, three rounds of surveys were conducted involving just under 10,000 workers and 75 different workplaces.⁸ This paper will focus on a subset of this data, the 5,559 responses collected from workers at the 24 Canadian workplaces of Ford, Chrysler, General Motors and CAMI. This includes workers involved in the assembly of vehicles, the manufacturing of components such as engines and transmissions, parts depots, and office and skilled trades workers.

⁷ See Appendix One for details on how the data was collected.

⁸ For summaries of the results of these surveys see, Wayne Lewchuk & David Robertson, "Working Conditions Under Lean Production: A Worker-based Benchmarking Study", *Asia Pacific Business Review*, summer 1996, pp. 60-81; CAW/TCA, *Working Conditions Study: Benchmarking Auto Assembly Plants*, (CAW, March 1996, pp. 1-41; Wayne Lewchuk and David Robertson, "Production Without Empowerment: Work-Reorganization from the Perspective of Motor Vehicle Workers", *Capital and Class*, 1997, pp. 37-65; Human Centred Benchmarking: Work Reorganization and the Quality of Work Life in the Clothing, Textile, Primary Textile, Box, Paper, Aluminum, Electrical and Electronic Products Sectors, report submitted to the Manufacturing Research Corporation of Ontario, August 1997, pp. 1-65. Ongoing surveys include the General Motors plant in Ellesmere Port and the Mitsubishi plant in Bloomington-Normal Illinois. See, Wayne Lewchuk, Paul Stewart and Charlotte Yates, *Global Firms Global Strategies an International Study of the Quality of Working Life in The Automobile Industry*, (unpublished); Robert Bruno & Lisa Jordon, "From High Hopes to Disillusionment: The Evolution of Worker Attitudes at Mitsubishi Motors", (Work Employment and Society Conference, 1998).

SECTION TWO: THE HEALTHY WORKPLACE INDEX

At a minimum, a healthy workplace is one where workers are not physically overloaded, where stress and tension are at a minimum, where management treats workers with respect, and where workers have a degree of control over decisions that affect their lives at work. An index reflecting these conditions needs to aggregate a number of different indicators of quality of life at work measured in different metrics. The methodology used to construct the Human Development Index (HDI) proved ideal for constructing a Healthy Workplace Index. The Human Development Index was created to overcome the limitations of national income as a measure of development and the quality of life in a country. It was argued that Gross National Product (GNP) was a poor reflection of overall quality of life where income was unequally distributed or where GNP only partially captures activities which people value highly. This might include better nutrition and health services, greater access to knowledge, more secure livelihoods, better working conditions, or security against crime and physical violence to name a few.⁹

The HDI was constructed from three different indicators of development: expectation of life, adult literacy, and income.¹⁰ Each of these indicators is measured in different units. To create a single index, minimum and maximum values were defined for each of the three indicators. The maximum can be interpreted as development targets. The original values for the three indicators were then translated onto a scale from 0 to 1, where 0 represented an indicator having the minimum value while 1 was assigned to an indicator with the maximum value. Values between 0 and 1 represent indicators above the minimum but below the maximum. The Human Development Index is the average of these three scale values.¹¹

⁹For instance, in the 1990 Human Development Report it was shown that Sri Lanka's GNP per capita was less than 1/5 of Brazil's, yet its life expectancy at birth was 71 years compared to 65 years in Brazil and its adult literacy rate was 87% compared with 78%. (p. 9)

¹⁰ In the original Human Development Index proposed in 1990 the targets used to calculate development were a life expectancy at birth of 78 years, 100% literacy, and a target income equal to the logarithm of the average poverty line of the richer countries. See Human Development Report, 1990, p. 14. The equation used to calculate the Index has been revised a number of times. See, Human Development Report, 1994 pp. 90-110.

¹¹ The HDI has become the focus of a number of research reports including a series of papers by Crafts. See, Crafts, N.F.R. (1997a), "Some dimensions of the 'quality of life' during the British industrial revolution", *Economic History Review*, 50, pp. 617-39; Crafts, N.F.R. (1997b), "The Human Development Index and changes in standards of living: Some historical comparisons", *European Review of Economic History*, 1, pp. 299-322.

The Healthy Workplace Index is constructed in a similar fashion. Eighteen different indicators of quality of life at work were selected from the CAW/McMaster survey ranging from the pace of work, to concern over losing one's job, to days working in pain. Maximums and minimums were defined for each of these 18 indicators. The indicators, and the maximums and minimums used in the Healthy Workplace Index are listed in Table One where they have been grouped into four categories: Physical Health, Emotional Health, Workload, and Job Control.

TABLE ONE: COMPONENTS OF THE HEALTHY WORKPLACE INDEX¹²
(Numerical value of minimums and maximums in brackets)

	MINIMUM	MAXIMUM
PHYSICAL HEALTH INDEX		
1) Days working in physical pain last month.	Every day (1)	Never (5)
2) Part of each day working in an awkward position.	All the time (1)	Not at all (5)
3) Days exhausted after shift in the last month.	Every day (1)	Never (5)
EMOTIONAL HEALTH INDEX		
1) How tense and wound up at work last month?	Very tense (1)	Not tense at all (4)
2) How concerned over losing your job in the next 3 years?	Very concerned (1)	Not concerned (3)
3) Days in last month felt distaste at the prospect of going to work.	Every day (1)	Never (5)
4) Enough energy after work for family in the last month.	Never (5)	Every day (1)
5) How easy was it to get time off to attend personal needs (doctor, ill child)?	Very difficult (4)	Very easy (1)
6) Could you keep current work pace until age 60?	No (4)	(Yes) 1
7) Are management policies fair?	Very unfair (5)	Very fair (1)
WORKLOAD INDEX		
1) Are there enough people in your area to do work assigned?	Far too few (5)	About right (3)*
2) Is the current physical work load?	Much too heavy (1)	About right (3)*
3) How much time to do the work currently assigned?	Far too little (5)	About right (3)*

¹² The actual questions can be found in the Appendix.

4) Is the current work speed?	Much too fast (1)	About right (3)*
5) What part of each day do you work as fast as you can so you do not fall behind?	All day (1)	Never (5)

JOB CONTROL INDEX

1) During a working day, how much can you vary your pace of work?	Not at all (5)	A great deal (1)
2) Is there adequate relief staff so you can easily leave the line to attend to personal matters? (washroom)	Far too few (5)	About right (3)*
3) How easy is it to change things you do not like about your job?	Very difficult (5)	Very easy (1)

One of the difficulties faced in defining indices such as the Human Development Index or the Healthy Workplace Index is that there is a degree of subjectivity in defining the maximums and minimums which define the end points of the scale.¹³ For the Healthy Workplace Index we relied on the minimums and maximums as defined in the survey and our own sense of a reasonable standard. For the six indicators with a time base such as days working in pain, or time working in an awkward position, the minimums and maximums were straightforward. Working in pain every day would be a minimum and never working in pain would be a maximum, a workplace reorganization goal. A second group of seven indicators such as 'how easy was it getting time off for personal matters', or 'the perceived fairness of management policies' had non-numerical answer choices of the variety from "very unfair" to "very fair" or from "very difficult" to "very easy". We relied on the end points of our survey questions for the minimums and maximums, assigning a value of 1 to minimums and increasing the value of each succeeding response by one unit with the maximum taking the value of the number of answer choices, in most cases 5. A third group of five indicators including questions relating to workplace or physical workload were more problematic. On the survey, respondents had the choice of reporting their workplace was 'much too fast', 'too fast', 'about right', 'too slow', or 'much too slow'. It seemed unreasonable to use 'much too slow' as an objective given it is not clear if having a workplace which is 'much too slow' is necessarily an improvement over having a workplace which is 'about right'. It was

¹³ After a number of revisions, the Human Development Index sets minimums at the lowest value any country in the sample reported over the previous thirty years. The maximums are set at the level which the United Nations predicts the leading country will achieve within the next 30 years. See, Human Development Report, 1994, p.92.

decided to use 'about right' as the maximum for this series of questions. This raises the difficult issue, not addressed in this paper, of how workplace norms are defined between industries and across time and the meaning which should be attached to the response 'about right'.

To construct the index, the raw values from each of the 18 survey questions, usually ranging from 1 to 5, were converted to a scale from 0 and 1. A simple linear formula was used to calculate this value.¹⁴ A value of 0 would represent someone with working conditions defined by the minimum for this indicator while a value of 1 would represent someone with working conditions defined by the maximum for this indicator. A value of .5 would represent someone half way between the minimum and the maximum. To see how the index was calculated it might be useful to look at an actual example. For the indicator days working in physical pain the minimum was working in physical pain every day (value 1) and the maximum was never working in physical pain (value 5). For a worker reporting working in physical pain most days (value 2) the indicator would take the value $(\text{Individual response} - \text{minimum}) / (\text{Maximum} - \text{minimum}) = (2 - 1) / (5 - 1) = .25$.

The 18 life at work indicators were grouped into the four categories listed in Table One. The rationale for doing this was it allowed us to decompose the index into four constituent parts and facilitated having an unequal number of questions in each component. The index for each category was simply the average of the scale value of the indicators in that category. The final Healthy Workplace Index was simply the average of the four category indices. A value of 0 on the Healthy Workplace Index would represent a workplace where working conditions were at the minimum on all 18 indicators. A value of 1 would represent a workplace where working conditions were at the maximum on all 18 indicators.

¹⁴ Where the numerical value of the maximum was greater than the minimum the index formula was $(\text{Individual response} - \text{minimum}) / (\text{Maximum} - \text{minimum})$. Where the numerical value of the maximum was less than the minimum the formula was $(\text{Minimum} - \text{individual response}) / (\text{Minimum} - \text{maximum})$. In either case the formula returns a value of 0 where the individual reports working conditions equivalent to the minimum and 1 where conditions are equivalent to the maximum.

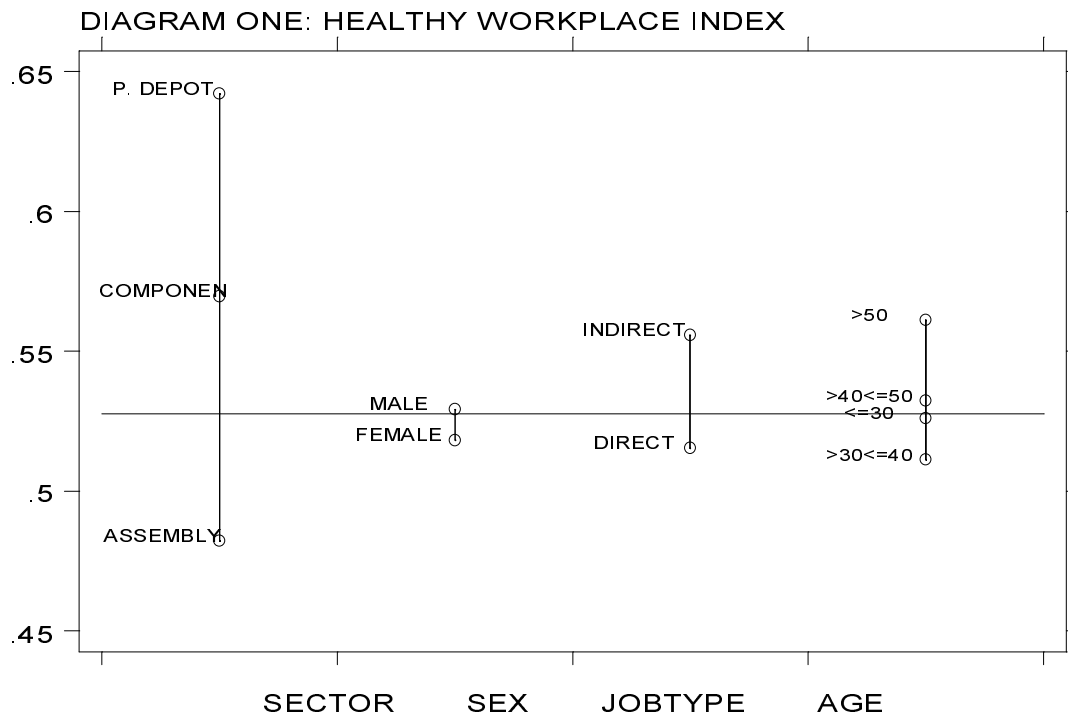
SECTION THREE: THE QUALITY OF LIFE AT WORK IN CANADIAN AUTOMOBILE PLANTS

This section will examine two questions. First, does the Healthy Workplace Index (HWI) reflect general assumptions regarding the quality of life at work in different sectors? We would be concerned if for instance it suggested that skilled workers had less control than assembly line workers, or office work was physically more demanding than working on a moving assembly line. Second, what does the Healthy Workplace Index tell us about the quality of life at work in the Canadian automobile industry?

Diagram One reports the mean values of the Healthy Workplace Index for 3,962 direct and indirect workers employed assembling vehicles, manufacturing components and in parts depots. The horizontal line in each of the diagrams is the unweighed sample mean. The vertical lines report means disaggregated by sector, sex, type of job and age. In Diagram One, the sample mean for the Healthy Workplace Index is .54. This should be interpreted as the average worker reporting working conditions about half way between the minimums and the maximums defined in Table One. Diagram One also reveals significant differences between the responses of workers employed in different sectors. The assembly plants had a lower HWI (.48) than those working in parts depots (.64) with those in component plants in between. The other characteristics for which disaggregated results are provided appear to be less significant. Males reported virtually the same HWI as females. Direct workers (eg. assembly line and machine operators) had somewhat lower HWI than indirect workers (eg. inspectors and material handlers). Workers 50 and over reported higher HWI but there was no obvious pattern for those below 50.

The results reported in Diagram One suggest that the HWI does reflect generally held assumptions regarding the quality of work enjoyed by workers in different sectors and with different characteristics. Most would predict that of the three types of workplaces for which we have data, working in an assembly plant organized around a moving assembly line would be the least attractive while working in a parts depot where workers have greater freedom to pace themselves would be the most attractive. Most would also expect that direct production workers, many of whom are mechanically paced on short cycle jobs, would report poorer quality of life at work than indirect workers many of whom work at non-machine paced tasks with longer job cycles. Assumptions regarding the impact of sex and age on the quality of life at work are less obvious. Given that jobs are allocated in these plants on the basis of seniority one would expect that male workers and older workers, both of whom have more seniority on average, would be working at better jobs than female workers and younger workers. For older workers this advantage may be negated if they are finding it increasingly difficult to sustain the expected workplace. Diagram One suggests that the advantage reported by males is marginal, while it would appear that older workers have been able to bid into more attractive jobs. The HWIs reported in Diagram One are broadly consistent with expectations of the quality of life at work in different contexts. This suggests it is a valid measure of the quality of life at work and can be used to rank

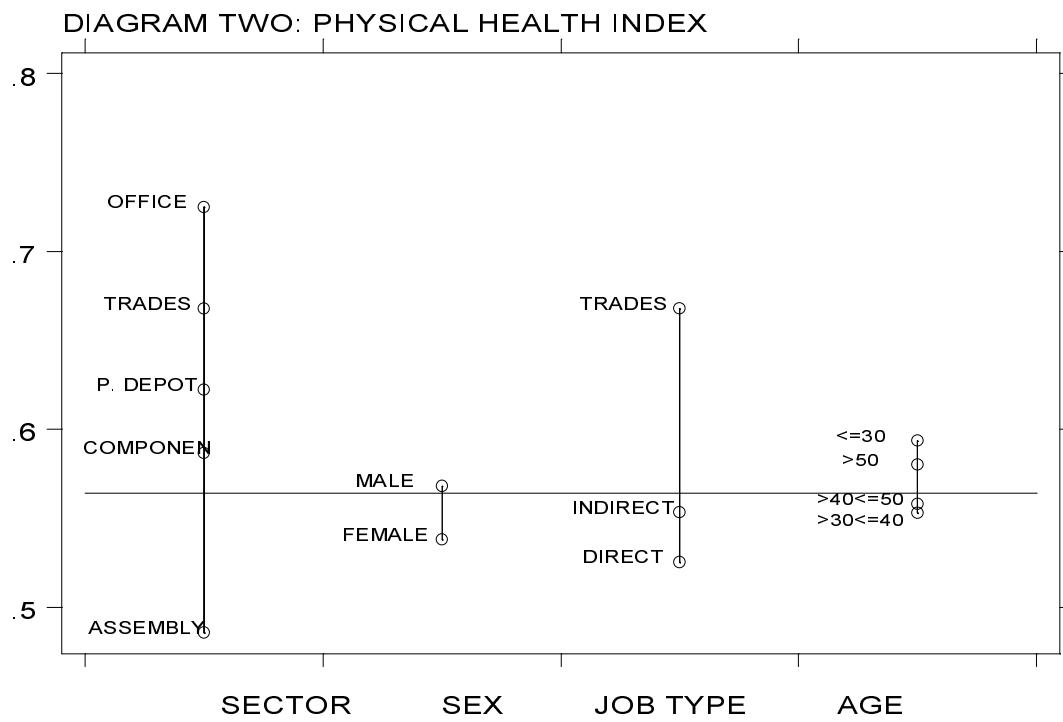
conditions at different companies using different models of work organization.



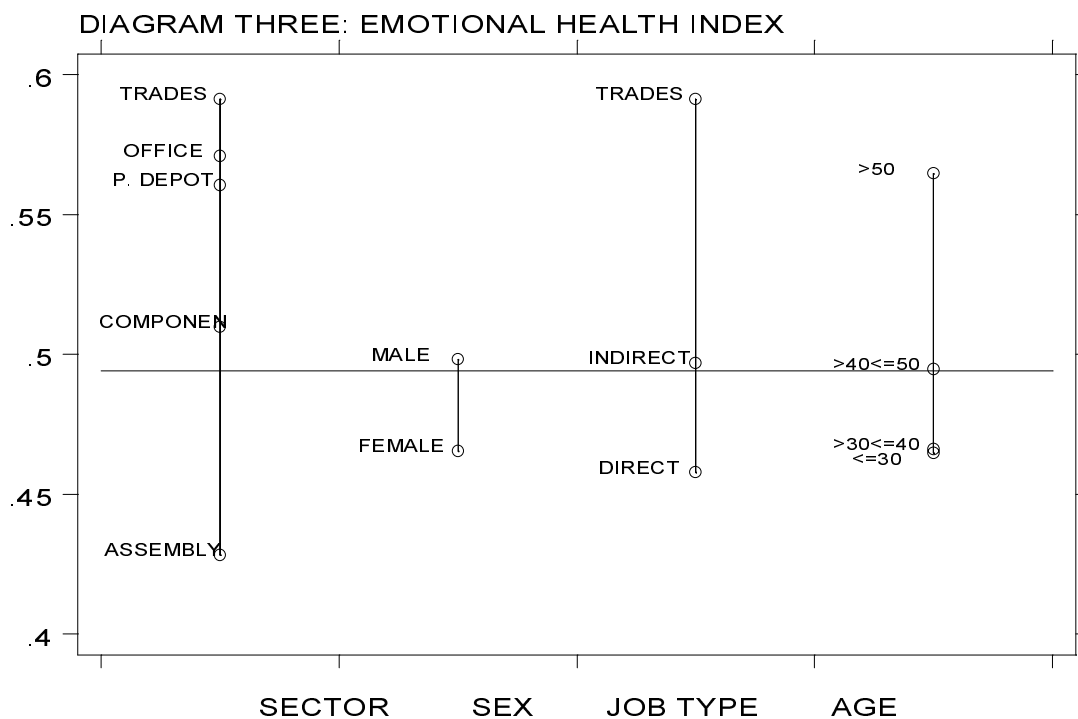
The Healthy Workplace Index provides a single measure which can be used as an indicator of the overall quality of life at work at different workplaces. Further insights can be drawn by examining the four components of the Index which are reported in Diagrams Two to Five. The Workload Index and the Job Control Index employ the same sample as the Healthy Workplace Index. The two health components, the Physical Health Index and the Emotional Health Index include as well just over 1,000 office workers and skilled trades workers employed at the 24 workplaces in the study.

The results from the Physical Health Index (PHI), which includes indicators of working in pain, working in an awkward position, and exhaustion after work are reported in Diagram Two. The PHI mirrors the overall Healthy Workplace Index with a few exceptions. Not surprisingly, disaggregating by sector reveals that office and skilled trades workers enjoy significantly better physical conditions than those employed in assembly plants. The Index for office workers was 49% higher than that reported by those in assembly plants. Women reported marginally poorer physical conditions than men. Age had only a minor impact on the PHI. The latter suggests that the ability of older workers to bid onto better jobs is more or less negated by the decline in their

ability to sustain the pace and physical load expected in this sector. Skilled trades workers reported better conditions than either indirect or direct workers.



The results from the Emotional Health Index (EHI) which includes questions on tension, job security, and relations with family are reported in Diagram Three. There are some interesting differences between the Emotional and Physical Health Indices. The mean value of the EHI (.49) was 14% lower than the mean value of PHI which may suggest that more attention needs to be directed towards stress and tension related health concerns. Disaggregating by sector revealed that the highest EHI was reported by skilled trades workers. Office workers, who reported the highest score on the PSI, do not score nearly as well relative to other sectors on the EHI. The EHI for office workers was only marginally higher than those working in parts depots and only 32% higher than those working in assembly plants compared with 49% higher on the PHI. The difference between male and female workers was somewhat larger, although still small relative to the differences reported between sectors. Age also appears to be a more important determinant of scores on the EMI. There was a clear correlation between age and the values of EMI with workers over age 50 reporting EHI 22% higher than those 30 or younger.

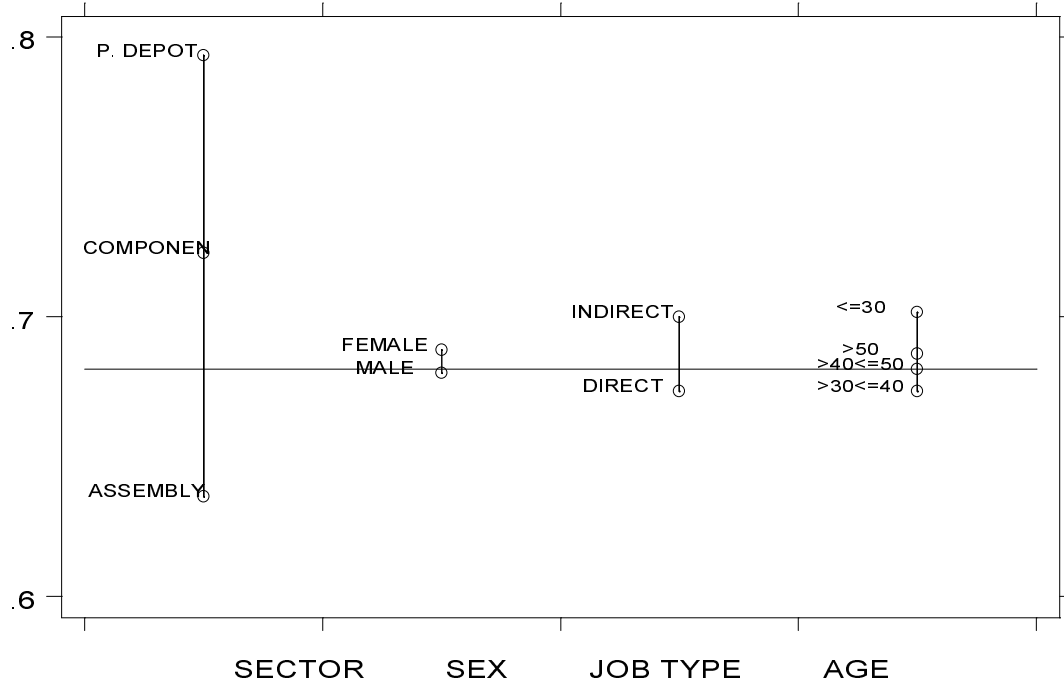


Results for the Workload Index(WLI), which includes questions on the speed of work, the physical load, the amount of time allocated, the number of people and the pace needed so one does not fall behind are reported in Table Four. Of all the indices calculated, the Workload Index has the highest mean value at .68. In interpreting this figure it is important to keep in mind that the survey included a range of questions about physical workload and the pace of work. It is unlikely that all of these questions would apply to all types of work. For instance, people working in a parts depot may be concerned that they have too little time to do their work and that there are not enough people assigned, but they are unlikely to report their work is too fast. Those on an assembly line may report their work is too fast and too heavy, but are unlikely to report there are too few people assigned as most line operations must have their full quota of workers to operate. This is confirmed by looking at the correlation matrix for the five questions in this index. All were less than .6 and most were between .25 and .45 suggesting a moderate degree of correlation. This is also confirmed by looking at how many workers reported at least one aspects of their workload was excessive compared to those who report their workload was excessive on all aspects. In the entire sample, 69% reported that their work was either too fast, too heavy, had too little time allotted, or had too few people assigned but only 14% reported it was all of these things.

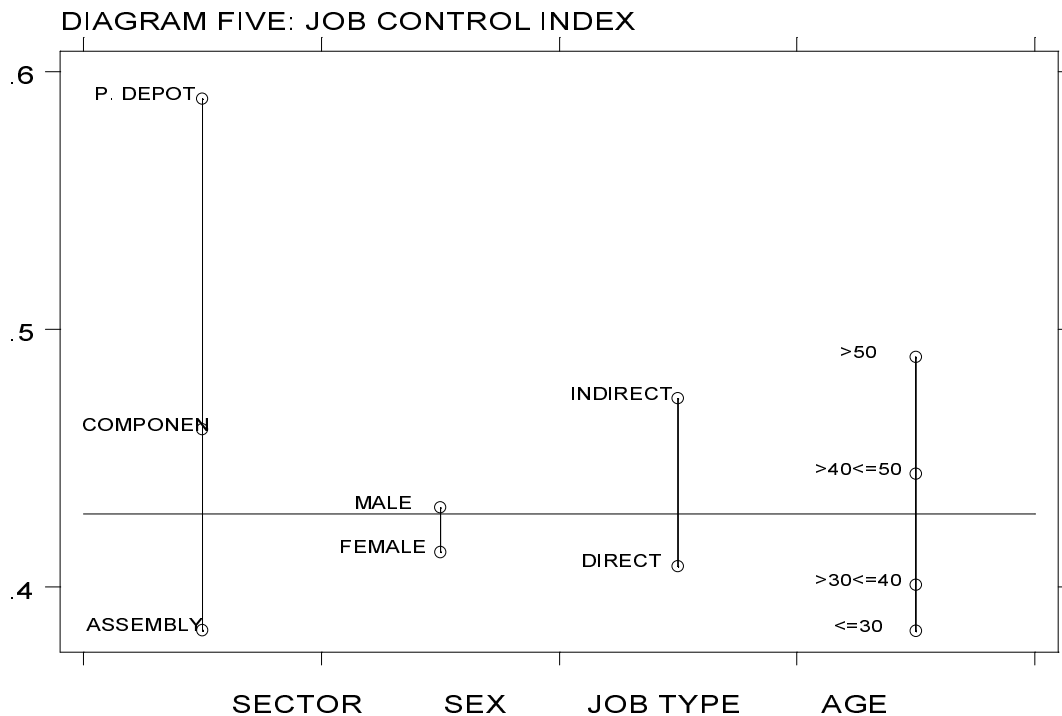
In designing this component of the HWI, it was necessary to make a choice between attempting to correct for this possible upward bias versus making the index construction as simple as possible and transparent to the reader. In previous work by the authors, this problem was resolved by measuring overloaded jobs as those where workers reported their load was excessive on three out of four or five indicators. We have opted not to take this approach here as we felt it would make the index less transparent to the reader and raise questions regarding the value of the WLI compared to the other indices calculated. Instead we have opted simply to warn the reader that in interpreting this index one needs to be sensitive to the likely upward bias created by the construction of the index.

Returning to the WLI itself, while the mean score on this index is higher than any other index the variance between workers in different sectors or with different characteristics was relatively small. Those working in parts depots reported a WLI which was only 23% higher than the WLI for those employed in assembly plants. Personal characteristics appear to have almost no impact on the WLI. As was the case with the PHI, the advantage older workers might have in bidding onto preferred jobs appears to be counterbalanced by the difficulty older workers have sustaining the workload expected in this sector.

DIAGRAM FOUR: WORKLOAD INDEX



Results for the Job Control Index (JCI), which includes questions on the ability to vary workplace, find relief to attend to personal matters at work, or change things you do not like about your job are reported in Diagram Five. The sample mean score of .43 was the lowest of all the indices calculated. This raises doubts about the extent to which changes in work organization in the automobile industry have empowered workers. Disaggregating by sector revealed that parts depot workers had a JCI 55% higher than those working in assembly plants. Sex appears to have had little impact on reported scores. Indirect workers generally reported higher scores than direct workers and older workers reported higher scores than younger workers.



Diagrams One to Five suggest that the Healthy Workplace Index can be a valid measure of the quality of life at work. It suggests that the sector one works in has a significant impact on reported Index values. It also suggests that personal characteristics such as sex, age and job type are generally less important. The detailed study of the four components which make up the Index suggest that in areas such as Physical Health and Workload, any advantages an older worker might have by being able to bid onto a preferred job are balanced by the reality that as one ages it becomes more difficult to sustain the workload expected in this sector.

SECTION FOUR: RANKING THE QUALITY OF LIFE AT WORK AT DIFFERENT COMPANIES AND WORKPLACES

In the previous section of the paper, we argued that the Health Workplace Index was a valid instrument for measuring the quality of life at work. It was shown that the reported values of the Index varied significantly by sector and to a lesser degree by personal characteristics such as sex, job type and age. In this section of the paper we will look at a single sector, motor vehicle assembly, and how the quality of life at work varies across the four companies and nine workplaces for which we have data. There are two reasons for doing this. The first reason is a desire to determine if the quality of life at work within a sector is determined largely by factors beyond the control of individual companies and workplaces. If this were the case we would expect to find little variance in the HWI. If the HWI varies between companies or between workplaces this suggests that choices are being made regarding how to implement technology which can have either a positive or negative impact on the quality of life at work. The second reason for focussing only on the assembly sector is that the work emerging from the International Motor Vehicle Project at MIT has created a great deal of confusion in policy and academic circles by suggesting that the quality of life at work is improving as a result of the shift to Lean Production. The HWI can be used to test this hypothesis.

In previous work, we argued that at the time of the survey each of the four companies assembling vehicles in Canada was at a different point in the transition to Lean Production.¹⁵ We argued that GM had gone the furthest down the road towards lean production practicing a top-down teamless variant of the system. Workplace standards had been tightened, jobs were redesigned to reduce the ability of employees to vary from a pre-defined work sequence, JIT was in place, continuous improvement was being promoted, and overall labour hours per vehicle had fallen dramatically. When it opened, CAMI, a joint project of Suzuki and GM had gone some way towards implementing a team based system of lean production borrowing heavily from the work organization practices of Suzuki. Since the opening, many of these early practices have either been abandoned or become less important in the overall organization of the plant.¹⁶ Teams now play a minor role in day to day decisions and the task of continuous improvement has increasingly become a management task. Chrysler and Ford had made the least progress in adopting a workplace set of institutions consistent with lean production. Chrysler had emphasised new product design over the last decade and its ability to sell as many mini-vans as it produces made regularity of output a higher priority than minimizing the cost of production. The Ford assembly plant in the

¹⁵ See, Wayne Lewchuk and David Robertson, "Production Without Empowerment: Work-Reorganization from the Perspective of Motor Vehicle Workers", *Capital and Class*, vol. 63, 1997, pp. 37-65.

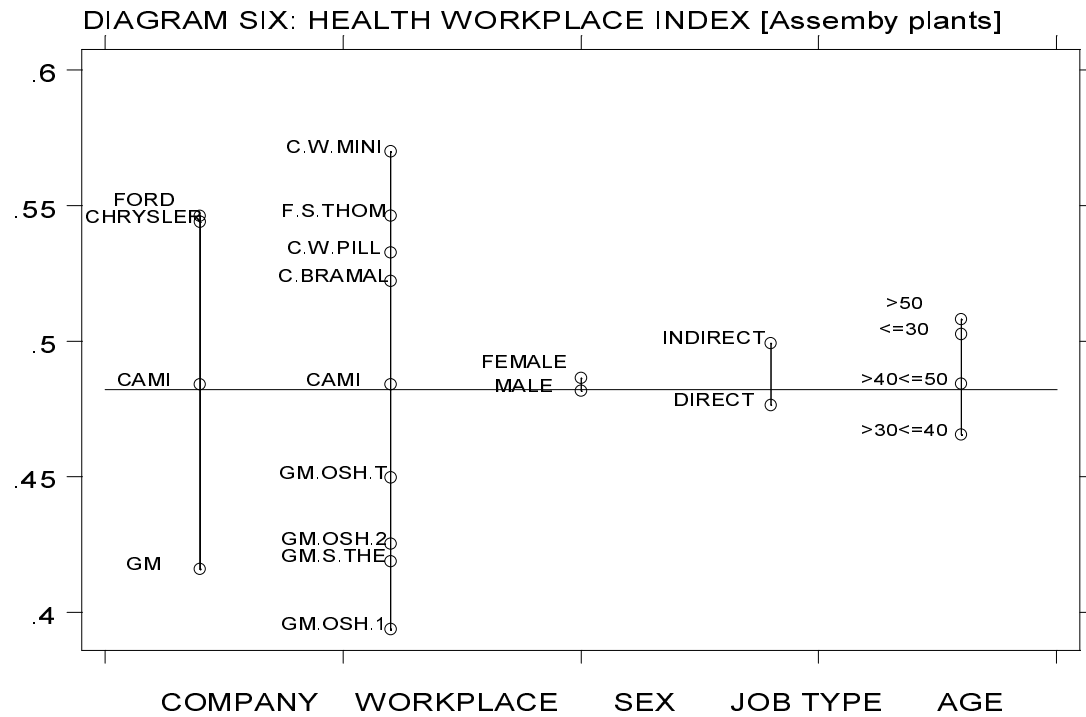
¹⁶ See, James Rinehart, Christopher Huxley and David Robertson, *Just Another Car Factory*, (ILR Press, 1997).

sample produces an older model and has made limited efforts to move towards the practices associated with lean production.

Diagram Six reports HWI for the assembly sector only by company, workplace, sex, job type and age. A total of 2,424 observations from 9 different assembly plants are included. The first observation is that company seems to matter. Ford's score on the HWI was 31% higher than that of GM. This is comparable to the difference between assembly plants and parts depots in Diagram One. Workplace has less of an influence. Individual GM and the Chrysler workplaces are tightly bunched around the GM and Chrysler means. The HWI at the best workplace is 46% higher than at the worst workplace while the best Chrysler workplace is 10% better than the worst Chrysler workplace and the best GM workplace is 15% better than the worst GM workplace. The remaining three personal characteristics are relatively less important.

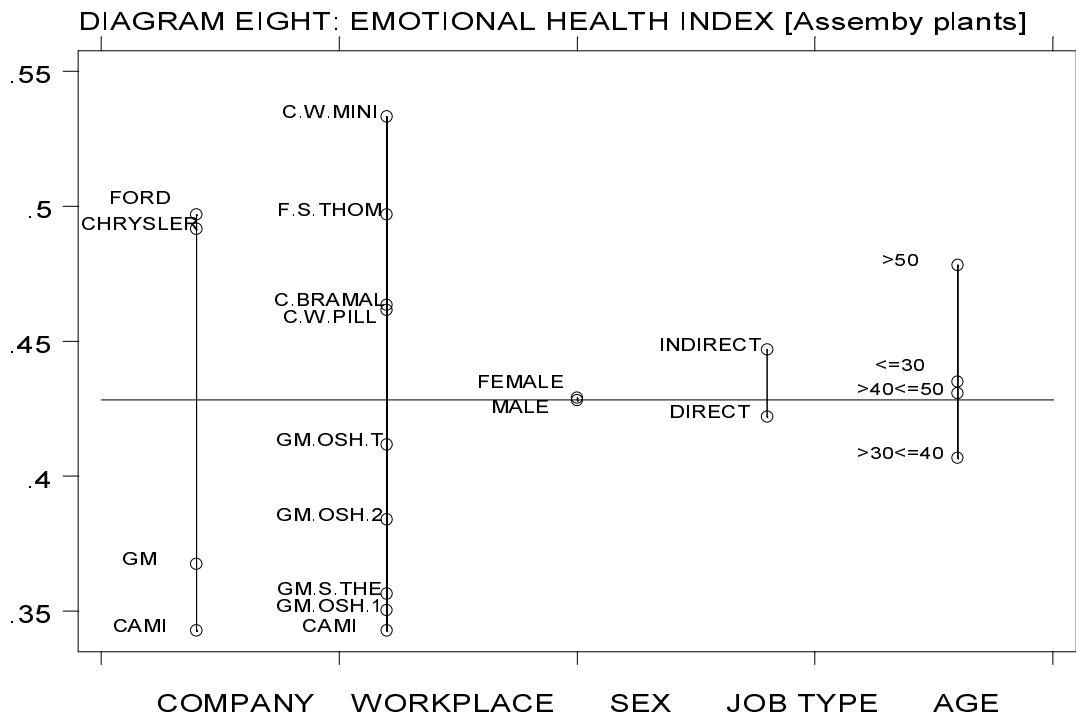
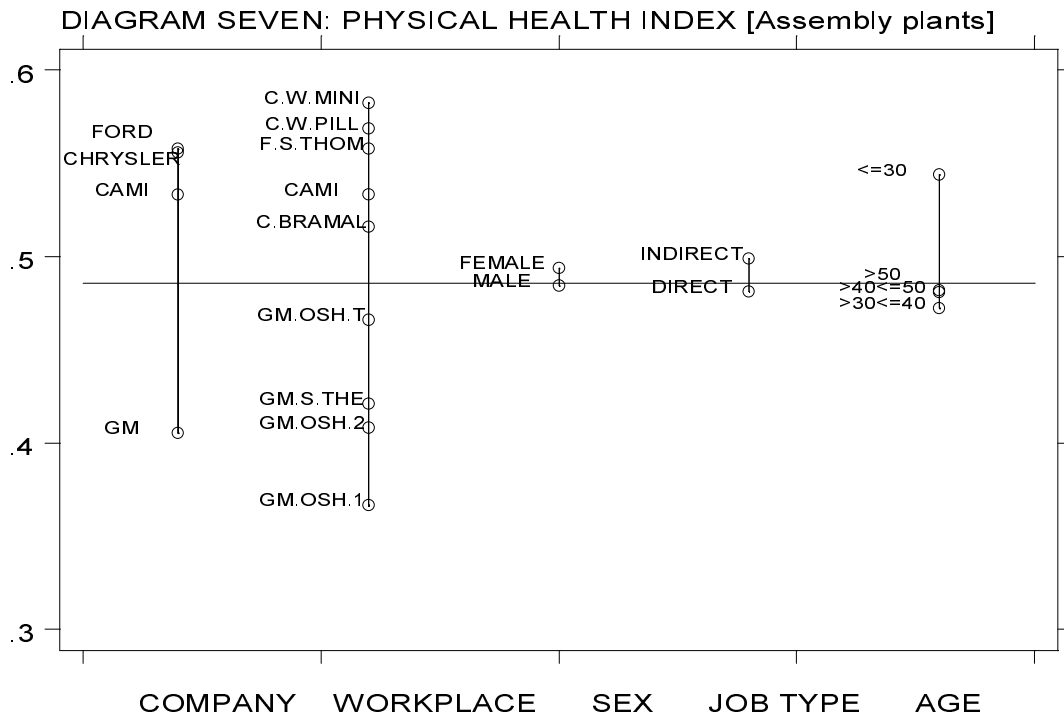
The observation that the HWI varies across companies suggests that the quality of life at work is not simply technically determined. Even within a relatively technologically homogeneous sector, factors such as work organization, management policies and involvement of the union appear to influence the quality of life at work of workers. However, this effect appears to be influenced mainly by company policies. At the local level there was much less variance between workplaces belonging to the same company.

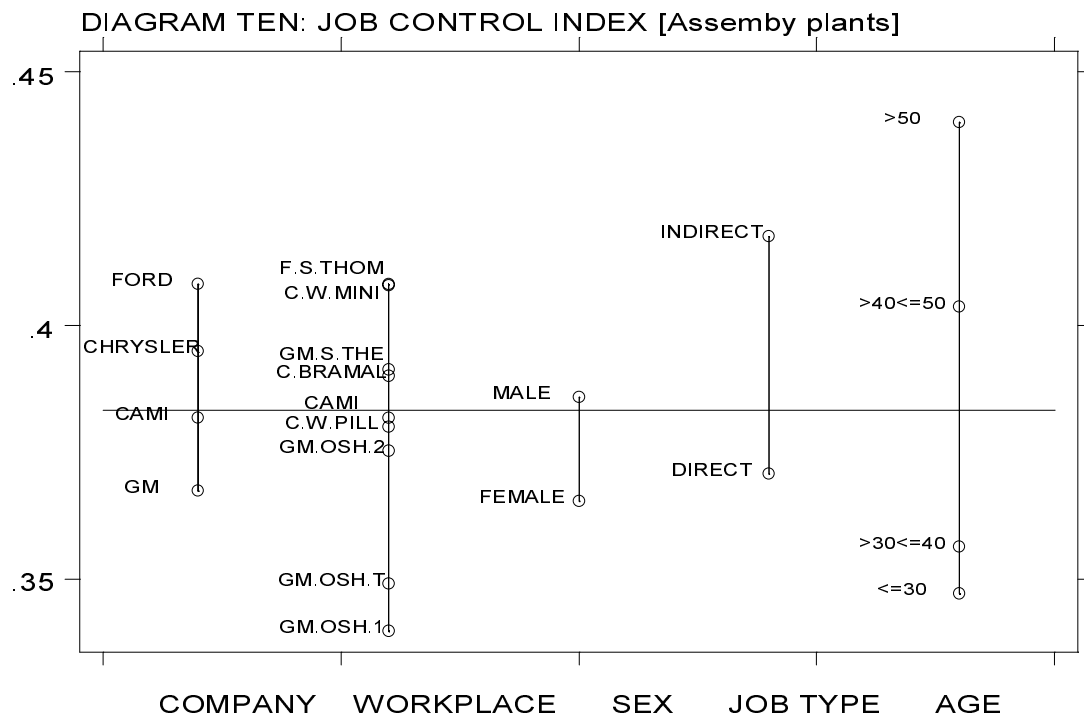
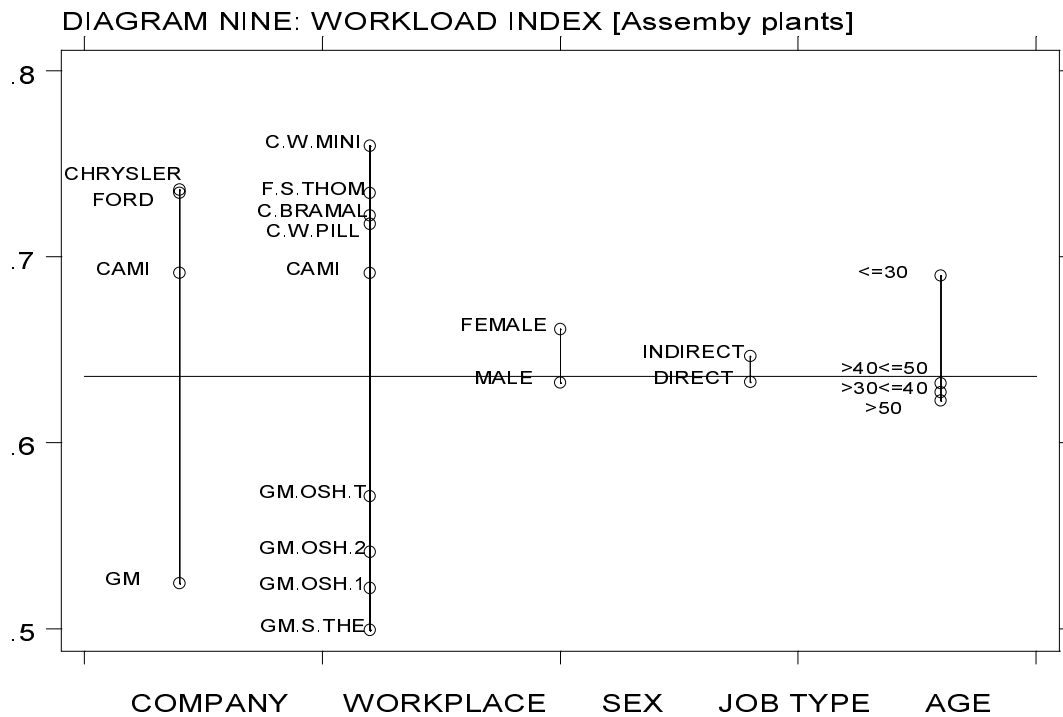
Diagram Six raises serious concerns regarding the hypothesis that the shift to Lean Production will enhance the quality of life at work. In Diagram Six, the ranking of the different companies on the HWI is inversely related to the extent to which each company has moved towards lean practices. GM, which has made the most effort to become lean, is at the bottom of the scale while Ford, which has made the least effort to change, is at the top. This should not be interpreted as suggesting that the old Fordist model of work organization is attractive to workers. A score of .55 on the HWI at Ford suggests quite the opposite. Our results do suggest that progress in implementing lean and becoming more productive and competitive does not appear to be associated with a climb up the HWI league tables for workers.



Diagrams Seven to Ten report results for the four components of the HWI. The results can be summarized briefly. A quick scan of the Diagrams makes it clear that Ford and Chrysler workplaces reported the the highest quality of life at work. In general, GM workers reported the lowest index scores except on the EHI where CAMI had the lowest scores. CAMI scored closer to Ford and Chrysler on the PHI and the WLI. The percentage difference between the lowest and the highest company scores on the four indices was, PHI 37%, EHI 47%, WLI 42% and JCI 11%. This suggests that there were significant company differences in the quality of life at work on at least three components of the index, but that scores on the JCI were tightly bunched around the mean. This last finding contradicts the argument that the shift to lean production would enhance the quality of life at work by empowering workers and giving them greater control over decisions affecting them. Given the workers in our sample report limited ability to vary their workplace, almost no capacity to changes things they do not like about their job, and problems getting time off the job to go to the washroom, it is hard to envision describing these workers as empowered or in control in any meaningful way. Workplace appears to have less influence on the quality of life at work than company. On three of the four indicators the GM and the Chrysler workplaces were tightly bunched around the GM and Chrysler company means. The only Index where this was not the case was the Job Control Index which also exhibited the least variance between company means.

The differences between male and female workers was very small on all four indicators. On three of the four indicators women reported better conditions than men. Indirect workers reported higher indices than direct workers, but again the differences were small. Age was the one personal characteristic that seemed to affect index scores. Younger workers, less than age 30, had a PHI 15% higher than workers 30-40 and 13% higher than workers 30-50. On EHI it was older workers over the age of 50 who reported the highest index, 17% higher than those age 30-40. The different impact of age on the two health indices is of some interest. It suggests that younger workers are the most resilient in the face of physical demands, that older workers are the most resilient in the face of emotional demands, and that on both indices it is middle age workers, age 30-40, who report the lowest quality of life at work as measured by PHI and EHI. The other component of the index where age was relatively important was the JCI. While there was very little difference between workplaces on this component of the HWI, within each workplace it appears that younger workers perceive themselves to have the least control while older workers have the most. But even for workers over age 50, their JCI was still only .44 suggesting a minimal degree of control at work.





A detailed examination of the HWI for the vehicle assembly sector suggests that there are important differences across companies in the quality of life at work. It suggests that Ford and Chrysler have found a less alienating way to produce vehicles than GM. CAMI oscillates between looking like Ford and Chrysler on a number of indicators and like GM on others. There was much less variance between workplaces from the same company suggesting that local actors have limited independence and are constrained by decisions taken at a higher level. These results suggest that the quality of life at work is a function of both the technological imperatives associated with particular sectors, but also choices under each company's control regarding how this technology is implemented. Men and women face very similar quality of life at work across this sector while indirect workers report marginally better conditions than direct workers. Age appears to have a complex effect on the quality of life at work. There is some evidence that as workers grow older they find the physical demands of the job more onerous, but the emotional demands less so. There is also evidence that as workers grow older they find ways to enhance their control of their work environment.

SECTION FIVE: A MULTIPLE REGRESSION ANALYSIS OF THE HEALTHY WORKPLACE INDEX

Sections Three and Four of this paper explored the validity of the Health Workplace Index and how it could be used to shed light on a single manufacturing sector. Each relied on a simple presentation which ignored potential problems from sectors or companies having different compositions of workers in terms of age, sex or job type. In this section we will use the HWI as the dependent variable in a multiple regression analysis. This will allow us to control for differences in the composition of the workforce across sectors and companies.

Table Two present simple OLS regressions which use HWI and its four components as the dependent variable. The indices are regressed against company dummies, sex, job type dummies and age, where age is normalized around the age of 30. The omitted categories, and hence reference point for interpreting the coefficients, are direct, male workers, age 30, working at GM, in assembly plants. The coefficients in Table Two indicate the difference between the reference worker and a worker with this alternative characteristic. For instance under HWI a worker at Chrysler had an index value 10.7 percentage points higher than the reference worker.

Table Two broadly confirms the conclusions based on the evidence presented in Diagrams One to Ten. The vast majority of independent variables were highly significant. Only in a small number of cases were coefficients not significant at the .01 level. While most were significant, the size of the coefficients varied considerably. Workers at all three companies reported higher HWI than workers at GM, from 17% higher at CAMI to 26% higher at Chrysler. Correcting for compositional differences leads to slightly lower scores for Ford relative to Chrysler than was the case in the diagrams above. Sector remains an important factor in determining the indices. As was the case above, the other two sectors for which we have full information, components and parts depots, report higher indices than assembly. Personal characteristics including sex, job type and age are the most likely to be statistically insignificant and have the smallest coefficients.

TABLE TWO: EFFECT OF COMPANY, SECTOR AND PERSONAL CHARACTERISTICS ON THE HEALTHY WORKER INDEX AND ITS COMPONENTS.
(Comparison worker works at GM, in assembly, is male, direct and age 30.)

DEPENDENT VARIABLE	HEALTHY WORKPLACE INDEX	PHYSICAL HEALTH INDEX	EMOTIONAL HEALTH INDEX	WORKLOAD INDEX	JOB CONTROL INDEX
FORD	7.2	7.7	8.6	9.4	1.5**
CHRYSLER	10.7	10.1	9.1	15.4	4.4
CAMI	6.7	10.2	1.7***	13.6	4.5*
PARTS DEPOTS	16.9	15.9	13.4	17.4	19.8
COMPONENT	9.4	10.9	7.5	10.4	8.4
OFFICE	-	20.8	7.9	-	-
SKILLED TRADES	-	19.4	15.9	-	-
FEMALE	-2.0*	-2.9	-1.4**	-1.0***	-2.2*
INDIRECT WORKER	2.1	2.1*	1.9	1.0***	4.0
AGE	0.02	-0.01**	0.31	0.01***	0.35
CONSTANT	41.0	43.9	34.7	55.4	31.8

Unless otherwise indicated, all coefficients statistically significant at the .01 level.

* Statistically significant at the .05 level; ** at the .10 level; *** greater than .10

CONCLUSIONS

This paper set out to construct a Healthy Workplace Index using the United Nations Human Development Index as a model. This new Index was tested and found to offer measures which were consistent with generally held perceptions of quality of life at work in different sectors. It was then used to examine the quality of life at work in the Canadian automobile industry. The results suggest that there is significant room for improvement in this sector. Equally important, the results suggest that as important as sector was in shaping the work experience of people in the sample, that within a sector such as assembly there were surprising differences between companies, although not between workplaces from the same company. It was argued that the low scores of GM, and to some extent CAMI, suggest that new lean models of work organization are having a negative effect on the quality of life of workers. While Fordist style plants were revealed to have their own quality of work life problems, lean workplaces appear to offer even less healthy working conditions.

APPENDIX ONE: THE CAW/McMASTER SURVEY

The study had two components, a survey distributed to workers at their workplaces and a site visit by one or more members of the research team. The site visit allowed us to inspect the production process and to interview members of the union executive. All workplaces assembling vehicles or components in Canada, owned by Ford, Chrysler, General Motors and CAMI, and organized by the CAW were originally included in the study. The Ford Oakville assembly complex had to be dropped due to a combination of funding problems and awkward timing. The survey was distributed to approximately one out of every six production workers. Surveys were randomly distributed by local union members. Each person was asked to distribute 25 surveys in his or her area to ensure an even distribution throughout the plant. Surveys targeted at different areas of the workplace and different shifts were pre-bundled by the research team based on rough estimates of the proportion of people in each area of the plant. Surveys were filled out by workers on their own time and were returned to their local union representative, or the union office, in unmarked sealed envelopes. Respondents were asked not to identify themselves on the survey. The surveys were returned to the national office of the CAW and then sent to McMaster University for coding and data analysis.

Measures of the quality of life at work are notoriously difficult.¹⁷ Simple questions such as, "Are you satisfied with your job?" often give contradictory results. It is impossible to completely eliminate the impact of a person's earlier experiences and expectations from responses to questions about current working conditions. The impact of this problem was minimized in a number of ways. Answer choices were either arranged along an objective time scale eg. from "All day" to "Never" or with relatively easily understood end points such as from "Very difficult" to "Very easy". Care was taken to make the survey worker friendly, using language used on the shop floor, and limiting the survey to four pages of questions, about 45 in total. The success of the survey instrument can be measured in part by the high overall response rate of 60% and that most surveys were filled out completely.

¹⁷ See Christian Berggren, *Alternatives to Lean Production: Work Organization in the Swedish Auto Industry*, (Ithaca, 1992), pp. 184-193.

TABLE THREE: RESPONSE RATE

	POPULATION	SURVEYS DISTRIBUTED	SURVEYS RETURNED	RESPONSE RATE
CHRYSLER				
Bramalea Assembly	2,600	450	305	68
Pillette Rd Assembly	1,700	270	206	76
Windsor Mini Van Plant	5,600	750	357	48
Etobicoke Casting	248	200	70	35
Ajax Trim	655	125	72	58
Mississauga Parts Depot	215	183	84	46
Skilled Trades	1,176	345	211	61
Office	267	162	119	73
GENERAL MOTORS				
Oshawa Car Assembly Plant #1	2,841	450	335	74
Oshawa Car Assembly Plant #2	3,172	450	301	67
Oshawa Truck Assembly	3,600	450	107	24
St. Therese Assembly	2,841	450	382	85
Windsor Transmission	1,358	225	155	69
ST.Catherines Engine	1,450	250	159	64
St.Catherines Components	2,288	400	246	62
Windsor Trim	1,200	175	147	84
Woodstock Parts Depot	575	250	202	81
Skilled Trades	2,851	625	430	69
FORD				
St. Thomas Assembly	2,600	450	325	72
Windsor Engine Plant 1	730	200	113	57
Windsor Truck Engine	611	150	102	68
Essex Engine	1,244	250	217	87
Windsor Casting	984	200	150	75
Windsor Aluminum	425	150	121	81
Essex Casting	523	150	65	43
Bramalea Parts Depot	275	275	78	28
Skilled Trades	992	425	276	65
Office	136	111	83	75
CAMI				
CAMI Car and Truck Assembly	2,500	550	106	19
Skilled Trades	139	125	36	29
TOTAL ASSEMBLY	27,454	4,270	2,424	57
TOTAL COMPONENTS	11,716	2,485	1,617	65
TOTAL OFFICE	403	273	202	74
TOTAL PARTS DEPOTS	1,065	708	364	51
TOTAL SKILLED TRADES	5,159	1,520	953	63
TOTAL	45,797	9,256	5,560	60

TABLE FOUR: INDEX VALUES (Entire sample)

	HEALTHY WORKPLACE INDEX	PHYSICAL HEALTH INDEX	EMOTIONAL HEALTH INDEX	WORKLOAD INDEX	JOB CONTROL INDEX
Sample mean	.53	.56	.49	.68	.43
Assembly	.48	.49	.43	.64	.38
Components	.57	.59	.51	.72	.46
Parts Depots	.64	.62	.56	.79	.59
Office	-	.73	.57	-	-
Skilled trades	-	.67	.59	-	-
Male	.53	.57	.50	.68	.43
Female	.52	.54	.47	.69	.41
Indirect	.56	.55	.50	.70	.47
Direct	.52	.53	.46	.67	.41
AGE					
>50	.56	.58	.56	.69	.49
>40<=50	.53	.57	.49	.68	.44
>30<=40	.51	.57	.47	.67	.40
<=30	.53	.59	.46	.70	.38

TABLE FIVE: INDEX VALUES (Assembly plants only)

	HEALTHY WORKPLACE INDEX	PHYSICAL HEALTH INDEX	EMOTIONAL HEALTH INDEX	WORKLOAD INDEX	JOB CONTROL INDEX
Sample mean	.48	.49	.43	.64	.38
Ford	.55	.56	.50	.73	.41
Chrysler	.54	.56	.49	.74	.39
CAMI	.48	.53	.34	.69	.38
GM	.42	.41	.37	.52	.37
CHRYSLER					
Bramalea	.52	.52	.46	.72	.39
Pillette Road	.53	.57	.46	.72	.38
Mini Van	.57	.58	.53	.76	.41
FORD					
St.Thomas	.55	.56	.50	.73	.41
GM					
Oshawa #1	.39	.37	.35	.52	.34
Oshawa #2	.43	.41	.38	.54	.38
Oshawa Truck	.45	.47	.41	.57	.35
St. Therese	.42	.42	.36	.50	.39
CAMI					
Car & Truck	.48	.53	.34	.69	.38
Male	.48	.48	.43	.63	.39
Female	.49	.49	.43	.66	.37
Indirect	.50	.50	.45	.65	.42
Direct	.48	.48	.42	.63	.37
AGE					
=>50	.51	.54	.48	.62	.44
>40<=50	.48	.48	.43	.63	.40
>30<=40	.47	.47	.41	.63	.36
<=30	.50	.48	.43	.69	.35

APPENDIX THREE: SURVEY QUESTIONS

PHYSICAL HEALTH INDEX

1. In the last month at work, how many days have you worked with physical pain or discomfort?
every day most days half the time a few days never
2. What part of each day do you work in physically awkward positions?
all the time three quarters half one quarter not at all
3. In the last month, how often have you felt exhausted after your shift?
every day most days half the time a few days never

EMOTIONAL HEALTH INDEX

1. In the last month at work, how tense and wound up were you?
very tense somewhat tense not very tense not tense at all
2. How concerned are you about losing your job in the next three years?
very concerned concerned not concerned
3. In the last month, how many days have you felt distaste at the prospect of going to work?
every day most days half the time a few days never
4. In the last month, how often have you had enough energy after work for your family?
every day most days half the time a few days never
5. Over the last two years, was it easy for you to get time off to attend to personal needs such as a doctor's appointment, an ill child or a wedding?
very easy easy difficult very difficult
6. Could you work at the pace of your current job until age 60?
yes likely not likely no
7. Are management policies reasonable and fair at this workplace?
very fair fair neither unfair very unfair

WORKLOAD INDEX

1. Are there enough people in your area to do the work assigned?
far too many too many about right too few far too few
2. Is your current physical work load(positioning and fastening parts, moving and lifting sub-assemblies, air tool torque):
much too heavy too heavy about right too light much too light
3. How much time do you have to do the work currently assigned to you?
far too much too much about right too little far too little
4. Is your current work speed or work pace:
much too fast too fast about right too slow much too slow
5. For what part of each day do you work as fast as you can so you don't fall behind?
all day 75% of the time 50% of the time 25% of the time never

JOB CONTROL INDEX

1. Over the course of a working day, how much can you vary your pace of work?
a great deal a lot some a little not at all
2. Is there adequate relief staff in your work area so that you can easily leave the line to attend to personal matters(eg. going to the washroom, etc.)?
far too many too many about right too few far too few
3. How easy is it for you to change the things you do not like about your job?
very easy easy neither difficult very difficult

CSLS Conference on the State of Living Standards and the Quality of Life in Canada

October 30 - 31, 1998 Château Laurier Hotel, Ottawa, Ontario



*Centre for the
Study of Living Standards
Centre d'étude des
niveaux de vie*

“Good Life Time” (GLT): Health, Income and the Time to Enjoy Them

Michael Wolfson
Statistics Canada

Session 8: Health, Insecurity and Well-being
October 31 12:15 PM - 3:45 PM

“Good Life Time” (GLT): Health, Income, and the Time to Enjoy Them

Indicators Based on a New Integrated Microanalytic Framework for Socio-Economic Statistics

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Statistics Canada

Abstract

Contemporary public policy increasingly takes an integrated view of individuals – in their family contexts, in their time spent in leisure and unpaid as well as paid work, and in their interactions with major government institutions such as schooling, health care, taxes and cash transfers. Moreover, policy-related information needs, as well as those of the general public, include both broad summary indices and detailed distributional patterns. However, there is no widely accepted integrated framework for socio-economic statistics that spans these domains, particularly one based on explicit and coherent microanalytic foundations. LifePaths is a prototype of such a framework under development at Statistics Canada. It builds on ideas developed for the UN's (1975) System of Social and Demographic Statistics, and Juster and Land's (1981) discussion of demographic versus time-based systems of social accounts. This paper extends earlier work sketching the initial LifePaths prototype (Wolfson, 1997) from a cross-sectional or period framework to an historical cohort, or equivalently an overlapping generations, framework. New illustrative results provide initial working estimates of the extent and distribution of “good life time”, defined as spells of leisure time over the life cycle that are coincident with adequate disposable income and health.

Introduction

There is a pervasive interest in contemporary societies to know how well things are going, to have indicators of performance. These range from the commonplaces of sports scores and blockbuster movie revenues, to financial market indices, and to measures for entire societies like GDP per capita and life expectancy. However, there is also a continuing malaise with regard to the standard national-level indicators. The predominance of GDP and related measures, while useful for economic matters, lacks balance as a reflection of the diversity of social activity, and what is generally considered important in life. Similarly, the ubiquity of national health measures based only on mortality rates, taking no account of health status among the living, is increasingly seen as inadequate for social measurement.

As a reflection of this dissatisfaction with conventional socio-economic indicators, there is almost as long a history of search for alternatives. Among the various proposals, there is a resurgence, certainly in North America, of work in developing specific indicators, or *ad hoc* collections (e.g. OECD 1982; Sustainable Seattle, [www](#); Federation of Canadian Municipalities, [www](#); Redefining Progress, [www](#)). Indeed, the OECD (1998b) recently brought an illustrative collection of indicators together for social affairs ministers because “the need for a system of social indicators has recently become more pressing” (p2).

The most ambitious social indicator proposals involve more than *ad hoc* collections of indicators. These are proposals for an integrated framework for socio-economic statistics – such as Juster and Land's discussion of time-based and demographic systems of accounts (1981), Richard Stone's System of Social and Demographic Statistics (Stone, 1973; UN, 1975), the System of National Accounts and others' discussions of Satellite Accounts and Social Accounting Matrices or SAMs (e.g. UN et. al, 1993; Vanoli, 1994; Keunig, 1994; Pyatt, 1990)

Such integrated frameworks – when compared to *ad hoc* collections of a few diverse indicators – have the disadvantages that their indicators, because they are also part of a framework, may be more difficult to understand; and they also have at least the appearance that they are far more costly to implement. On the other hand, indicators embedded in a statistical framework have the benefits of a well articulated

conceptual foundation and logical consistency. They may also, if properly designed, yield more reliable statistical measures. And in the end, they may be no more costly than a wide-ranging collection of *ad hoc* indicators, especially when account is taken of the range of underlying data collection vehicles required.

This paper describes one such integrated framework that has been under development at Statistics Canada, generically called LifePaths. Here we focus on one incarnation, where the emphasis is on social indicators relating to time, money and health, hence LifePaths TMH. In a parallel paper (Wolfson and Rowe, 1998), we focus on inter-generational equity and generational accounting (GA) using another variant called LifePaths GA. LifePaths TMH is still a prototype, so the results are very much initial estimates. In line with the practice of “rapid prototyping” in the software industry, the LifePaths TMH results to be discussed here should be seen as early worked examples, and not the more definitive set of results that will be produced once more of the underlying data analysis has been completed, and richer data become available.

The key goals of LifePaths include :

- providing a useful and broadly based set of summary socio-economic indicators, for example various decompositions of life expectancy such as “good life time”;
- producing indicators with “construct validity” – that reasonably reflect what are widely agreed to be major socio-economic outcomes and attributes of the level of well-being in society;
- helping to “conceptualize, measure and understand social change” (p xiv, Juster and Land, 1981), thereby allowing representations not only of socio-economic outcomes, but also their underlying causal pathways;
- providing a framework for integration and coherence – more than mere juxtaposition or arbitrary aggregation to form overall indicators (as in the Genuine Progress Index, Cobb, 1996); Fordham Index of Social Health (1995); and the UNDP’s (1997) Human Development Index); and
- tightly coupling the resulting indicators, and the system of socio-economic statistics within which they are embedded, with a simulation capacity – the capacity to pose carefully and answer a series of “what if” questions, both for research and for policy analytic purposes.

In order to motivate the LifePaths TMH results to be presented, we begin in the next section with a review of a few indicators already extant in the literature. All of these turn out (not accidentally) to be nested within LifePaths TMH. (They also provide an introduction to some of the methods underlying LifePaths.) An overview of the structure of LifePaths TMH is then given, followed by brief discussions of validation, and the relationships between LifePaths TMH and the System of National Accounts (SNA). We then present an initial set of estimates building up to a set of measures relating three major socio-economic domains – namely time, money, and health. In particular, we use LifePaths TMH to provide estimates of the *joint* availability of a minimum level of leisure or discretionary time, adequate money income, and good health – adequate TMH, or “good life time” (GLT). The LifePaths framework allows us to generate estimates of GLT and its components over the entire life course by birth cohort in Canada. Moreover, realistic heterogeneity within cohorts is included.

Since the foundations of the analysis are explicitly microanalytic, with richly heterogeneous cohorts of individuals, the underlying data are highly multivariate. Such detail is essential to the construction of the summary socio-economic indicators of interest, but is also complex. Fortunately, with the spectacular improvements in computing, we need not suppress this underlying detail. Instead, we can draw on computer graphics and data visualization to show considerably more of the underlying detail than is possible with the usual tabular presentations.

Components of the Vision

In order to motivate LifePaths TMH, and its vision of an integrated framework for socio-economic statistics, it is useful to review a number of (up to now) disparate examples. However, there is one unifying theme. All the examples build on measures of the time individuals spend in various situations or socio-economic states, or the rates at which they make transitions between the various states. There is, as a

result, a common numeraire in all these examples, other than money – namely time, measured in hours, days, weeks and years as appropriate.

Population Age Structure – The first example, shown in Figure 1, is a series of well-known population pyramids. In this case, there are three pyramids, showing the Canadian populations in 1961 and 1991, and as projected for 2031. In addition, the more darkly shaded area indicates those individuals classified by the census (1961 and 1991) or projected by Canada's Chief Actuary (2031 – OSFI, 1995) as in the paid labour force.

Such population pyramids are a very widely used form of social indicator. In this case, they show clearly several major phenomena:

- the post-war baby boom and bust, and as a result the expected aging of the population,
- the increase in female labour force participation, and
- the growing ratio of the non-working population (mainly elderly) to the working population.

It is important to note that the three pyramids represent cross-sectional or “period” views of the population. An alternative view is that of a birth cohort or generation. This kind of view would be built up by following, those born in a given year over time. In Figure 1, this is illustrated by the dashed horizontal line at about age 17 in the 1961 pyramid, age 47 in the 1991 pyramid, and age 87 in the 2031 pyramid, which shows where individuals in a given birth cohort would appear in each of these successive cross-sectional period views of the population. This distinction between period and cohort views is fundamental to much of what follows.

Educational Progression – A second group of examples involve extensions to the ideas of life expectancy and the underlying life tables upon which such measures are based. For example the table at the top of Figure 2, based on Quebec's annual publication of indicators for their educational system, shows the amount of time children and youth have been spending in various stages of the education system, and in the bottom part, the corresponding rates of transition and drop out for the most recent year. It is important to emphasize that these two sets of figures are complementary. The average durations of various kinds of schooling in the table at the top of Figure 2 are the direct results of the transition rates in the bottom part.

These kinds of displays, and the data on which they are based, can illuminate widely used indicators like “the” high school drop out rate. In fact, there are many ways to measure this rate – for example the number of children leaving high school before graduating with a diploma (27% in Quebec according to Figure 2), or the number failing to attain a diploma by age 20 (only 13% in Quebec). Embedding these different rates in a framework like that in Figure 2 provides coherence. It also helps greatly in avoiding otherwise distracting controversy about which dropout rate is the “right one”, by clearly displaying the reasons for the differences just noted – in this case because many drop-outs of the first kind return to school and do complete their courses within a few years.

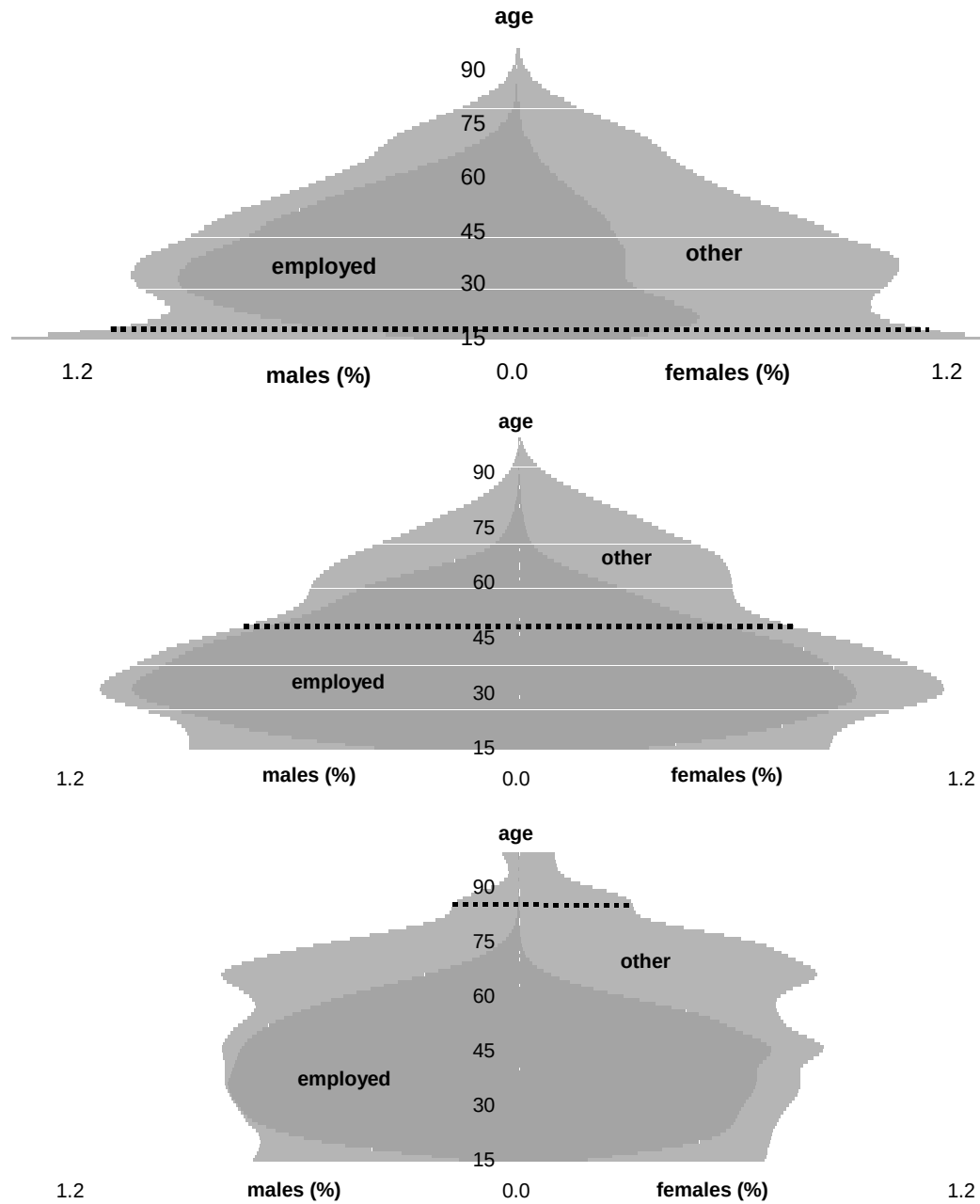
Figure 1 – Period Populations Age 15+, Overall and Employed

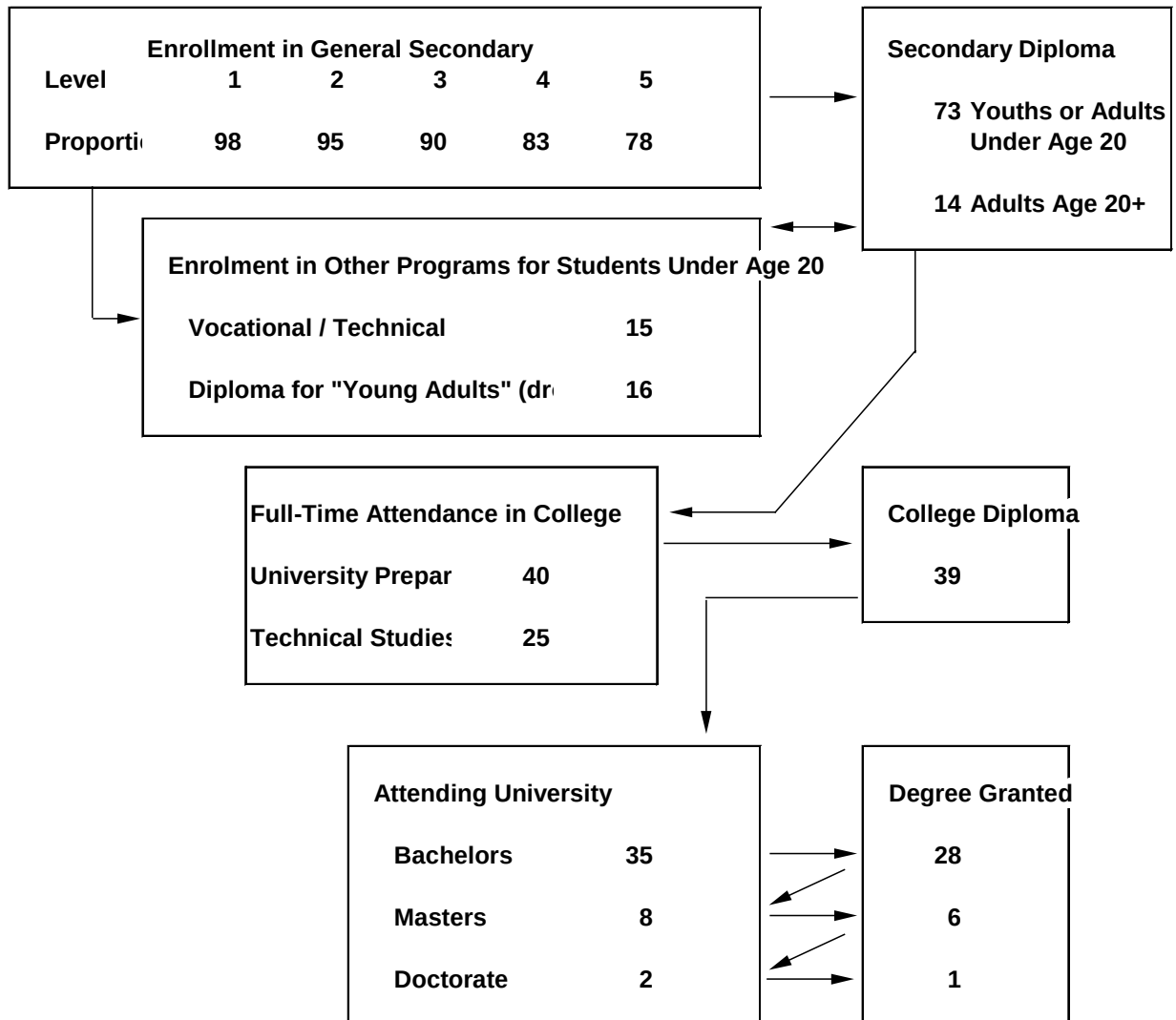
Figure 2 – Educational Progression in Quebec, Canada

(Adapted from Indicateurs de l'éducation, Ministère de l'Éducation, pp 7 and 45)

Expected Years of Schooling in Quebec for a Child Entering Primary School

Year	1988	1990	1992	1993	1994	1995
males	14.0	14.4	14.9	15.0	15.0	14.9
females	14.5	15.0	15.5	15.5	15.5	15.5
Total	14.3	14.8	15.2	15.3	15.3	15.2
primary	6.1	6.1	6.1	6.1	6.1	6.1
secondary	5.0	5.0	5.0	5.0	5.0	4.9
primary & secon	0.2	0.6	0.8	0.8	0.8	0.9
college	1.6	1.6	1.8	1.8	1.8	1.8
university	1.3	1.5	1.6	1.6	1.6	1.6
Total	14.3	14.8	15.2	15.3	15.3	15.2

Pathways Followed by 100 Young Quebecers Through the School System



Working Life – Analogous to education progression, life table methods have also been used to examine the working phase of the life course – how much of their lifetimes individuals can expect to spend in the paid labour force. The first such estimates for Canada were Denton and Ostry (1969), in turn updated by Gnanasekaran and Montigny (1975). More recently, Bélanger and Larrivée (1992) have developed more sophisticated estimates. Table 1 draws together these two sets of estimates, and shows ages at three major transitions: from school into the paid labour force, into retirement, and death. These demarcate three main phases of the life course – school, work, and retirement. Notwithstanding the various simplifying assumptions, this series of male working life table results vividly displays the long run trends of more time spent in schooling, ever earlier ages of retirement, a general reduction in working years, and hence a long run decline in the ratio of working to inactive or retired years. The last two columns in particular show a clear pincer-like trend toward shorter working lives and more years of retirement, with obvious implications for the “affordability” of public pensions.

Table 1 -- Historical Stationary Male Life and Working Life Expectancies at Age 15

Year	Average Age at		Death	Number of Years	
	LF Entry	Retirement		Working	Retired
1921	17.5	62.7	67.6	45.2	4.9
1931	18.0	63.0	68.4	45.0	5.4
1941	18.2	63.1	69.1	44.9	6.0
1951	18.5	62.9	70.4	44.4	7.5
1961	19.2	63.0	71.2	43.8	8.2
1971	19.8	62.3	71.3	42.5	9.0
1986a	20.0	65.5	73.8	44.6	8.3
1986b	20.0	60.3	73.8	39.4	13.5

Source: Adapted from Gnanasekaran and Montigny for decades 1921 to 1971 (Tables 2.1 and 12, 1975), and Bélanger and Larrivée for the two 1986 rows (Tables 1 and 2, 1992)

Notes: The Bélanger and Larrivée results were given only at age 16; age 15 results have been extrapolated. Working life expectancy is taken from their Table 2 for both the active and inactive populations for the 1986b row. Also, they have only estimated the average age at death, and the expected number of working years, so the average age at retirement and number of years retired were derived based on the simple assumption that the average age at labour force entry was exactly 20. There also appears to be an inconsistency in the Gnanasekaran and Montigny results for 1971 average number of years working in comparison to all their other estimates, so this figure has been adjusted. The Bélanger and Larrivée definition of “working” is having worked at least one hour in a reference week in September of each year. The Gnanasekaran and Montigny definition for 1971 was essentially working or looking for work in the week prior to census enumeration, but then excluding summer students.

The results in Table 1 for 1921 to 1971 are based only on cross-sectional age-specific labour force participation and mortality rate data, since these were the only data available over this period. As a result, the Gnanasekaran and Montigny (1975) life tables included just two living states – working, and not working. Transitions between these states were then based on two key assumptions: (1) that gross flows into and out of work exactly equaled net flows – an individual could only enter and leave the labour market once over their entire lifetime, and (2) that overall, labour force participation rates first rise monotonically to an age where they are at a maximum, and then fall monotonically. Thus, up to the age of the maximum participation rate a^* (around age 30 in 1971), the rate of entry to the labour force at each age was assumed to equal the difference in the participation rate between ages $a-1$ and a (plus the mortality rate). After age a^* , only exits from the labour force were assumed, again equal the difference in the participation rate between ages $a-1$ and a (also assuming mortality rates are independent of labour force status).

The more recent increment-decrement life table methods used by Bélanger and Larrivée (1992) allowed them to relax this restrictive assumption by using longitudinal microdata from Statistics Canada’s Labour Market Activities Survey. These data allow *gross* flow transition probabilities to be estimated directly -- rather than inferring them based on an assumed equality with *net* flows, in turn derived by first-differencing age-specific participation rates. As a result, multiple exits and re-entries to the labour force over a lifetime are not ruled out *a priori*, as in the earlier working life tables.

Specifically, the last two rows in Table 1 give Bélanger and Larrivée's alternative working life estimates for 1986. The row labeled "1986a" used the older gross = net flow assumption, while the last row, 1986b, used an increment-decrement life table based on gross transition probabilities. Bélanger and Larrivée estimate an average of 2.6 labour force entries for men over their lifetimes using the gross flow approach, compared to 0.94 using the net flow approach (0.94 being the maximum participation rate at age a*). The rather large 5.2 year difference in expected working life in these last two rows further reflects the sensitivity of these kinds of results to detailed assumptions on transition rates.

However, strong simplifying assumptions are still embodied in the Bélanger and Larrivée increment-decrement life table analysis. In particular, transition probabilities into and out of the labour force are assumed to be first order Markov, depending only on age, sex, and labour force status in the year. This ignores the observed dependence of labour force participation in any given year on other factors like educational attainment, marital status, and fertility, as well as how long the individual has already been working. Moreover, both of the life table estimates in Table 1 take the calendar year as the smallest time period, and treat working within a given year as a dichotomous variable. There is no accounting for part-time or part-year rather than full-time full-year work, and nothing on unpaid work – points to which we return later.

Divorce and Lone Parents – As a fourth example, there is a long tradition in demography of interest in the dynamics of the family. One very well-known indicator is the fertility rate, while another is the proportion of marriages that can be expected to end in divorce. Both of these indicators are constructed using life table methods. Indeed, multi-state life tables can be used to construct families of related demographic and nuptiality indicators. For example, Table 2 from Wolfson (1989, Table 3) shows first how the period between age 25 and 64 is likely to be spent by women in various socio-demographic states, and then in the bottom portion of the table, how their children can expect to grow up.

In this case, the focus of the analysis was on the implications of different divorce rate scenarios. The first scenario assumes no divorce at all. The second and third scenarios assume that divorce is a function only of age, and use the observed age-specific divorce rates centered on the 1971 and 1981 censuses, a decade characterized by a rapid rise in divorce rates. In other words, they make the same first order Markov transition assumption as in the case of the working time estimates in Table 1. The last scenario draws on a more sophisticated hazard rate analysis of data from the 1983 Family History Survey (FHS; Rowe, 1989) where divorce was found to depend not only on age, but also on age at marriage, presence of pre-school children, and labour market history.

The results in this table are notable in several respects. First, they are based on a precursor of the LifePaths model, showing that a microsimulation approach can be used to generalize multi-state life table methods. Specifically, microsimulation nests, as a special case, increment-decrement life tables based on first order Markov transitions. In addition, the FHS results indicate the capacity to move beyond simple first order transition rates to draw upon more richly multivariate transition probability functions. In this case, Table 2 illustrates the differences between the implications of standard age-specific divorce rates on the one hand, and the more detailed FHS transition functions. These latter multivariate transition probability functions showed that marriage dissolution propensities depended not only on age, but also on the presence of pre-school children, which depressed age-specific divorce rates. Omitting this factor biases the results toward an impression that rising divorce rates have been associated with an even more rapid increase in the amount of time children can be expected to grow up in lone parent family settings. Specifically, comparing the last two columns, the number of years women could expect to spend divorced increases by about 50%, while the time children could expect to spend living with a lone parent actually drops.

Table 2 – How Individuals Can Expect to spend Parts of Their Lives Under Alternative Divorce Scenarios

Average numbers of years spent by:	None	Divorce Scenario		FHS
		1970-1972	1980-1982	
Females age 25 to 64				
Never-married	5.9	5.9	6.3	6.1
First Married	30.1	25.6	22.6	22.5
Working	17.5	15.0	12.9	12.9
Childless	2.3	2.3	2.0	1.6
One or more children	10.5	9.0	7.9	8.5
Empty nest	4.7	3.7	3.0	2.8
Not Working	12.7	10.6	9.7	9.6
Divorced	0	1.8	2.6	3.3
Widowed	2.1	2.0	2.1	2.1
Remarried	0.4	3.4	4.9	4.5
Total	38.6	38.6	38.6	38.4
Children growing up with				
Mother before marriage	1.9	2.1	2.1	2.1
Both natural parents	17.8	16.2	15.3	15.8
and mother is working	11.0	9.7	9.0	9.4
and father is working	15.6	14.3	13.5	13.8
A lone parent after marriage	0.4	1.1	1.5	1.3
A remarried parent or orphaned	0.2	1.0	1.5	1.1
Total	20.3	20.4	20.4	20.3

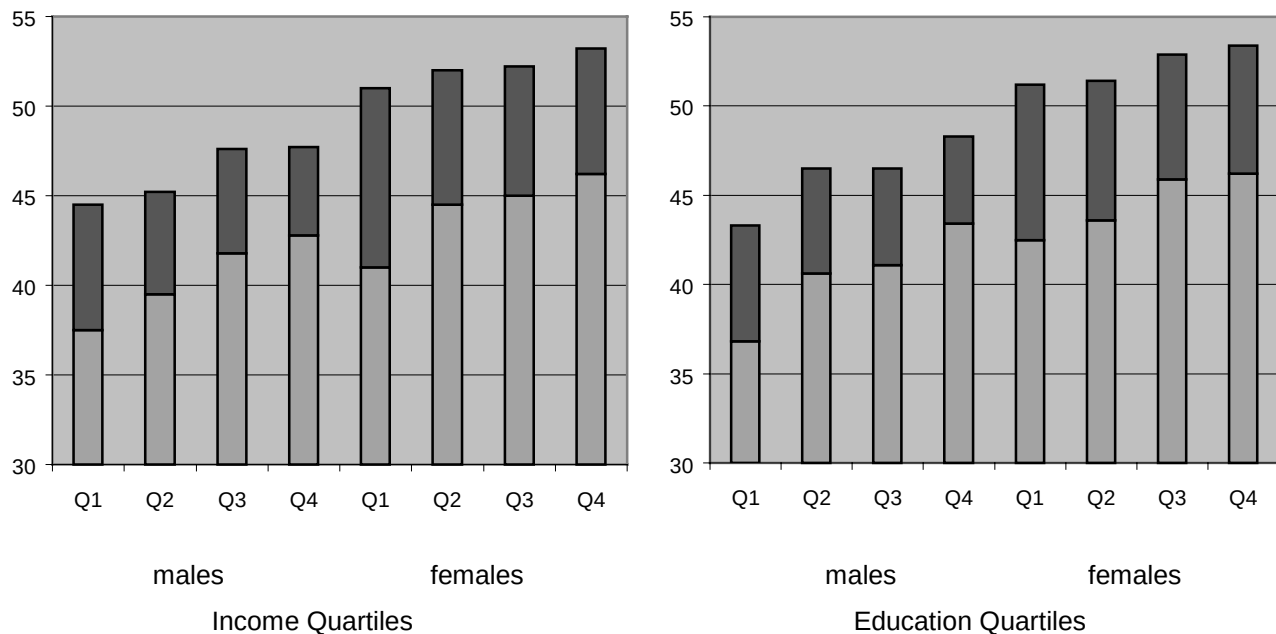
(n.b. Monte carlo error is such that the estimates should be treated as accurate to about 0.5 years.)

Finally, this analysis of divorce patterns and their consequences illustrates the utility of embedding the construction of social indicators within a simulation framework. In this case, we were able to draw out the implications of otherwise rather inscrutable hazard regressions in forms that are more practical and intuitively accessible (i.e. technically multi-state life table-style sojourn time results, and vernacularly how long people can expect to spend in different family situations). Moreover, in the spirit of Juster and Land's view that a framework of socio-economic statistics should help us to "conceptualize, measure and understand social change" (1981,p xiv), this kind of indicator plus modeling capacity points us toward much better frameworks for clarifying and presenting more richly textured views of the consequences and correlates of changing divorce rates.

Health Status – A final example is in the health domain. Life expectancy is a very well-known and widely used indicator. However, it suffers as a health indicator by making absolutely no distinction between person-years lived either in excellent or poor health. To address this concern, there is growing international interest (e.g. Mathers and Robine, 1993; OECD, 1998a) in a variant called health-adjusted life expectancy (HALE). In effect, this measure weights individual person-years by an index of health status (taking values between one for perfectly healthy, and zero for dead). There is considerable methodological work underway, particularly regarding the ways to assign a number in the zero-to-one interval to a person-year summarizing that individual's health status (e.g. Gold et al., 1996; Field and Gold, 1998).

Figure 3 presents results for the Manitoba population broken down into sub-groups based on two alternative socio-economic status (SES) variables, educational attainment and family income (Nault, Roberge, and Berthelot, 1996). One set of results is conventional life expectancy (LE), and the other is health-adjusted life expectancy (HALE). For both males and females, considerable differences across SES quartiles are clearly evident, with individuals in the highest education and income categories living longer, and in better health than those in the lowest categories. Also clearly evident for both the income and education groupings is a gradient. . In other words, the relationship is not a threshold phenomenon –steps up the socio-economic scale, even starting further up the scale, are generally associated with an increment in health status, measured either as LE or as HALE.

Figure 3: Life Expectancy (both bars) and Health-Adjusted Life Expectancy (lower bar) at age 30 Using Health Status Data for 1994



The magnitudes of the differences in HALE between high and low quartiles is 3.7 to 6.6 years for income and education, and men and women. These are wider than for LE, which differs by amounts ranging from 2.2 to 5.0 years between the high and low quartiles. Thus, estimates of SES differences in mortality may understate the magnitude of health inequalities when population health status is measured more broadly to encompass morbidity as well as mortality. In turn, these broader measures like HALE require a life cycle framework which can follow the shifting distribution of morbidity by age.

Figure 3 gives only a one-time set of estimates. However, if we had a time series of these HALE and LE estimates, we would also be able to shed light on one of the grand debates in epidemiology – the so-called “compression of morbidity”. The basic issue is whether or not increasing life expectancy is associated with a greater or lesser proportion of the life course spent in poor health. This issue has obvious implications, in the context of aging populations, for future health care costs.

All of the examples just presented are important and interesting in their own right. In addition, and notwithstanding the diversity of their substantive domains, they share a common family of metrics – namely the amounts of time spent over the life course in various socio-economic states, or the average ages at or rates of transition between them. However, they are all examples of “stovepipe” indicators. Historically, these various indicators have all been estimated independently, with no obvious connections between them. They have not been constructed as elements or facets of a larger framework. The LifePaths vision is a conceptual and statistical framework that nests all of these indicators in a integrated and coherent manner.

Related Visions for Integrated Statistical Frameworks

Of course, LifePaths has not been developed in a vacuum. Other integrated and coherent socio-economic statistical frameworks have been proposed. The best developed and most widely used framework is the System of National Accounts (SNA). However, the SNA has been challenged as being too narrow, with its strong focus on the macro economy. In turn, a number of suggestions have been made to enlarge the SNA. These include social accounting matrices (e.g. Keunig, 1994) and Satellite Accounts (e.g. Vanoli, 1994), which are outlined in detail in the most recent revision of the SNA (UN, et. al., 1993, Chapters 20 and 21). The most clearly articulated and widely disseminated proposal for an independent (alternative) integrated system of socio-economic statistics is Stone’s SSDS (UN, 1975; Stone, 1973).

One important feature of both the SNA (including its SAM extensions) and the SSDS is their complexity. It is impossible to specify their full structure in a one-page diagram, or in a few paragraphs of

text. LifePaths is similar in this regard, so in the next section we provide only a brief overview. Another feature of the SNA and SAMs, and of Stone's SSDS, is that their realization requires a network of carefully designed surveys and data collection vehicles. Neither could be constructed from a single data source. The same is true of LifePaths. It is in the nature of any integrated framework for socio-economic statistics that its realization requires both a carefully designed set of data feeder systems, and a set of methods for data integration. Concerns about the complexity of LifePaths, and the implied costs of its data feeder systems, should therefore be judged with the view that any alternative with similar objectives would have to be similarly complex and costly. Moreover, there has been a considerable increase in the number and breadth of longitudinal surveys in particular (certainly in North America) for a host of other reasons, so there is an increasingly fertile statistical base for LifePaths style development.

There is, however, one major difference between LifePaths and these other alternatives. This is its explicit microanalytic foundation. The SNA, SAMs, and Stone's SSDS all are constructed at the macro or meso level. This is understandable, given their history, and the fact that they predate the revolution in computing. However, it is a serious limitation, as noted decades ago by Ruggles and Ruggles (1973). Indeed, Stone (1973) was quite explicit that the SSDS would be better served by microanalytic foundations, if the necessary data were available:

"Of course, if statistics are collected by means of a linked system of compatible records or, better still, by a continuously updated, comprehensive system of individual data, a discussion of sequence becomes largely irrelevant since the information in a vast, computerized data bank can be combined in any desired manner. But while these may be the methods of statistical collection in the future, they are not, with very limited exceptions, in operation at present, and so it makes sense to discuss the systematization of social statistics in terms of more familiar methods of collection." (p152)

In this sense, the future has arrived, albeit in two strands. First, many of the detailed longitudinal microdata sets about which Stone conjectured now exist; and second, modern microsimulation methods can in effect mimic Stone's ideal underlying data. As a result, Stone's matrix algebra, restrictive first order Markov assumptions, and "familiar methods of data collection" need no longer be constraining. Certainly in Canada and other advanced economies, richly multivariate and often longitudinal microdata sets are increasingly available – as are the powerful computing platforms and statistical methods needed to extract meaningful patterns and structure ("operating characteristics" in the sense of Orcutt (1957) and Orcutt et al (1976) from these data.

Overview of LifePaths Structure

LifePaths can be viewed in several ways. It is

- a conceptual framework,
- a representative microcosm of the Canadian population,
- a repository for a wide range of data, and
- a computer simulation model.

It is explicitly microanalytic, which means that the basic units of observation are individuals (as compared to groups or sectors in the SNA, SAMs, or the SSDS). It is also focused on micro-level dynamics – the way individuals flow among various socio-economic states over their life courses.

And finally, LifePaths is "meta-synthetic" – drawing upon multiple data sets, covering diverse subject matters, and using each in order to assemble the best possible overall estimate of the information of interest. (The term "meta-synthesis" is used in contrast to the epidemiological term "meta-analysis", which refers to the combination of results from a number of data sets, but where the data sets all pertain to the same question, such as a series of independent randomized clinical trials of a specific drug.) This is a characteristic LifePaths shares with the SNA (and the SSDS if it were implemented), since both have to draw on a very wide range of diverse data sets. However, a crucial difference is that the SNA and SAMs combine data at the meso or macro level, while LifePaths does so at the micro level. In turn, this means that the meta-synthesis underlying LifePaths is somewhat more complex statistically, and far more computer-

intensive. (The idea of synthetically matching data at the micro level is also decades old, though at that time, the focus was on cross-sectional data; see UN,1979.)

The basic unit of analysis in LifePaths is an individual life history, as shown in Figure 4. The “state space” of attributes or individual characteristics is shown along the vertical axis, with age and calendar time along the horizontal. The third axis indicates a representative sample of individuals in the population of interest. As Figure 4 shows, these are not all unrelated individuals; rather they are juxtaposed or sorted in a way showing that family structure is also included.

Given these micro level life histories as the basic building blocks, LifePaths then assembles representative samples of individuals (grouped into nuclear families) in a sequence of overlapping birth cohorts, as shown in Figure 5. Each “slab” in the diagram represents one birth cohort, while the sequence of slabs represents successive birth cohorts. Recalling Figure 1, each of those population pyramids corresponds to a vertical slice through the overlapping birth cohorts like that indicated in Figure 5 by the line for “today”. On the other hand, the dashed lines in each of the three pyramids of Figure 1 correspond to a single birth cohort, the “slab” corresponding to the 1944 birth cohort. (Note that this diagram implies that time is discrete; in fact, LifePaths represents and models all events in continuous time.)

Figure 4 – State Space and Longitudinal Micro Data Sample Generated by a LifePaths Simulation

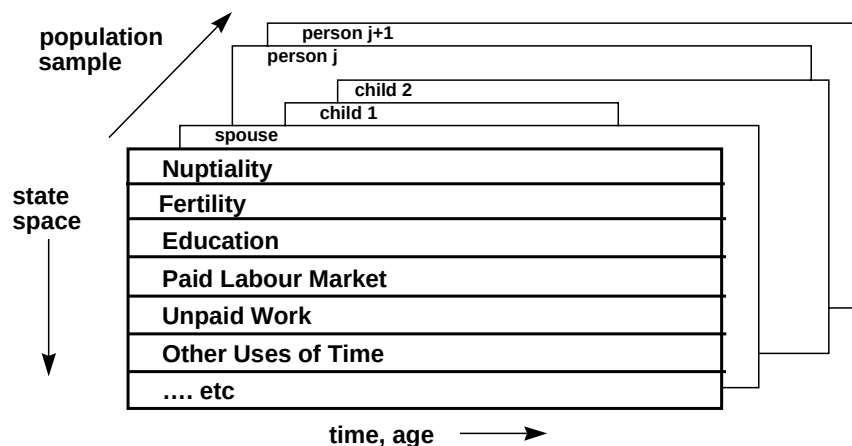
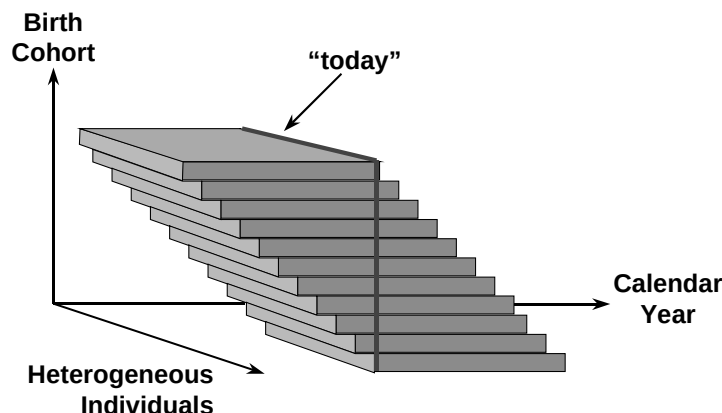


Figure 5 – Overlapping Birth Cohorts with Heterogeneous Members



LifePaths essentially estimates a set of individual life histories corresponding to decennial birth cohorts, in a way that is mutually consistent with a very wide range of data including population characteristics from censuses, mortality and fertility rates dating back to about the turn of the century, SNA figures on labour income and personal savings going back to the 1920s, longitudinal survey data on earnings dynamics in relation to age, sex, and education, and so on. Estimation proceeds by data synthesis using

longitudinal microsimulation – each individual's life history is synthesized, starting at birth and then recursively generating all the events and characteristics indicated by the categories along the vertical axis of Figure 4 over time (i.e. along the horizontal axis) until death. Then another family of individuals is synthetically generated, and again, and again – until a very large sample (e.g. 1,000,000) is generated. The result is our “fitted” population microcosm. This is a longitudinal sample of individuals synthesized using computer simulation, that – by construction – reproduces a diversity of observed data, such as age- and sex-specific labour force participation rates, and similarly disaggregated average earnings.

As a final methodological note, LifePaths is readily “extensible”. It is highly modular, so that as new data sets become available, with attendant new or revised sets of empirical relationships, or there are new characteristics to be added, this does not entail starting over again from scratch. Rather, old modules can be easily replaced and thereby updated, and new modules readily added, given the design of the software and modeling environment.

On Validating LifePaths TMH

Given the synthetic character of LifePaths results, a major concern is their validity. Earlier versions of LifePaths generated ahistorical *period* life table-type results, the same kinds of results shown in Tables 1 and 2 (working life and demography) and in Figures 2 and 3 (education and health). These period results are very widely used, not only because they generate intuitively accessible and useful indicators, but also in large part because they rely on data for only one calendar year or one point in time. As a result, data availability is good. However with period life table-type results, we face the fundamental problem that the underlying construct is an ahistorical hypothetical cohort, one that is born in the given year, say 1990, and every year thereafter is exposed to the transition probabilities observed in 1990. It is in the nature of this construct that it is inherently unverifiable, since it corresponds to a cohort that can never exist. The only way to “verify” an indicator like life expectancy in 1990 is to check the inputs, and then the calculations. There is no possibility of external validation.

The situation is different with historical cohorts, as in the current version of LifePaths. From the viewpoint of data availability, the exercise is much more challenging – there is a paucity of data going back in time, and a need to project into the future until the end of life for the last of those cohorts still living. On the other hand, we can claim to be constructing a causal story. In addition, at least in principle, the results are externally verifiable. Of course, practically, the stock of socio-economic data inherited from the past is essentially fixed, so that to the extent that we use it in building LifePaths, we diminish our capacity for the strongest form of validation – external comparisons. Going into the future, the possibility of assessing predictive validity would seem to offer the strongest test of all. But there are a number of problems:

- having to wait until we reach the end of the projection period to see whether or not everything turned out as projected, though intermediate results clearly would not require as long a wait;
- the fact that the LifePaths projections are conditional, depending in turn on other projections such as those of the Chief Actuary for mortality and long run economic growth; and
- the possibility that projections will be self-destroying, for example as the prospects of adverse fiscal outcomes from population aging are acted upon by amending public pension structures.

As a result, the minimum requirement for valid results is to use a set of reasonable data gathering and meta-synthesis practices to assure the best possible quality for the inputs and processes of both forms of LifePaths results – period and cohort. The methods available for the external validation of historical cohort results have their limitations. However, they do have the major advantage of offering the possibility of falsifiability. Moreover, it is difficult to imagine other methods – both for understanding historical dynamics and for making projections in these areas of inquiry – that would have superior capacities for validation, while delivering the same level of detailed results.

On the Relationship of LifePaths TMH and the SNA

This Time/Money/Health (TMH) version of LifePaths complements the SNA and its possible extensions such as SAMs. The two overlap with regard to household sector incomes and expenditures, and government direct taxes and cash transfers collected from and paid to households. The SNA then provides

complementary information on intermediate production, other categories of final demand, with commodity and industry detail. Meanwhile, LifePaths TMH provides coherently integrated and detailed data on demography, labour force participation, health status, time use, etc.

These strengths of LifePaths, by design, address some of the inadequacies of SNA – the absence of explicit microanalytic foundations, the dominance of money-metric measurement and the associated focus on activities relating to economic markets (quite properly, since that has been the purpose of the SNA, but) to the exclusion of other major aspects of socio-economic life.

Finally, the SNA and LifePaths share important similarities with regard to validation. GDP is a concept or construct – just like period life expectancy, and period LifePaths results more generally. Both are inherently and necessarily aggregations or constructions from many data sources. Fortunately, GDP can be built up in alternative ways. Hence, the key to the validation of the GDP concept (as well as some, but by no means all, of its components) is multiple independent estimates of the same concept, particularly income and expenditure (sources = uses). This in turn leads to “data confrontations” (Wilk, 1987) where two independent estimates of GDP must be reconciled. On the other hand, some elements of GDP (e.g. selected cells in input/output tables, or flow of funds tables) have no underlying data at all, let alone multiple data sources to generate data confrontations.

LifePaths is similar in these regards. It has also been designed and constructed to build upon data confrontations (e.g. census data on educational attainment versus school and university administrative data on enrolments, household survey versus SNA data on household incomes). On the other hand, LifePaths is similar to the SNA in having a number of estimates where there are no directly underlying data. For example, LifePaths generates results on transition rates from [good health and working] to [good health and not working] by age and sex and leisure time – even though the data on which this is based include only various partial versions of this multivariate relationship. For example, data on the average transition rate leaving aside any breakdown by leisure time are available, as are data on leisure time in relation to work status. This is not unlike selected cells in the input/output tables which are estimated residually, or based on some form of pro-rating.

Working Results

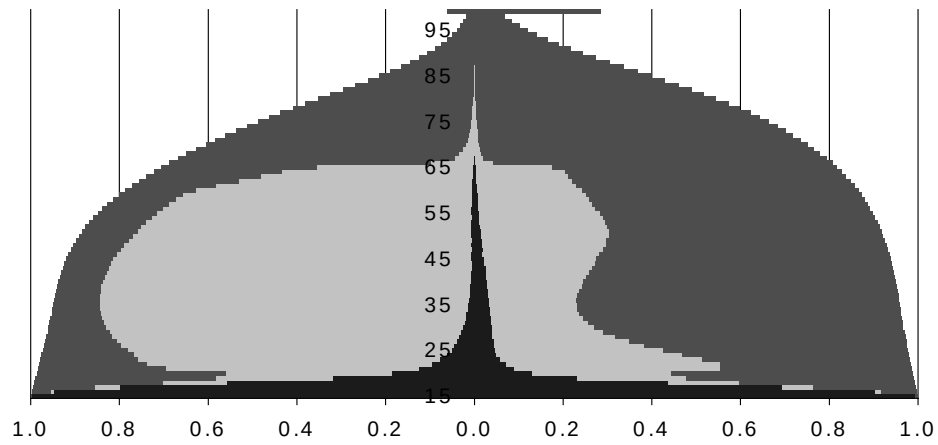
“Active Sequence” – In this section, we present an initial series of estimates from LifePaths TMH. We start with the basic trichotomy of school, paid work, and other activities, shown in Figure 6a. This basic activity classification in fact corresponds to the first of a number of sub-accounts or “views” in Stone’s SSDS, specifically his “active sequence”. It is important to note a fundamental difference between these population pyramids, and those shown in Figure 1 above. The earlier population pyramids were cross-sectional or point-in-time slices through a series of overlapping birth cohorts, while those in Figure 6a are for actual historical cohorts.

The “envelopes” for these population pyramids represent male (left) and female (right) survival curves (with age going up the middle vertical axis). They show not only falling mortality rates over time, but also the “rectangularization” of the survival curve. They also show a substantial increase in time spent in schooling, and a dramatic increase in female labour force participation.

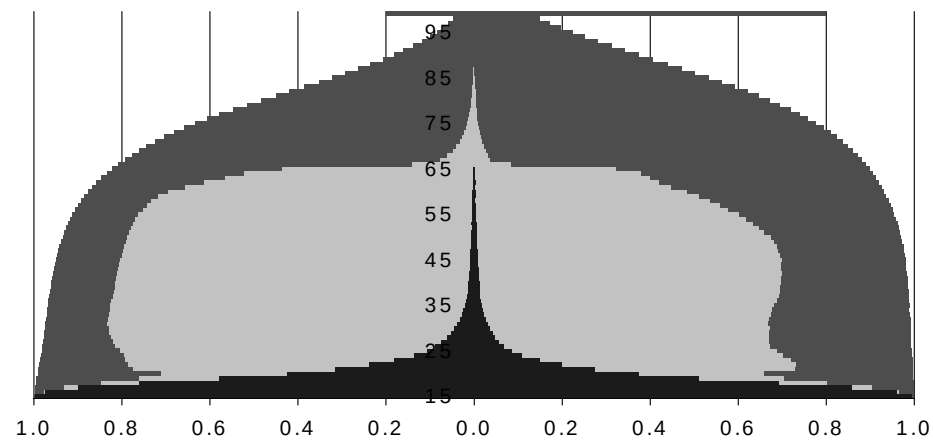
However, these results are based on a very coarse classification of time use, basically using calendar years as the smallest unit. Since they draw on census data, the classification of being in “school” was based on reporting full time attendance at school for the nine months preceding census day (typically mid-summer). If the person was not in school, then they were classified as working if they indicated receipt of a non-zero amount of employment or self-employment income on their census form. Otherwise, they were classified to “other”. However, it is obvious that during the course of a year, individuals may spend some of their time working, some in school, and certainly quite a bit in “other” activities. LifePaths has not only included the census-based annual classification of activity, but also much more detailed data drawn from a large household sample that collected time use data using daily diaries, with the smallest interval of time reporting being 15 minutes (Statistics Canada, 1997).

Figure 6a – “Active Sequence”, Cohort Populations by Age, Sex, and Activity
(Leisure & Other, Paid Work, and School – from outside to inside bands)

1912 – 1921 Birth Cohort



1952 – 1961 Birth Cohort



1992 – 2001 Birth Cohort

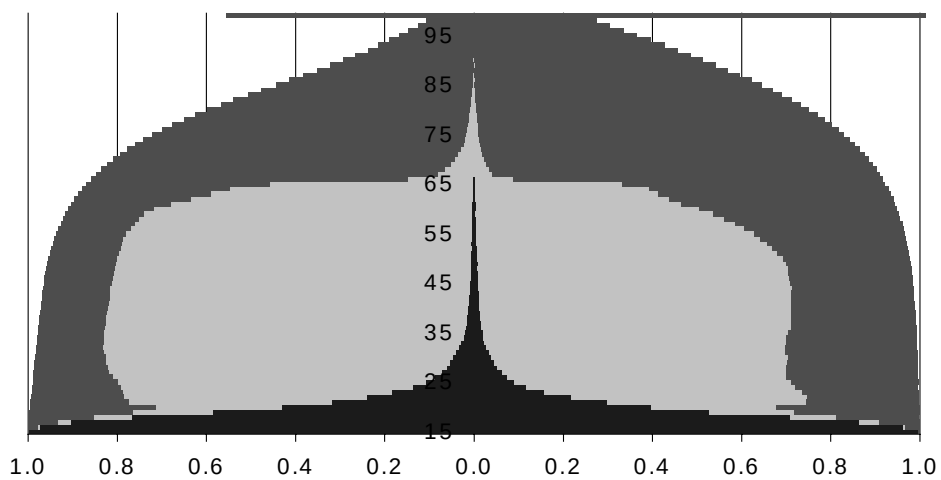
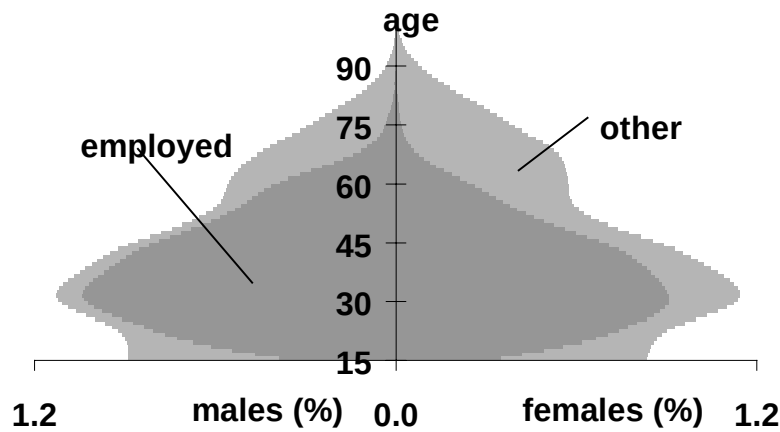


Figure 7 contrasts the impressions of the amount of time spent in work and school using these different “granularities” of time reporting. The population pyramid on the top is from Figure 1 for 1991, while that on the bottom integrates data from both the census and the time use survey. Essentially, the 1992 time use survey was post-stratified so that its sample weights matched the 1991 census population disaggregated first by the joint distribution of age and family size, and second by the joint distribution of labour force participation, age and sex. Perhaps the most dramatic difference in these images is in the amount of time spent in paid work. It is far smaller when time is (more accurately) classified hour by hour than by the year.

Figure 7 – Period Population Age 15+ in 1991 by Age, Sex and Kind of Activity for Two Levels of “Granularity” for Time Accounting

a. Census (annual) Classification



b. Time Use Diary (hourly) Classification

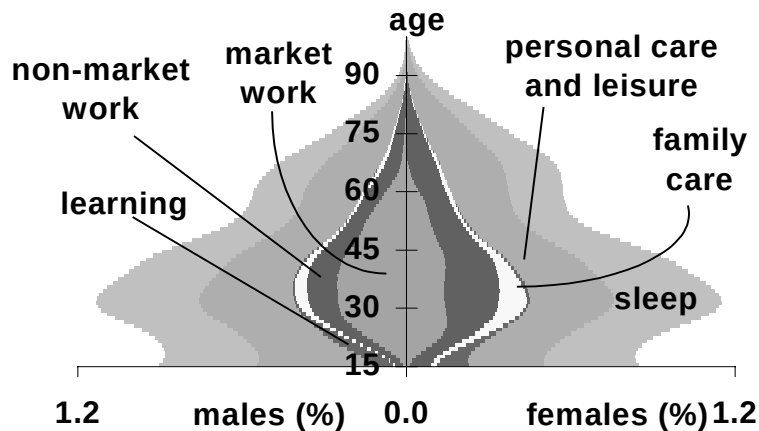


Figure 7, however, returns to a cross-sectional result. Using LifePaths, we have estimated the corresponding activity patterns for the same birth cohorts. They draw on time use patterns from the 1992 General Social Survey, the same as those underlying the bottom part of Figure 7, based on methods described in the Appendix. These historical and projected time use estimates necessarily involve rather heroic assumptions. However, this is more than sufficient for our purposes of illustration, and it provides a

base for improvement as new time use surveys, such as the 1998 General Social Survey, become available, and historical time use surveys dating back to 1971 are subject to detailed re-analyses.

Table 3 shows the resulting comparisons between annual and hourly granularity of time accounting for the three LifePaths birth cohorts. It presents, in effect, two new set of estimates of the working life table results shown in Table 1 above. In addition, these earlier results have been significantly generalized – first to include women, second to use historical or generational birth cohorts rather than hypothetical period data, and third to use much more fine-grained data on time patterns of activity.

Table 3 – Average Sojourn Times (years) by Activity and “Granularity” of Time Accounting (age 15+)

Sex and Birth Cohort	Annual Basis			Hourly Basis				Total = Life Expectancy	
	School	Paid Work	Leisure + Other	School	Paid Work	Leisure	Other	At Age 15	At Birth*
Males									
1912-1921	4.7	34.0	18.2	2.2	9.0	14.6	31.1	56.9	71.9
1951-1962	6.3	34.4	21.9	2.7	9.1	16.3	34.2	62.3	77.3
1992-2001	6.4	34.5	25.7	2.7	9.3	17.7	36.9	66.6	81.6
Females									
1912-1921	4.6	12.9	45.9	2.0	3.9	15.7	41.8	63.4	78.4
1951-1962	5.8	28.0	35.7	2.5	6.8	16.9	43.2	69.5	84.5
1992-2001	6.0	29.0	39.2	2.5	7.0	18.3	46.2	74.0	89.0

* assuming 100% survival from birth to age 15

The left side of the table, the “annual basis”, shows the numbers of years spent in each of three categories of activity defined exactly as in Figure 6a. The “hourly basis” data on the right side draw on the same data as in the bottom of Figure 7, and correspond to the cohort population pyramids shown in Figure 6b. In this case, “paid work” is defined as time spent in either employment or self-employment, “school” as time spent either attending formal elementary, secondary or post-secondary classes or adult classes, and leisure as time spent in socializing, in active pursuits like sports, in “serviced pursuits like attending movies, and reading or other passive activities. The residual “other” category includes sleep, personal care, volunteer activity, unpaid household work, caring for others, and shopping.

As in Figure 7, the most dramatic differences between the two sides of Table 3, and between Figures 6a and 6b, are for paid work. This drops by almost 75% when moving from the annual to the hourly basis for time accounting. But it should be noted that the 9.3 years of hourly basis paid work that the 1992-2001 male birth cohort can expect to do over its lifetime shown in Table 3 are “solid” years – 24 hours per day, 365 days per year, compared to the years on the left hand side where a “year” of full-time, full-year work might amount to 2,000 hours of paid work. Still, for every hour of paid work, this cohort can expect over 2 hours of leisure.

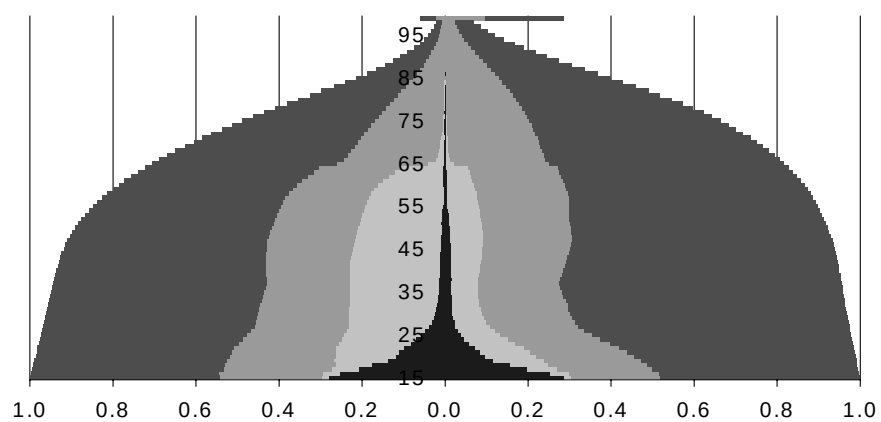
Looking to the trends over time, the increase in female working time is much more dramatic using the annual granularity, because no account is taken of part- versus full-time work. The increases in leisure time appear somewhat more modest for men than the increases in retirement in Table 1 above, though the results are not comparable conceptually. For women, the largest part of the increase in life expectancy for the first two cohorts is taken up by the increase paid work.

Recalling Stone’s SSDS, Figures 1, 6a, 6b, and 7, and Table 3, are different versions of the first of the proposed accounts or views, his “active sequence” – though we have the contrasts of cross-sectional versus cohort (Figure 1 versus Figure 6a and 6b), and annual versus hourly granularity (Figure 7, Table 3, and Figure 6a versus 6b).

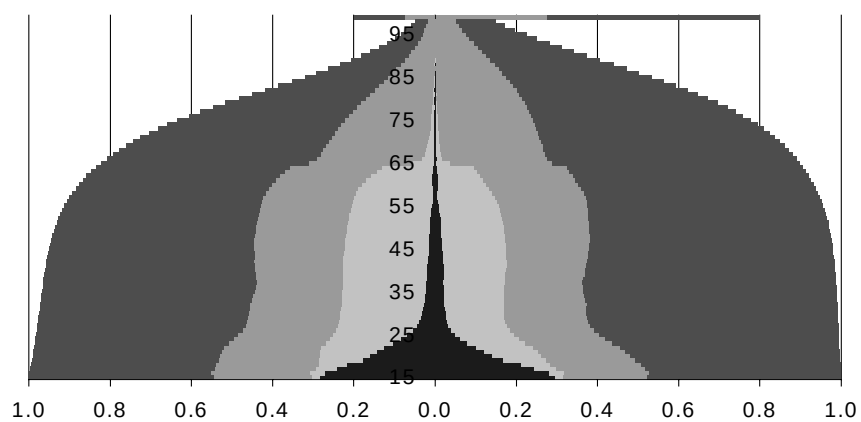
Figure 6b – “Active Sequence”, Cohort Populations by Age, Sex, and Main Activity

(Other, Leisure, Paid Work, and School – from outside to inside bands)

1912 – 1921 Birth Cohort



1952 – 1961 Birth Cohort



1992 – 2001 Birth Cohort

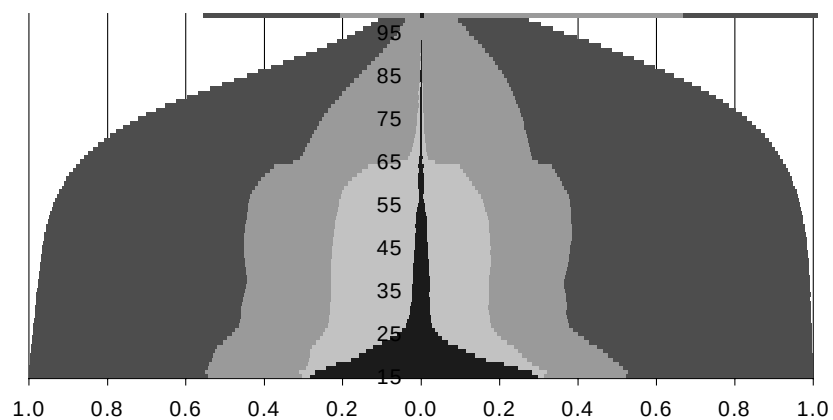
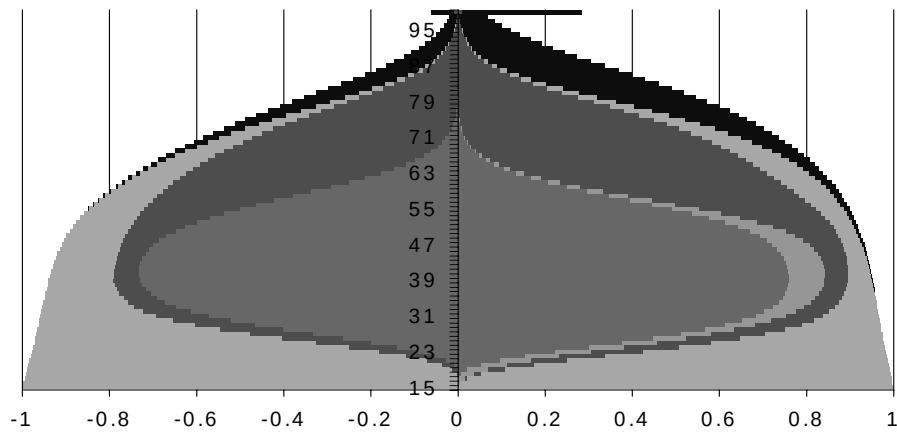
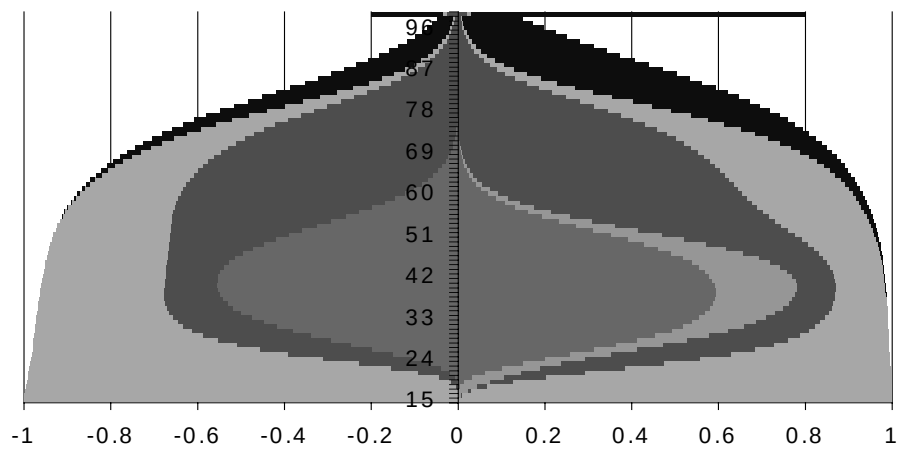
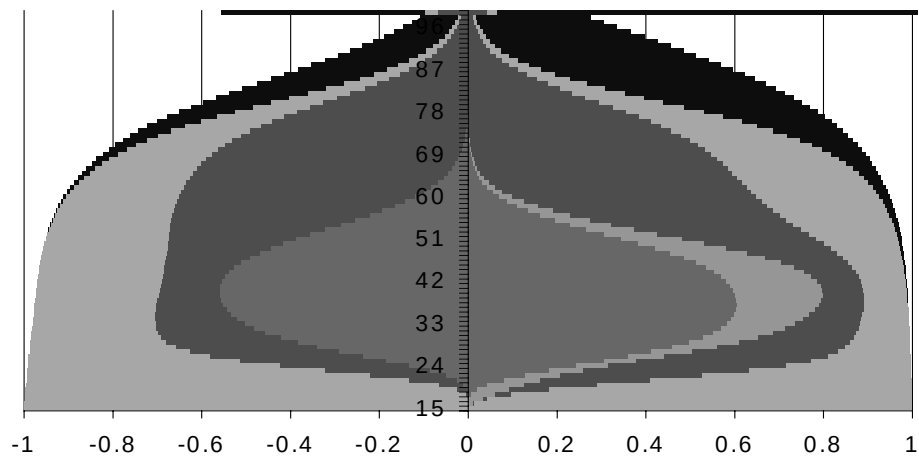


Figure 8 – “Passive Sequence”, Demographic Circumstances

(Institutionalized, Single, Couple without Children, Lone Parent (females only), and Couple with Children – from outside to inside bands)

1912 – 1921 Birth Cohort**1952 – 1961 Birth Cohort****1992 – 2001 Birth Cohort**

“Passive Sequence” – The second view or account in the SSDS was called the “passive sequence”. It classified individuals according to their demographic circumstances over the life course. Figure 8 shows the LifePaths counterpart to Stone's passive sequence, while Table 4 shows corresponding summary sojourn times.

Table 4 – Average Sojourn Time (years) by Family or Demographic Status after Age 15

Sex and Birth Cohort	Couple without Kids	Couple with Kids	Lone Parent	Unmarried	Living in an Institution	Total = Life Expectancy at Age 15
Males						
1912-1921	14.2	22.5	0.0	18.2	2.0	56.9
1951-1962	20.3	15.0	0.0	24.0	3.1	62.3
1992-2001	22.7	15.5	0.0	23.8	4.5	66.6
Females						
1912-1921	16.8	24.2	3.2	13.3	5.8	63.4
1951-1962	21.0	15.9	5.3	19.2	8.1	69.5
1992-2001	22.3	16.4	5.6	18.4	11.3	74.0

The shrinking amount of time spent in a “couple with kids” family from the first to the second cohort reflects both the fall in fertility rates, and the increase in marriage breakdown. The increase in “lone parent” person-years is another consequence of increased marriage breakdown (note that for now, only mothers are given custody), while the increased time spent as a “couple without kids” also reflects increased survival in the “empty nest” phase of the life course. The increase in “institutional” time reflects increased life expectancies. (For the time being, the usual naïve assumption has been used – that rates of institutionalization will remain constant within age/sex groups, so the only factor that influences the expectation of time over the life course spent institutionalized is the increasing numbers of more aged elderly individuals.)

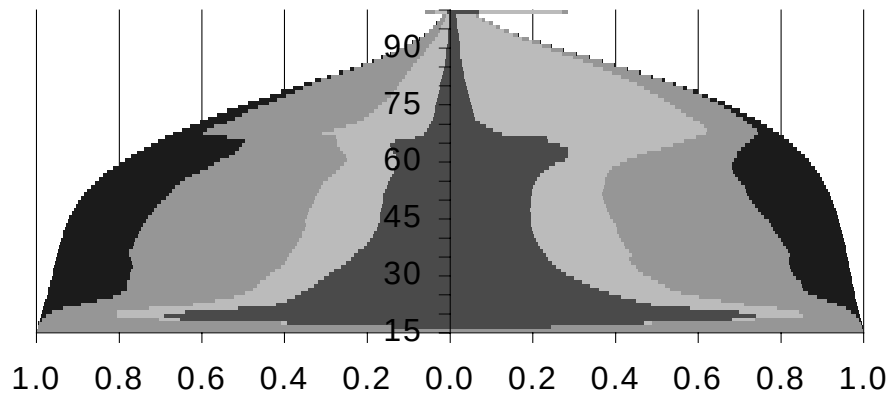
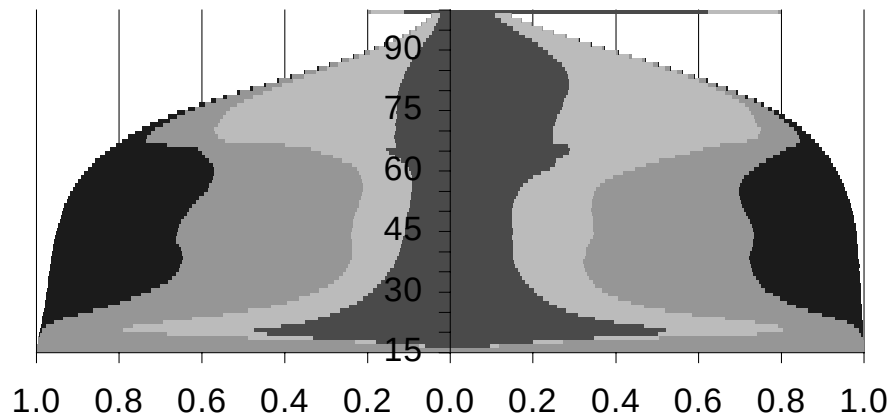
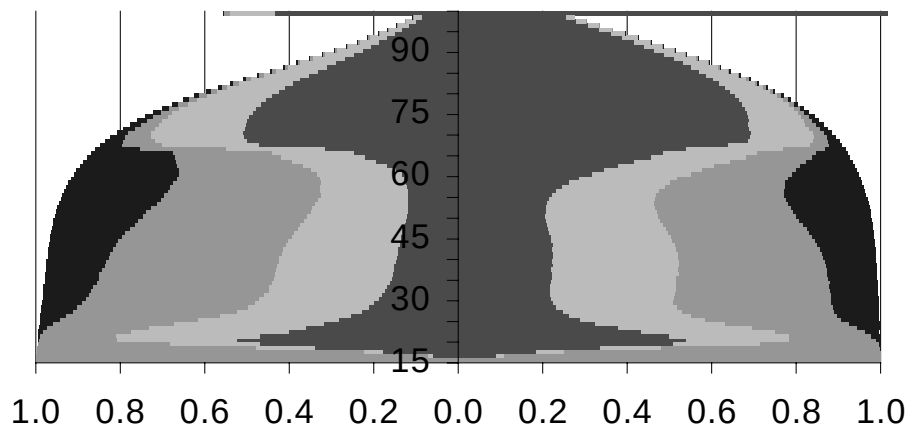
Of course, there is clearly more to life than work and school (the “active sequence”) and family life (the “passive sequence”). Leisure or discretionary time is not of much value if the individual has no money with which to enjoy it, or is in poor health. As a result, we have also used LifePaths to estimate time spent with “adequate income”, time spent in “adequate health”, and time spent with a combination of all three – “good life time” or GLT, defined as those portions of the life course when individuals were fortunate enough to have adequate income, good health, and the leisure time to enjoy them. (In principle, other attributes of life such as a supportive social environment could also be included, but the attributes being considered pose sufficient challenges at this stage in the development of LifePaths.)

Income Sequence – As the next step beyond the active and passive sequences, Table 5 and Figure 9 show an “income sequence” view of the underlying LifePaths population microcosm. Both show, for each birth cohort, a coarse view of the distribution of income.

Note that these cohorts span about 200 years, and except for the 1990s, we do not have data on all contemporaneously living individuals. Thus, we have constructed an income cut-point designed to approximate a relative, family-size adjusted or equivalized median income. For each person-year in each cohort, the individual's after-tax income was first added to that of his or her spouse (if present), and then divided by an equivalence scale to adjust for family size (based on 40% for second and subsequent adults and the first child in a lone parent family, and 30% for children otherwise). This equivalized income was then classified into four groups – less than half, 50 to 100%, 100 to 200%, and over twice the “cut-point”.

Figure 9 – Income Sequence

(Over 200%, 100 – 200%, 50 – 100% and Less than 50% of “Cut Point” – from outside to inside bands)

1912-1921 Birth Cohort**1952-1961 Birth Cohort****1992-2001 Birth Cohort**

This cut-point in turn was set at \$13,750 in 1996 dollars for a single individual (i.e. \$27,500 for a family of two adults plus two children). The cut-point was inflated or deflated for other calendar years by the change in the average wage. This cut-point, by construction, divides all the person-years in all birth cohorts from 1900 to 2100 (as simulated) roughly in half. It is therefore something like the median equivalized family income, but not in the usual sense. It is not a year-by-year median adjusted family income, because we do not have data in LifePaths on all families, say, in 1930 or 2030. Rather we have only those families associated with the birth cohorts LifePaths is following, namely those born in the twentieth century (including those born in other decades than the three that have been the focus of the graphs and tables). While this is not a conventional income cut-point, in the context of this LifePaths analysis it is a useful cut-point. It allows us to make comparisons not only amongst individuals within a birth cohort, but also between cohorts.

The most dramatic result in Figure 9 is the projected ballooning of “low income” (i.e. incomes below half the “cut-point”) amongst the future elderly. At the same time, virtually none of today’s elderly women (those born in the 1912-1921 cohort) have incomes *above* the cut-point, while the baby boom (1952-1961) cohort and the current (1992-2001) birth cohort can both expect to have considerable numbers in the highest income range (i.e. over twice the cut-point). In other words, these results signal a “disappearing middle” among the future elderly, a polarization between a majority who depend principally on public pensions and those who pass a minimal threshold of private saving. (While these results are based on a moderately rich portfolio model of household savings that tracks the historical SNA figures for the personal sector, there have not been any household surveys of net worth in Canada since 1984. Thus, Statistics Canada’s forthcoming Asset and Debt survey will provide a very important benchmark for this part of the LifePaths data synthetic effort.)

Table 5 – Average Sojourn Time (years) by Adjusted Family Disposable Income after Age 15

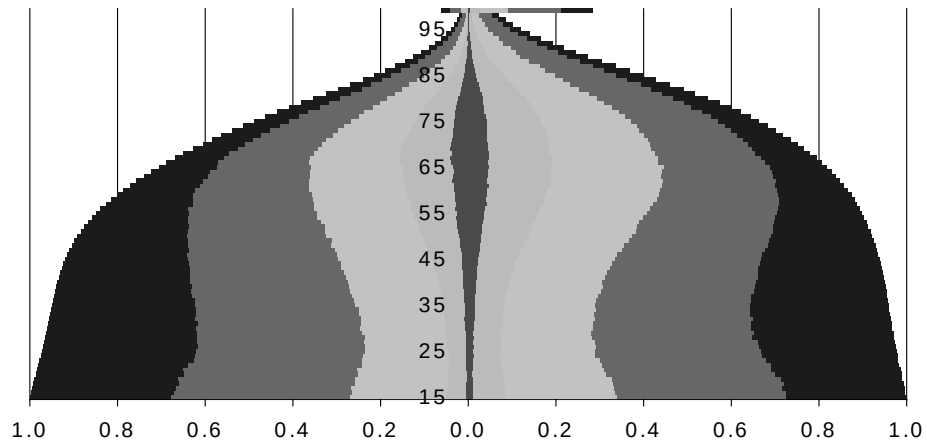
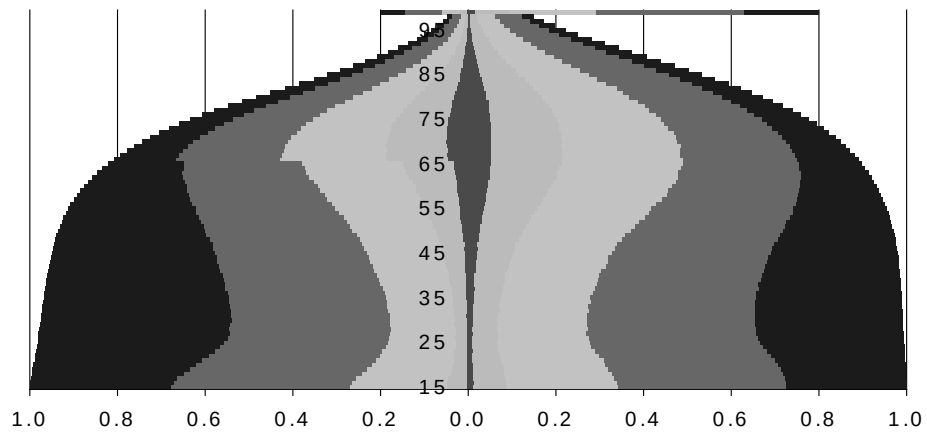
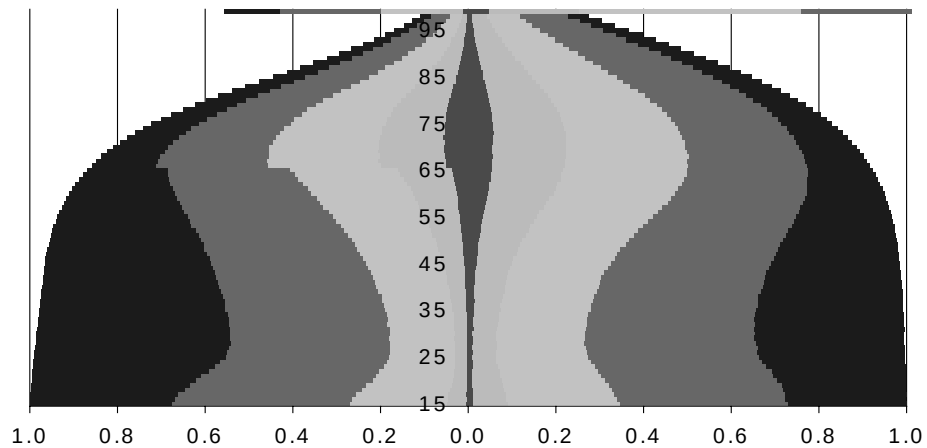
Sex and Birth Cohort	Income Groups as Proportions of the Median				Total = Life Expectancy at Age 15
	Below 50%	50 to 100%	100 to 200%	Above 200%	
Males					
1912-1921	13.1	10.5	23.8	9.4	56.9
1951-1962	11.8	15.6	22.8	12.2	62.3
1992-2001	21.5	16.7	20.9	7.5	66.6
Females					
1912-1921	16.3	20.2	19.6	7.3	63.4
1951-1962	19.5	19.9	20.4	9.8	69.5
1992-2001	33.8	16.2	17.9	6.1	74.0

Table 5 is based on exactly the same data as Figure 9, but gives a somewhat different view. It too shows a growing proportion of time spent (i.e. person-years lived) with incomes below half the “cut-point”. But in this case, years at any point in the life course (after age 15) are considered.

Health Sequence – The last component of “good life time” for purposes of this analysis is health status. This has been estimated from the 1994-95 National Population Health Survey (Statistics Canada, 1995). Figure 10, analogously to the active, passive and income sequences shown in Figures 6a and 6b, 8, and 9 above, shows a “health sequence” for each of the three cohorts being examined. In each case, the shading of the population pyramids shows the distribution of self-reported health status (classified as excellent, very good, good, fair, or poor – n.b. the monochrome shading appears to have combined good + fair). At younger ages, 70 to 80% of Canadians report themselves as in excellent or very good health. However, not surprisingly, the proportions in fair or poor health rise with age.

Figure 10 – Health Sequence

(Excellent, Very Good, Good, Fair and Poor – from outside to inside bands)

1912-1921 Birth Cohort**1952-1961 Birth Cohort****1992-2001 Birth Cohort**

Unfortunately, there are very limited historical data on health status in Canada, so LifePaths has used a rather naïve method, summarized in the Appendix, for imputing health status both for earlier and later years than 1994. In future development work, we will draw on the occasional earlier surveys and subsequent waves of the NPHS (which is longitudinal, so that it will provide data not only on trends over time, but also patterns of micro-level dynamics) in order to improve the results. Note, however, that the mortality data being used are of high quality, and based on a long historical series, as well as official projections (OSFI, 1995). Moreover, we have used special analyses of the Alameda County survey (Berkman and Breslow, 1983), a U.S. longitudinal study dating from the mid 1960s, in order to differentiate mortality rates not only by age and sex, but also by educational attainment and health status.

Table 6 – Average Sojourn Time (years) by Self-Reported Health Status after Age 15

Sex and Birth Cohort	Excellent	Very Good	Good	Fair	Poor	Total = Life Expectancy at Age 15
Males						
1912-1921	16.0	20.6	13.7	5.2	1.4	56.9
1951-1962	20.2	22.1	13.4	5.1	1.5	62.3
1992-2001	21.1	23.5	14.6	5.8	1.7	66.6
Females						
1912-1921	15.5	22.1	16.4	7.3	2.1	63.4
1951-1962	16.9	24.5	17.9	8.0	2.3	69.5
1992-2001	17.6	26.2	19.1	8.6	2.4	74.0

Table 6 suggests that the projected increase in life expectancy will largely be years of “good” or better health. However, the reader is cautioned again that the underlying projections are based on rather naïve assumptions.

Combination Sequences – The “bottom line” in this analysis is a set of estimates of “good life time”, defined as periods over the life course characterized by the combination of adequate income, health, and leisure time. For each of these three attributes, we have arbitrarily defined two levels, adequate and inadequate. The thresholds are:

- for equivalized family income: the “cut-point” (which has been defined as roughly the inter-temporal median of equivalized wage-indexed family income over the two centuries spanned by the birth cohorts),
- for health status: self-reported “excellent” or “very good”, and
- for leisure time: an overall annual average of at least 6 hours per day.

It turns out that, on more detailed investigation, the extent of leisure time seemed rather low. So we have also defined “extended” leisure which is the sum of leisure, as originally defined on the time use survey, plus sleep in excess of 9 hours per day plus personal care in excess of 2 hours per day plus shopping in excess of one hour per day. The implicit assumption is that sleep, personal care and shopping in excess of these amounts might better be considered a form of leisure.

Figures 11 and 12 show the resulting estimates of the age profiles of “adequate” time (i.e. leisure), extended time (i.e. leisure plus “excess” sleep, personal care and shopping), money and health, as well as the intersection of these presumably desirable states – namely “Good Life Time” and “Extended Good Life Time”. The vertical axis shows the number of individuals assuming an initial cohort size of 1,000. The upper-most curve, “Life (excl...)”, is the overall survival curve with two major exclusions – years lived prior to immigrating to Canada, and years while still in school full-time (i.e. continuously since childhood). The reader should also bear in mind the rather arbitrary definitions of “adequacy” being used, and that the data on time use patterns and health status, while accurate for the 1990s, are based on rather naïve historical imputations and projections for future years.

Figure 11 -- GLT, "Extended" GLT, and Their Components

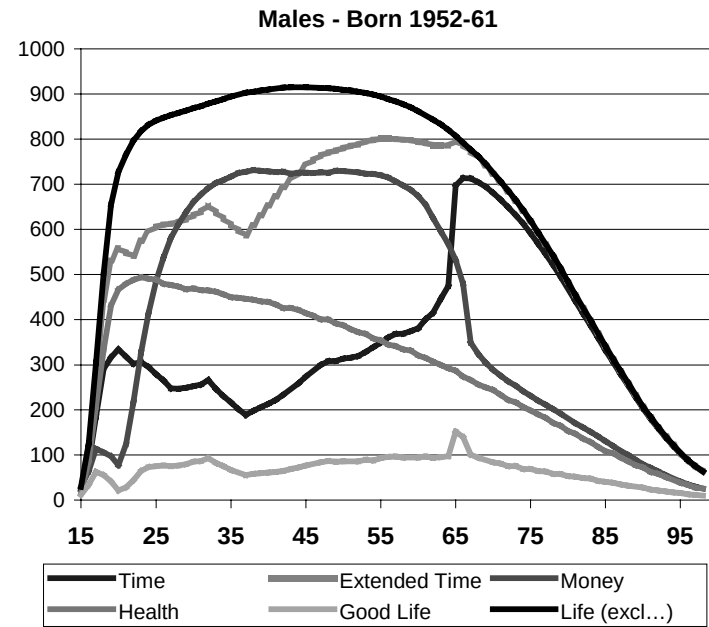
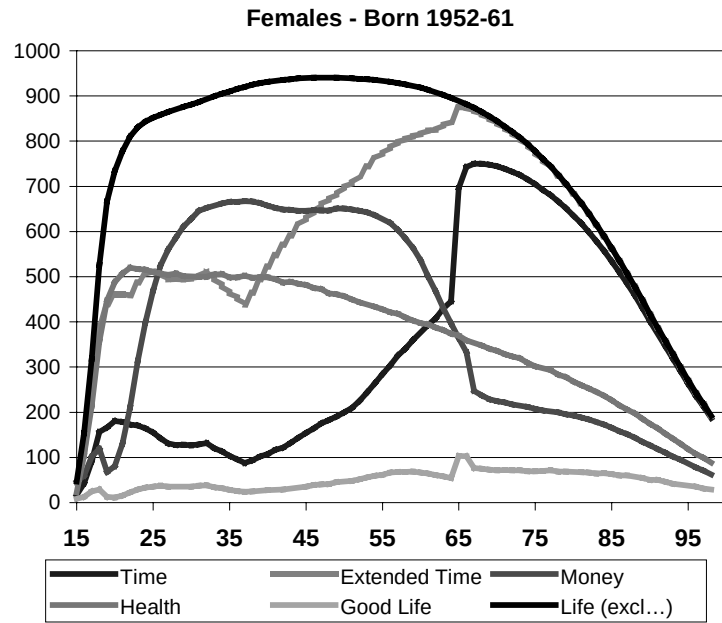
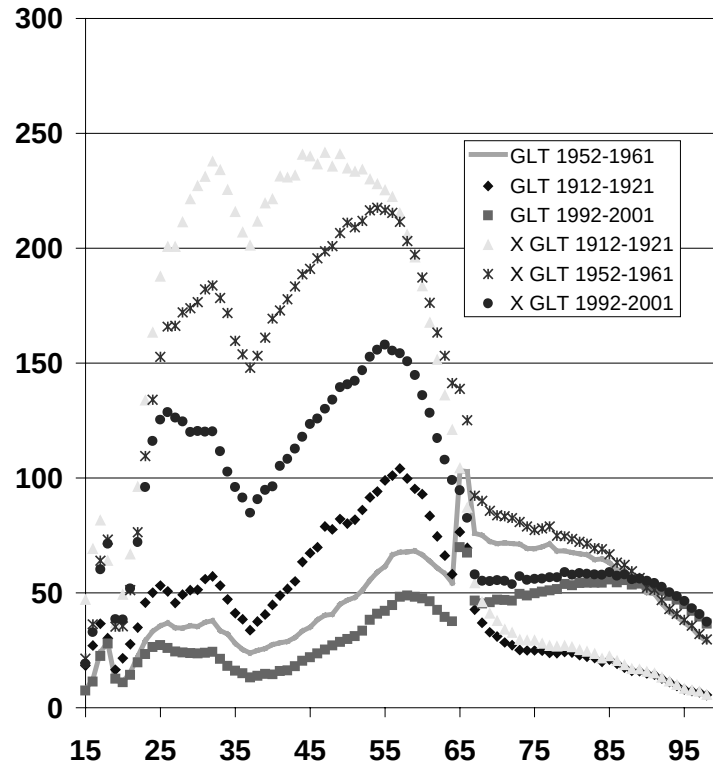


Figure 12 -- GLT and "Extended" GLT by Cohort

Females - "Good Life Time" (GLT)



Males - "Good Life Time" (GLT)

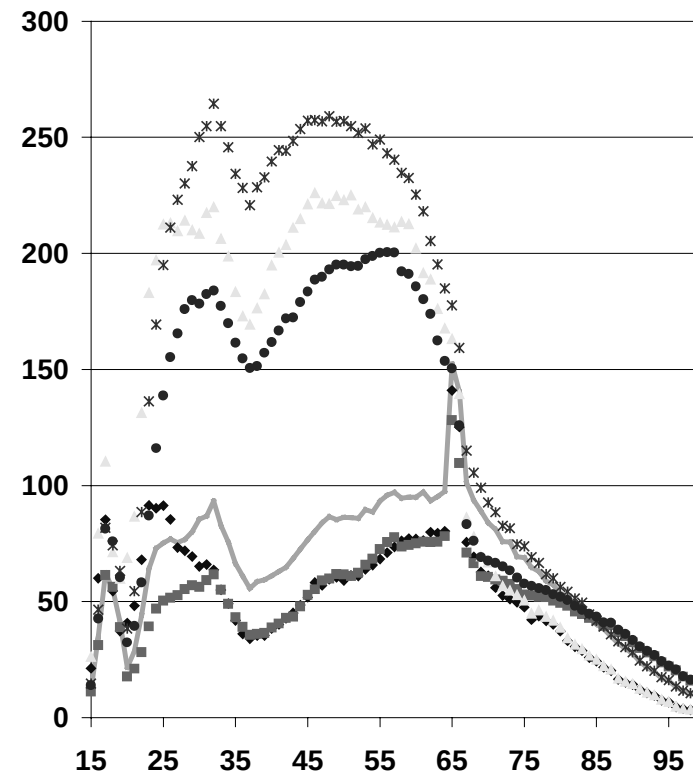


Figure 11 shows some expected as well as several interesting results. Not surprisingly, the curve for adequate income shows a typical life-cycle pattern, and is somewhat higher for men than for women. (Recall that in both cases, it is the joint spousal income that is used.) Adequate health shows similar patterns for men and women, and declines gradually with age (after rising initially with the overall cohort population as it either completes school or immigrates). Leisure time is rather low at the beginning of working years, rising gradually toward retirement age, then sharply at age 65. Extended leisure is considerably higher.

The intersection of these three states, the age profiles of “Good Life Time” or GLT is shown both in the top pair of graphs, at the same time as the other profiles, and then by itself in the bottom pair of graphs. It is generally higher for men than women, but generally amounts to less than 10% of the person years at each age.

All the data in Figure 11 are for the baby boom birth cohort. Figure 12 shows only the GLT profiles, but this time for all three of the cohorts, and for “extended” GLT as well as GLT. For both measures of GLT, the situation appears to be deteriorating during working ages, particularly for women. This is related to their increased participation in the paid labour force. After age 70 though, particularly for women, increases in longevity are associated with increased GLT.

More generally, the strongest factor militating against more “good life time” over the life course is the negative association between adequate income and adequate time – not the pairwise relationships between time and health, or money and health. Thus, one way to increase the extent of “good life time” is for individuals to spread their incomes over a wider range of the life course.

Of course, many individuals feel most satisfied when engaged in socially productive work – by definition then at the cost of leisure time. This in turn raises basic questions about just how good the “good life time” measure we have developed really is. At least a partial answer will be forthcoming in Statistics Canada’s 1998 Time Use Survey which is gathering data not only on time use patterns, but also indicators of the satisfaction derived from various ways of spending one’s time.

Concluding Comments

This paper has described a work in progress – initial estimates of “good life time” based on the LifePaths system for socio-economic statistics. It is being developed as a framework for data integration, which in turn is designed to support the production of a range of coherent socio-economic indicators. Moreover, because it is based on computer simulation, LifePaths can also support research and policy analysis with its capacity to answer “what if” questions.

Similarly to the other major integrative statistical framework in wide use, like the System of National Accounts, LifePaths relies on an extensive network of data feeder systems. And like the SNA at its inception, LifePaths faces major problems of data availability. The challenge is that LifePaths builds on richly multivariate longitudinal data on individuals and their socio-economic circumstances. While these kinds of data are relatively new, there is also a growing consensus that these data are of high priority for a variety of analytical and public policy purposes. Thus, LifePaths not only fits in well with the developing appreciation of the needs for data on the micro-level dynamics of individual behaviours, it also provides a major rationale and integrating framework for such data. Indeed, it can act as the conceptual framework for the design of networks of surveys and other data collection vehicles and, analogously to the role played by the SNA in national statistical offices, give the impetus for the common concepts and definitions that are fundamental to maintaining coherence and consistency in the statistical system. As such, it represents a development and “post computer revolution” extension of the UN’s (1975) proposed System of Social and Demographic Statistics.

In terms of the working results presented, LifePaths highlights the value of a more integrated while multi-faceted view of individuals in society. A full life-course perspective is essential, as (for example) childhood progression through the education system influences subsequent labour market experience, and this in turn affects expected incomes during retirement. It is also important to bridge information on domains that up to now have been disparate. For example, it is obvious to the general public that having a good income is not of much benefit if one has neither the time or the health to enjoy it.

But when we take this kind of integrated view, we see that there are serious “mismatches” in the availability of time, money and health both over individuals’ lifetimes, and between individuals. This general point lies at the core of such differing policy suggestions as mandating shorter work weeks, shifting health care from hospital to outpatient and home care, raising the age of entitlement to public pensions, and forcing or encouraging employers to adopt more “family friendly” policies especially to accommodate the needs of children in families where both parents are working. In the private sector, consumption of new products is often constrained more by lack of time than by lack of money (Linder, 1970). LifePaths provides a statistical framework within which to analyze these kinds of policy options and social changes. It also helps in understanding concerns increasingly expressed by the general public, for example being squeezed into caring both for their children and frail elderly parents, and experiencing “time crunch” more generally.

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APPENDIX -- Microsimulation of Patterns of Health and Time Use

This appendix provides further detail on the methods by which health status data from the 1994-95 National Population Health Survey (NPHS, Statistics Canada, 1995) and the time use data collected in the 1992 General Social Survey (GSS, Statistics Canada, 199X) were estimated for / imputed to the individual histories simulated by LifePaths.

Health Status – The NPHS provides data on subjectively rated health states and their contemporaneous SES correlates for a cross-section of about 17,000 Canadians in 1994. Our objective in using these data was, however, to specify a plausible model for variations in health over the life course and to link these variations to differential mortality risks.

The NPHS variables employed in constructing this model were limited to:

Health States:	Excellent, Very Good, Good, Fair, Poor
Education Level:	Less than Secondary School, Secondary School Only Greater than Secondary School
Labour Force Stage:	Student, Working Age, Retired
Recent Work Experience:	Working, Worked within the last year, Worked more than 12 months ago
Age:	single years
Sex:	Male, Female

In order to model variations in health, we have used a linearization technique based on the cumulative proportions in ordered categories. Specifically, we assigned scores (e.g., $Z(\text{health} | \text{age}, \text{sex})$) to health, education and recent work experience states. These scores corresponded to the standard normal value having the same cumulative probability as the state. That is, given the cumulative probability from 'poor' to 'very good' health at a given age and sex (i.e., $F(\text{health} | \text{age}, \text{sex})$), then the score $Z(\text{health} | \text{age}, \text{sex})$ is the standard normal value that satisfies $F(Z) = F(\text{health} | \text{age}, \text{sex})$. In order to estimate $F(\text{health} | \text{age}, \text{sex})$ by single year of age, a moving average was used to draw on responses from adjacent ages. Hence, the scores are smoothed – with inevitable (good or bad) endpoint effects at the youngest and oldest ages.

Having transformed discrete observations to normal scores, the associations among variables are simply expressed as product moment correlations (i.e. linear associations). These correlations were approximated from rank correlations (i.e., τ - Kendall's tau) estimated from smoothed bivariate tables. For normally distributed variables, τ is directly related to the correlation parameter ρ (i.e., $\rho = \sin(\pi * \tau / 2)$).

At its core, our model expresses health as a combination of time-varying and time-invariant factors. The time invariant factor is represented by a random element determined once and for all at birth (i.e., Z_I for simulated person I) which has a fixed correlation (r_A) with $Z(\text{health} | \text{age at } T, \text{sex}, I)$. The correlation ($r_A \approx 0.5$) was estimated from Alameda County data on the correlation between health scores of young respondents over a thirty year time lag. The time varying factors are represented by the correlation with contemporaneous work experience (if at the appropriate labour force stage) and by a purely random element drawn once each year of life (i.e., $Z_{I,T}$). Note that model represents health as a function of work experience and neglects the dependence of work experience on health.

Health Equations by Labour Force Stage

1. Student or Age < 15

$$Z(\text{health} \mid \text{age at } T, \text{sex}, I) = r_A * Z_I + \sqrt{(1 - r_A^2)} Z_{I,T}$$

2. Working Age

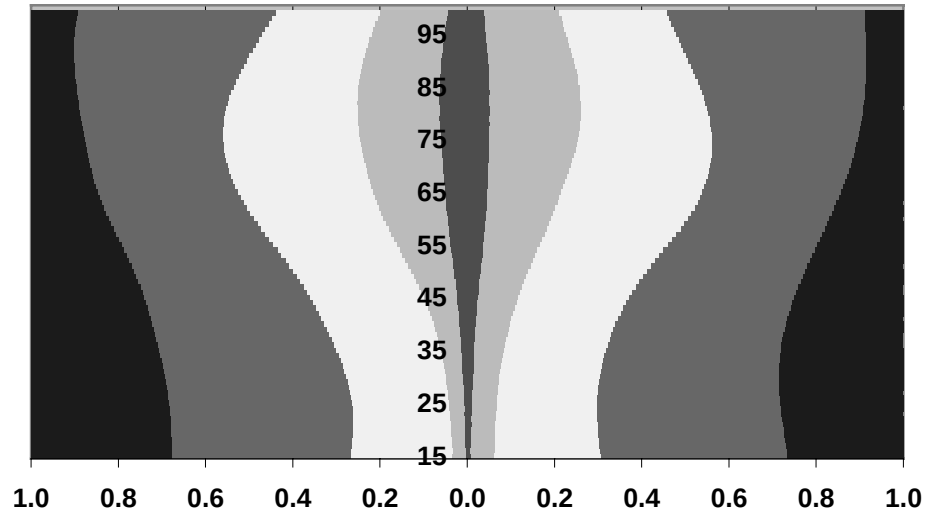
$$Z(\text{health} \mid \text{age at } T, \text{sex}, I) = r(\text{age, sex, education}) * Z(\text{recent work} \mid \text{age at } T, \text{sex}, I) \\ + \sqrt{(1 - r(\text{age, sex, education})^2)} (r_A * Z_I + \sqrt{(1 - r_A^2)} Z_{I,T})$$

3. Retired

$$Z(\text{health} \mid \text{age at } T, \text{sex}, I) = r(\text{age, sex, education}) * Z(\text{recent work at retirement of } I) \\ + \sqrt{(1 - r(\text{age, sex, education})^2)} (r_A * Z_I + \sqrt{(1 - r_A^2)} Z_{I,T})$$

For any randomly generated health score, the corresponding health state (i.e., excellent, ..., poor) can be obtained by locating the corresponding NPHS interval - $Z(\text{health}=\text{poor} \mid \text{age, sex})$, ..., $Z(\text{health}=\text{excellent} \mid \text{age, sex})$. Thus, the (smoothed) NPHS distributions could be recovered – compare Figures 10 and A1.

Figure A1 - Simulated Distributions of Self-Reported Health Status
(Excellent, Very Good, Good, Fair, Poor – from outside to centre of graph)



In order to represent selective mortality based on health and SES, a log-linear model of the relative risk of death was estimated from Alameda County data. Education and health covariates were constructed in the same manner as above (i.e., $Z(\text{health} \mid \text{cohort, sex})$ and $Z(\text{years of education} \mid \text{cohort, sex})$). The model included contemporaneous education, health and interaction effects, as well as a ten year lagged health term. The model was subsequently calibrated to reflect Canadian experience using cohort specific adjustment factors to ensure that the average simulated relative risk for each sex-cohort group was 1.0.

Detailed Time Use Patterns – The GSS data by their nature provide a cross-section of the time use patterns of Canadians in 1992, and cannot directly provide a view of time use over the life course. LifePaths simulations therefore require an imputation of time use patterns over the life times of synthetic individuals.

For these purposes, GSS time uses were partitioned into 17 mutually exclusive activity types:

employment	self employment	commuting
family care	domestic work	volunteer work
adult education	formal education	sleep/nap
shopping	personal care	social leisure
active leisure	serviced leisure (movies etc.)	passive leisure (tv etc.)
reading	other	

Given this classification of activities, the GSS data set can be thought of as an array of 8815 rows (each row corresponding to a respondent with a complete set of responses) and 17 columns. About 60% of all the cells of this array indicate zero reported time use. However, these zeros should not necessarily be interpreted as representing a complete absence of time engaged in a given activity, for two reasons:

- reported time use activities are “main” activities that partition the day into mutually exclusive periods; joint time use such as reading for leisure while traveling to work on the bus is precluded; and
- there is evidence of substantial rounding in the responses. For example, 32% of reported durations of sleep are even multiples of an hour, while 16% are even multiples of half an hour .

Moreover, it is important to distinguish between two types of zero in this overall array:

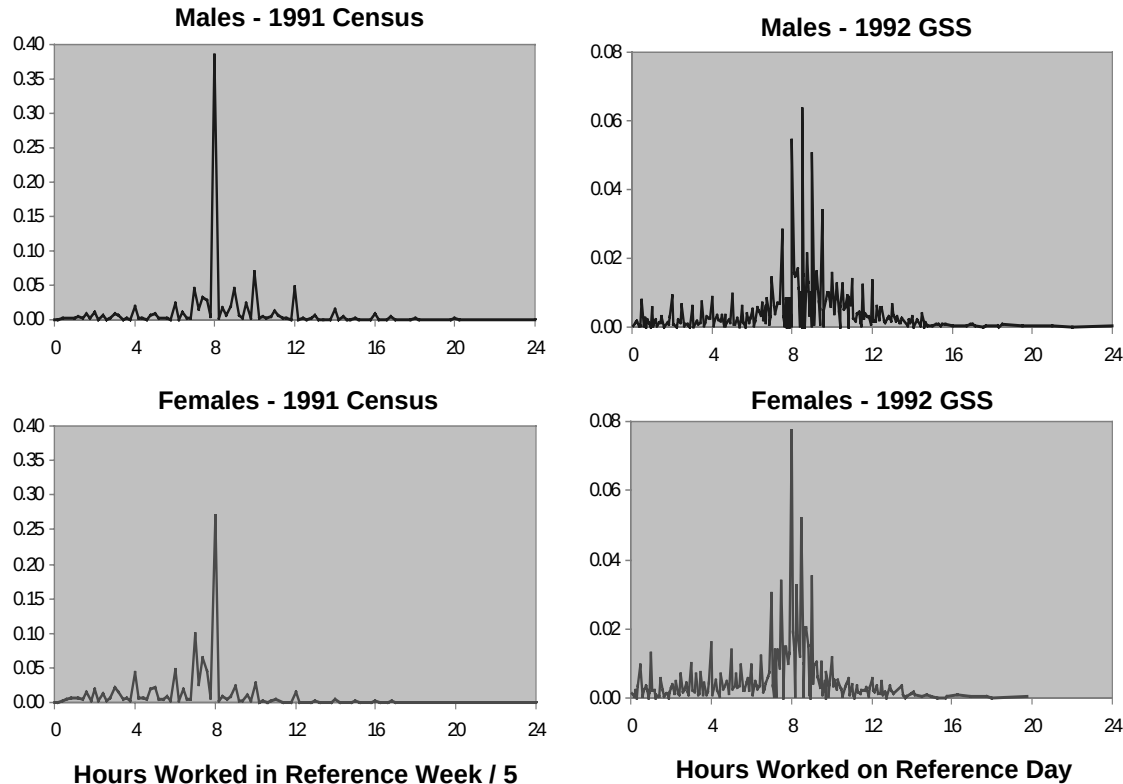
- Response Zeros -- zeros that represent activities that are engaged in with small probability, for short intervals, or that are unlikely to be a main activity. The expected values of such zeros in the observed GSS data should be represented as small positive quantities.
- Structural Zeros -- zero time spent in an activity that is likely to be a main activity, where such a zero is reasonable in relation to the stage in the life cycle. For example, retirement usually implies no paid work. Such zeros should be modeled as zeros – they are essentially impossible events.

Zero time spent in an activity was operationally identified as a structural zero for:

- employment or self-employment -- if the main activity in the previous 7 days was either retirement, long term illness, maternity/paternity leave, or other non-work if no work was reported in the previous year
- commuting -- where both employment and self-employment are structural zeros.
- formal education -- if employment and/or self-employment are non-zero.
- family care -- if no spouse or child were present in the household.

About 12,000 structural zeros were identified by these definitions, representing about 13% of the zeros in the data array.

By way of further background, the GSS time use data are characterized by a higher degree of heterogeneity than is typically observed from other data sources. For example, Figure A2 compares 1992 GSS data on hours of work in the reference day to 1991 Census data on hours of work (employed and self-employed) in the reference week (the latter number of hours divided by 5 for comparability).



Appendix Figure A2 – Distributions of Hours of Work, 1991 Census and 1992 GSS

In common with similar survey data on hours worked in a week, the Census data exhibit a marked spike corresponding to exactly 40 hours (nearly 40% of responses for males and about 25% for females). In contrast, the GSS reveals no more than about 8% of exactly 8 hour day responses. As such, the GSS data are putatively the more accurate representation of the heterogeneity in individual time use patterns, and indicate significant rounding bias in the reported census data.

Figure A3 displays selected patterns of time use in the form of triangular scatter plots. These plots represent a three-way partitioning of the hours in a day by the perpendicular distances from each edge of the triangle. Each dot in a triangle represents a single GSS response, with the area of the dot being proportionate to the survey weight associated with the response. The distances from the edges of the triangles represent, respectively, (i) hours spent in work of all types (market, domestic (including family care) & volunteer), (ii) hours spent in leisure and (iii) hours of personal care and sleep.

The scatter of observations displayed in Figure A3 reinforces the impression that the GSS data exhibit a high degree of heterogeneity, even in respect of a simple three-way partition of activity types. Differences between the employed and not-employed are characterized as much by increased dispersion as by inevitable differences in the location of the scatter of observations.

In summary, the GSS time use data comprise both highly varied observations of time use and a preponderance of zeros reflecting patterns of activity choice and intensity. As a result, these data cannot be summarized parsimoniously, so a more involved imputation method has been developed.

A sequence of three equations was used to impute daily time use patterns to the individual trajectories simulated by LifePaths. In all cases, k indexes the 17 activities, and i the individual respondents to the GSS. These equations were estimated from the GSS 8815 by 17 array.

The first logistic equation describes the patterns of occurrence of structural zeros.

$$(1) \quad E(\text{ZERO}_{ik}) \approx (1 + \exp[- X_{ij}^* \beta_{jk}^*])^{-1}$$

The second set of 17 log-linear equations provide estimates patterns of time use conditional on the structural zeros estimated in the first equation.

$$(2) \quad E(\text{GSS}_{ik} \mid \text{ZERO}_{ik} = 0) \approx \exp[X_{ij} \beta_{jk} + \beta_i]$$

where GSS_{ik} = the proportion of daily time spent by individual i in activity k . A special feature of this second set of equations is the term β_i representing a constant term for every respondent in the sample. These individual level constants represent a constraint on each individual's predicted time use pattern (i.e., it must sum to 100% of 24 hours). The individual level constants may also be interpreted as reflecting random factors at the individual level that can be further modeled.

The third set of equations then captures patterns in individual variability of time spent in each activity. Residual variances are defined in terms of differences in square root proportions, rather than the more usual log differences, to avoid problems with response and structural zeros (since the log residual $(\ln(0) - \ln(\mu))$ is undefined). As well as being defined for zeros, the vector distance measure expressed in terms of differences in square roots is a true distance (i.e., satisfying $d(x,y) \geq 0$, $d(x,y) = d(y,x)$ and $d(x,y) + d(y,z) \geq d(x,z)$) and is unique in that respect among common distance measures on the unit simplex.

$$(3) \quad \text{SD}_i = \sqrt{ \left(\sum (\sqrt{\text{GSS}_{ik}} - \sqrt{\exp[X_{ij} \beta_{jk} + \beta_i]})^2 \right) } \\ \approx \exp[X_{ij} \theta_{jk} + \sigma \varepsilon_i], \quad \text{where } \varepsilon \sim \text{Normal}(0, \sigma^2)$$

In other words, it is being assumed that the standard deviations (SD_i) of time use proportions are log normal, though with means depending on X_{ij} .

Estimation for equations (1) and (2) was carried-out by iterative proportionate adjustment, while equation (3) was estimated by least squares.

The choice of predictor variables in each of the equations was constrained by what was available both on the GSS and in the LifePaths model. The following variables were used:

<u>Predictor Variables</u>	<u>Definitions</u>
reference day	Sunday, ... , Saturday
sex	Male, Female
age group	15-17, 18-19, 20-24, 25-29, ... ,65-69, 70+
marital situation	married or CLU (spouse not working last week), married or CLU (spouse worked last week), never married, widowed, divorced or separated
children	no children at home, all children at home aged 5+, one or more children at home aged <5
education attainment	less than secondary school, secondary school only, at least some post-secondary
respondent's work	mainly a full time student last week, working last week, not working and not mainly a full time student last week
response rounding	0 responses in multiples of 1/2 hour, 1 response in a multiple of 1/2 hour, 2 responses in multiples of 1/2 hour, 3+ responses in multiples of 1/2 hour

An evaluation of the fit of these equations is difficult both because of the zeros in the data, and because the statistical properties of entries in time use diaries are difficult to specify. The following evaluation measures were calculated by analogy to statistical models of count data and should be taken as merely suggestive of the explanatory power of each variable.

Reduction in Deviance due to addition of independent variables	Structural Zero Model (Equation 1)		Time Use Model (Equation 2)	
	Deviance	# Fitted Parameters	Deviance	# Fitted Parameters
reference day	17.1 ns	42	4645 **	119
sex	875.0 **	12	923.1 **	34
age group	4611.8 **	78	1241 **	221
marital situation	29.1 ns	24	198.5 **	68
children	230.5 **	18	1325 **	51
education attainment	327.9 **	18	389.7 **	51
work	--	--	4355 **	51
rounding	--	--	48.55 ns	68

Note: ** denotes significance at 5%; ns denotes not significant at 5%

Finally, given the estimated set of equations, imputation of the 17 element time-use activity vectors was based on an algorithm that started with annual features, and then successively expanded to the imputation to weekly and ultimately daily features. For each individual life cycle history simulated by LifePaths, and for each year, the following procedure was implemented:

Starting at the annual level,

- choose ZERO day - based on a uniform random number ranging from 1 to 365. Note that the interval between successive ZERO days will range from 1 to 729 days.
- on ZERO day, it is decided whether not a structural zero will be imputed to market work, commuting, formal learning and/or care for family members for the next "year" (actually until the next ZERO day), based on probabilities determined from the logistic regression equation (1) estimated from GSS data.

Given these annual level imputations, the process next focuses on a week:

- choose a random REF day - based on a uniform random number ranging from 1 to 7. Note that the interval between successive REF days will range from 1 to 13 days.
- on REF day each week, one of the actual 8815 empirical residual vectors RESID is chosen at random. The residual vectors are in standardized form:

$$\text{RESID} = [(\text{sqrt} (\text{GSS}) - \text{sqrt} (\text{fitted from equation 2}))] / \text{SD}.$$

- also on REF day, a random heterogeneity term ($\sigma\epsilon$) is generated from the log-normal distribution represented by equation (3).

Finally, the imputation algorithm determines a set of daily activity patterns for all 365 days of the year (actually, all the days until the next ZERO day):

- each day, the appropriate average time use vector (AVG) is determined -- corresponding to the day of week, sex, age, marital situation, presence of children, employment/schooling and education attainment – by applying equation (2) to the LifePaths variables pertaining to that day. A corresponding calculation, based on equation (3), provides the heterogeneity term (SD) appropriate to the day of the week, etc. and to $\sigma\epsilon$.
- subsequently, the average, residual and heterogeneity terms are combined:

$$\text{sqrt (AVG)} + \text{RESID} * \text{SD}$$

The added variability due to the RESID and SD terms preserve correlations among time use activities and account for inter-individual variation. By varying RESID and SD only on a weekly basis, some (possibly spurious) correlation is induced between days of a given week.

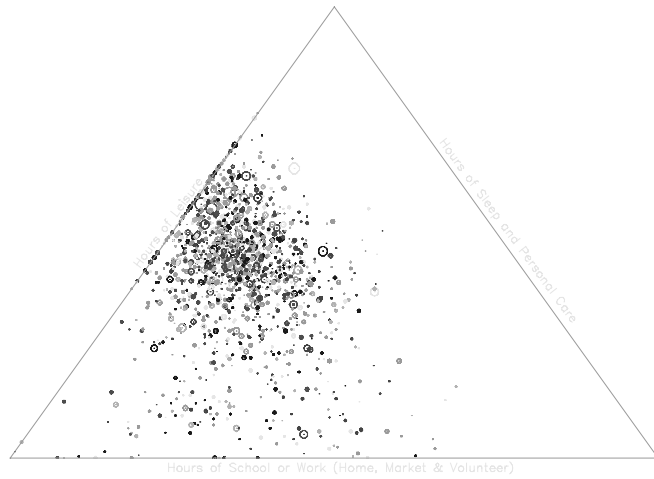
- impossible time uses are set to zero -- for example:
 - age < 6: pre-school: domestic work, formal learning & reading;
 - age < 12: family care;
 - age < 15: market work, commuting & adult education;
 - institutional: market work, commuting, family care, domestic work, & volunteer work

Likewise, structural zeros as prescribed above are set if necessary conditions are still met:

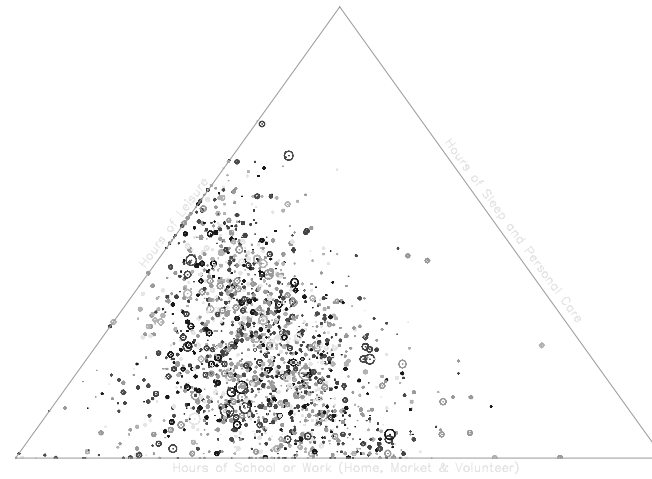
- employment time use = 0, if no work simulated for the previous 12 months
- self-employment time use = 0, if no work simulated for the previous 12 months
- commuting time use = 0, if no work simulated for the previous 12 months
- formal learning time use = 0, if currently employed
- family care time use = 0, if no spouse & no children are present at home
- finally, negative [sqrt (AVG) + RESID*SD] combinations are set to zero, with the remaining values transformed and scaled to sum to 1.0.

The algorithm therefore provides simulated time use proportions that approximately reproduce time use averages, variances and covariances as observed in the GSS data.

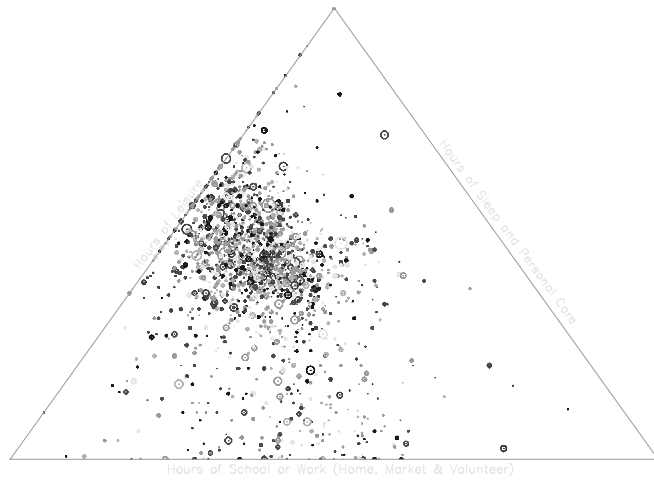
Women Employed
Time Use on Weekdays



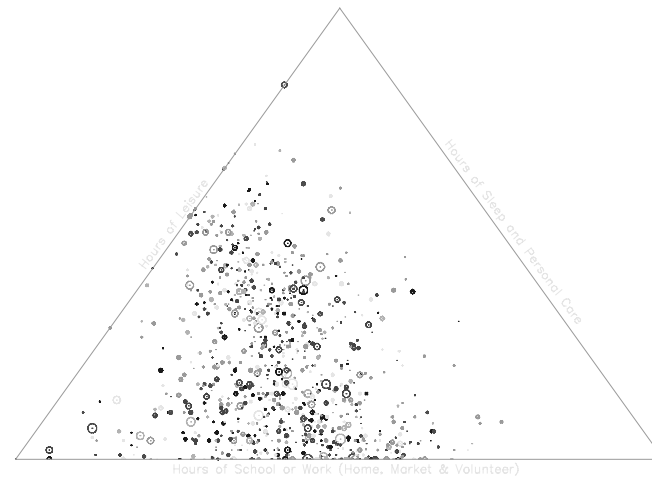
Women Not Employed
Time Use on Weekdays



Men Employed
Time Use on Weekdays



Men Not Employed
Time Use on Weekdays



CSLS Conference on the State of Living Standards and the Quality of Life in Canada

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Income Inequality and Inequality in Health: Implications for Thinking About Well-Being

Cam Mustard

Institute for Work and Health

Session 8: Health, Insecurity and Well-being
October 31 12:15 PM - 3:45 PM

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**Income Inequality and Inequality in Health:
Implications for Thinking About Well-Being**

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Paper presented to the:
Conference on the State of Living Standards
and the Quality of Life in Canada,
October 30-31, 1998, Ottawa, Canada

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Word Count
October 26, 1998: 3,124

Abstract

The constituents of wellbeing are understood to have a number of discrete dimensions: security of person, access to material resources, access to leisure pursuits and optimal physical and psychosocial health are a number of the more prominent constituents. Relying on a brief synthesis of the large empirical literature on the relationship between income and health, this paper draws attention to a strong and consistent dependence between the material resources available to an individual and individual health. The paper presents evidence to argue that on a population basis the causal direction of this relationship is dominated by the pathway from income to health status, rather than the opposite pathway, where health status determines income through effects on educational attainment and tenure of labour force participation.

In addition to the well-established relationship between an individual's access to material resources and individual health, the paper also summarizes evidence from an emerging body of empirical work which documents a relationship between the income distribution profile in a country, a structural characteristic of the economy, and the health of individuals. This evidence adds important nuance to the simple assumption that a rising economic tide lifts all boats evenly, and has implications for the emphasis given to policies which alter the distribution of income in mature market economies.

Introduction

Along with dimensions such as security of person, access to material resources and access to leisure pursuits, optimal physical and psychosocial health is a prominent constituent of the concept of well-being. This paper presents a brief summary of what we know about the consequences for health which arise as a result of an individual's position in the social hierarchy and of the distributional profile of material resources in a society. This paper will draw attention to a strong and consistent dependence between material resources and health. The paper will present evidence to argue that on a population basis the causal direction of this relationship is dominated by the pathway from income to health status, rather than the converse pathway, whereby health status determines income through effects on educational attainment and tenure of labour force participation. In addition, the paper will summarize a body of recent population health literature which is indicating that health may reflect the influences not only of absolute material resources, but also the relative distribution of material resources in a society.

Income and Health

Socioeconomic inequalities in health status are ubiquitous in industrialized countries. Rates of all-cause mortality, premature mortality and cause-specific mortality are consistently found to be lowest among the highest income members of a population and highest among those with the lowest levels of income. Societies

with steep gradients in income distribution have steep gradients in the distribution of health status. The incidence of infectious disease, the prevalence of chronic disorders and the prevalence of disability is also distributed inversely to income in developed economies. These broad patterns have been invariant over time, and seem to be unrelated to international differences in both the GNP share allocated to health care services and the mechanisms of finance, organization and delivery of health care.

To illustrate this phenomena, we provide three brief snapshots of the relationship between health and socioeconomic status in Canadian populations. Figure 1 reports the distribution of premature mortality (deaths to persons before age 75) for the population of Winnipeg classified to five equal sized groups on the basis of average neighbourhood income (22). Figure 2 reports the mortality experience for a complete cohort of Canadian males in the five years after age 65, classified on the basis of average earnings in the ten year period prior to retirement (2). Both examples illustrate the consistent pattern of increasing risk of mortality with declining material resources and emphasize that this pattern is a linear gradient, rather than a threshold effect associated simply with the insufficiency of material resources associated with poverty. While both of these examples use income as the measure of place in a social hierarchy, it is not at all clear that the implied material explanation is the sole or even the dominant mechanism at work.

Figure 3 reports results from the 1994 National Population Health Survey, showing the distribution of self-reported perceived health status (measured on a five point Likert scale: excellent, very good, good, fair and poor) and a composite index of health status (the Health Utilities Index) in relation to income decile (18). These results, adjusted for age differences over the income decile distribution, emphasize again the negative income gradient in health status.

There are a limited set of explanations for these observed associations. These examples can potentially be explained by a pathway which runs from health to socioeconomic status. In this framework, biological differences in vitality and health among individuals acts as a primary mechanism selecting working age adults into high, median and low income occupations and as a corollary mechanism, the onset of illness or disability will impair labour force participation for some individuals, resulting in downward socioeconomic migration. A competing explanation argues that the physical and material conditions of life, which are determined by occupational opportunities in working age adults, set the context in which individuals' health is determined and that relative deprivation in income or wealth produces relative deprivation in health and longevity. A third explanation diminishes the importance attached to material resources in producing health consequences, and argues instead

that the socioeconomic gradient in health status is the result of differences in the distribution of freely chosen health-damaging behaviors across income groups.

A large body of empirical research in the fields of epidemiology and population health have established that the effects of the socioeconomic distribution of health behaviors such as smoking and alcohol consumption do not account for a dominant component of the socioeconomic health gradient in developed societies. Similarly, while health selection effects can be demonstrated (and are dominant in the case of some disorders, such as serious mental health disorders) these effects have been shown to account for only a minority share of any observed socioeconomic health gradient.

The socioeconomic health gradient in Canada has been shown to be temporally persistent. Russell Wilkins, in comparing relative mortality across neighbourhood income rank for two time periods (1971 and 1986) for urban populations, found that while life expectancy increased over this period, the relative risk of mortality between the top and the bottom neighbourhood income quintiles did not moderate (1,3). It is important to note that this period of unchanging socioeconomic mortality differences coincides with the public policy experiment of universal health care insurance. Figure 4 also illustrates two additional patterns regularly observed in analyses of socioeconomic status and

health: first, that income-related gradients appear steepest in the middle period of the lifecourse, and second, that the socioeconomic gradients for males are steeper than those for females (24).

A final example to complete this necessarily brief overview is presented to illustrate that there can be significant temporal dynamics in the socioeconomic distribution of health. Figure 5 reports premature mortality rates for 12 regional health authority populations in Manitoba for two time periods (1985-89 and 1990-94) (23). Over these two time periods, life expectancy in Manitoba increased, displaying the simple correlation with economic growth that is consistently observed in developed countries. However, against this background of improvements in health status measured at the provincial level, there was strong evidence of widening inequality in health at the sub-provincial level. The two regions with the worst health status (indicated by premature mortality) in the period 1985-89 experienced a decline in health status over the subsequent observation period.

Does the Magnitude of Income Inequality have Consequences for Health?

The previous section briefly sketched the strong correlation between income (or other markers of socioeconomic status such as education and occupation) and health within countries. In something of a paradox, the correlation between GNPpc and health

is very weak in analyses comparing developed economies. Richard Wilkinson, in focusing on this paradox, has drawn attention to a number of issues (7,15,16,17). Figure 6 draws out two observations concerning the relationship between national income and health, observations which dispute the assumption that changes in national material circumstances are directly and linearly related to improvements in health. The first observation asks why a constant level of material resources (for example 5K income per capita) associates with different levels of life expectancy across birth cohorts. The second observation asks why, on a cross-national basis, the relationship between income and health tends to flatten with increasing levels of income.

A plausible explanation for the first observation rests with failure of price indices (which are a primary means of producing scales of economic resource equivalence over time) to adequately adjust for qualitative changes arising from economic growth. Work on the inadequacies of price indices has established that improvements in living standards are substantially underestimated by this method. The succession of new and higher curves in Figure 6 may be artifacts of the failure to measure the extent of qualitative improvements in the standard of living and accurate measures of living standards might conceivably resolve the rising parts of the family of curves at different points in time into one curve.

In the second observation, attention is drawn to the apparent diminishing returns to health with increases in income once economic growth has reached a certain point. At the flat of the curve, a stage has been reached when improvements in population health are no longer determined primarily by crude increases in the supply of basic necessities. Wilkinson has noted that changes in the main causes of death and in the social distribution of morbidity which occur in congruence with the flattening of the curve are consistent with a phenomena known as the epidemiologic transition (in the epidemiologic transition, mortality declines abruptly, fertility falls and causes of death shift from infectious to chronic diseases). The benefits to health from economic growth seem to change following the epidemiologic transition, with the possibility that important benefits thereafter may come in the form of qualitative improvements in standards rather than from increases in the absolute amount of increase in economic resources.

Wilkinson and others have focused attention on the particular qualitative dimension of *income inequality* as a potential determinant of health differences in affluent developed countries (5,6,10,11,14). Figure 7 displays the correlation of life expectancy and post-tax income inequality (measured by gini coefficients) for 11 developed countries in 1970. In this cross-national comparison, countries with the highest income inequality had the lowest life expectancy. This relationship is emphatically

much stronger than the relationship between GNPpc and health and supports Wilkinson's hypothesis that health is more prominently affected by qualitative features of a country's wealth (such as the income inequality profile) than by the absolute level of wealth following the epidemiologic transition.

Recent work has examined the degree to which this cross-national pattern is also evident within countries. Figures 8 and 9 reproduce results from two recent national studies of the relationship between measures of income inequality and mortality. Ben-Shlomo and colleagues have recently reported the distribution of premature mortality (deaths before age 65) for 8464 geographic wards in the United Kingdom (4). For each ward, a measure of premature mortality was obtained for the period 1981-85 and a measure of deprivation was computed from the 1981 census. Wards were then aggregated within 369 Local Authorities, and the median of the ward deprivation scores and mean of ward mortality rates were computed. In addition, the interquartile range of ward deprivation score was computed for each Local Authority. Figure 8 presents the mean mortality rate for Local Authorities, simultaneously stratified by quartile of deprivation and quartile of variation in deprivation score. As expected, mortality rises with increasing deprivation. In addition, however, within a deprivation quartile, mortality increases with increasing variance of within-authority deprivation. The authors argue that these results support the hypothesis that variations in income

distribution contribute an additional effect on mortality in addition to the effect of deprivation alone. Individuals residing in areas with greater variation in deprivation characteristics appear to experience higher mortality than their counterparts in more homogeneous areas.

Figure 9 presents results from a similar study examining the relationship between income inequality and mortality in the United States (8). This work found that metropolitan areas with high income inequality had significantly greater age-adjusted mortality than those of low inequality, and that this relationship was independent of absolute levels of mean household income in these areas. These findings were robust across three different measures of the inequality of the income distribution (Gini coefficient, Atkinson Deprivation Index and the Theil Entropy Index). The magnitude of this relative income effect associated with the structure of the income distribution within geographic areas is substantial.

There have been a number methodologic challenges to this body of work. One criticism has been that the association between income inequality measures and population rates of mortality is overly sensitive to the choice of inequality measures. Additional concerns have been raised about the comparability of measures of income inequality across countries in international comparisons of this hypothesis. Neither of these methodologic concerns has

been found to be sufficiently robust to have standing as an artefact explanation for the observed association.

More recently, Gravelle has proposed an elegant argument that the relationship between the distribution of income in a society and an individual's risk of mortality may be a statistical artefact in the family of inferential threats known as the ecological fallacy (9). Gravelle has demonstrated the theoretical possibility that a positive correlation between population mortality and income inequality can arise at the aggregate level even if inequality has no effect on the individual risk of mortality. This hypothesis depends on a non-monotonic relationship between absolute levels of income and individual mortality risk, where the risk of mortality falls at a declining rate, rather than a constant rate, with increases in income. If the relationship between income and mortality risk follows this shape of diminishing returns, Gravelle has demonstrated that two populations with different income inequality profiles can generate different aggregate mortality rates which arise exclusively from the absolute income/mortality relationship and yet are spuriously correlated with income inequality. A number of research groups are currently engaged in empirical tests of this hypothesis, including Michael Wolfson and colleagues at Statistics Canada.

Does the relationship between income inequality and health

pertain in Canada? The answer to this question is not yet clear. Studies monitoring the profile of income distribution in this country have shown that inequality increased over the period 1970-90 when measured by market income (see Figure 10)(19). At the same time, however, the influence of growing inequality in market income has been mediated by tax and income transfer policies, such that post-tax, post-transfer household income inequality did not change over these two decades in Canada.

While the profile of relative stability in the Canadian income distribution is well-established, there has been very little research incorporating Canadian data on the income distribution and the distribution of health into international comparative studies. One study, by Humphries and van Doorslaer, found that health inequalities in relation to income in Canada were among the largest of 10 countries examined (Figure 12) (18). This study is based on the computation of an ill-health concentration index (see Figure 11), conceptually similar to a gini coefficient, which used a latent continuous measure of health status, such as the measure of perceived health status illustrated in Figure 3. Additional work is currently underway within Statistics Canada examining the relationship between provincial measures of income inequality and provincial measures of life expectancy.

Discussion

As outlined in this paper, the distribution of health status in

relation to structures of socioeconomic hierarchy in a society is a relevant measure of well-being. To this point in time in Canada, portraits of the distribution of health in relation to socioeconomic status have been exceedingly rare. But the limited information available does indicate that the processes which shape the distribution of inequalities in health appear to be sufficiently independent of the processes which drive overall economic well-being to warrant increased attention to the measurement of socioeconomic inequality in health in addition to the traditional measurement of changes in absolute levels of health in a population.

Do measures of health belong in a measure of economic well-being? From one perspective, health is a central component of the stock of human capital, which like education and occupational skill training, is an important determinant of current economic well-being. And like education, the health of a population has a strong intergenerational component, with contributions to future economic well-being. Health-enhancing investments in the developmental period of the human lifecourse, during childhood, have consequences for individual productivity during the period of labour force participation and for health and function at the end of the lifecourse (20-21). It has been decisively established that the level of health in a population is not a simple derivative function of the economic resources of a society. Given that two populations can achieve the same level of health against

very different profiles of economic resources, this argues for the independence, rather than the dependence, of health as a measure of economic well-being.

At the end of the day, however, health is a component of overall well-being, rather than a constituent of the economic component of overall well-being. The most appropriate approach may be to construct a distinct index of health, to parallel and complement an index of economic well-being. An index of health could be constructed to reflect the same four dimensions articulated in the CCLS framework: flows, stock, inequality and insecurity (with credit for this idea to M McCracken). Measures of population health status at different points in the life course would constitute the component elements of measures of flows and stock. Measures of health stock might include public and private expenditures on health research and development, capital investments in the health care system and in environment and pollution control technologies. An index of health stock might also include measures of the prevalence of health-enhancing behaviors in the population, which can be understood to predict future health status.

Measures of the distribution of health in relation to measures of socioeconomic status would be components of the inequality dimension and would balance established measures of absolute changes in population health, such as the year-over-year trend in

life expectancy. The dimension of the index focusing on health insecurity might emphasize the measurement of the comprehensiveness of publicly funded health insurance programs, the proportion of health expenditures paid by private household sources and the structure and source of disability insurance benefits in the country.

As a minimum starting point, the national statistics agency should assemble time series profiles of a number of measures of socioeconomic health inequality from currently available data sources. The relative mortality analyses for urban income quintiles pioneered by Russell Wilkins should be replicated for the 1991 and 1996 census years. In addition, a program of analyses should be structured around the National Population Health Survey, reporting concentration indices for disability and for measures of generic health status, applying an appropriate level of geographic aggregation.

The emerging international evidence identifying a relationship between health and the income distribution characteristics of a society, in addition to the relationship between health and the absolute level of income obtained by an individual, adds important nuance to the simple assumption that a rising economic tide lifts all boats evenly. A number of strands of explanation have been offered to account for the process by which income inequality, as a characteristic of the collective economic

environment, may act to influence individual health. Income inequality may be associated with a set of social processes and economic policies that systematically underinvest in physical and social infrastructure and with these underinvestments then having consequences for health. Alternatively, large disparities in income distribution may have direct consequences on people's perceptions of their relative place in the social environment, leading to behavioral and cognitive states which influence health. Income inequality is a structural characteristic of the economy, and although income inequality is not measurable at the level of the individual, disparities in the distribution of income may affect disease processes that occur in individuals. If policies that alter the distribution of income are to be judged at least partly by their effects on population health, it becomes important to fully understand the independent contributions of absolute income effects as well as the effects of disparities in the income distribution on individual health.

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Personal Security Index -PSI

Centre for International Statistics at the
Canadian Council on Social Development

Insurance Bureau of Canada

Session 8: Health, Insecurity and Well-being
October 31 12:15 PM - 3:45 PM

Personal Security Index - PSI

Proposed Model

October 1998

In conjunction with the
Insurance Bureau of Canada



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The Canadian Council on Social Development (CCSD) is a voluntary, non-profit organization. Its mission is to develop and promote progressive social policies through research, consultation, public education and advocacy. Affiliated with the CCSD is the **Centre for International Statistics**, whose mandate is to provide statistical research services to the CCSD and a wide range of other organizations. The Centre – a non-profit, self-sustaining division of the CCSD – collects, analyses and disseminates Canadian and international data on families and children.

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Personal Security Index

Introduction

The combination of societal and economic changes that have characterized the 1990s have placed issues related to personal security at the forefront of Canadians' concerns. As we emerge from a period of profound economic restructuring, the working lives of many Canadians are being radically transformed. Economic security is arguably the issue of our times – a reality that is reflected in the public's concern about high unemployment and the growing prevalence of less secure forms of work. Growing apprehension about declining economic security is accompanied by the perception that Canadian society itself is becoming less secure – that the streets are less safe, our homes more vulnerable to break-in – and that threats to our health are more prevalent.

In order to measure the personal security of Canadians, the Canadian Council on Social Development (CCSD) and the Insurance Bureau of Canada (IBC) are working together to develop an annual "Personal Security Index" (PSI). The PSI will be comprised of a series of indicators organized under two sub-indices: economic security and physical security. We propose to use a combination of objective and subjective indicators, drawing primarily on existing Statistics Canada and IBC data bases as well as commissioning survey questions to solicit Canadians' perceptions of personal security. These measures will be combined to form a single national Index that will assess historical trends in personal security and will chart change over time. In addition to producing a national snapshot of personal security, we will examine Index scores for men and women, different age groups, and persons in different regions, if data permit, to give a more detailed picture of security among Canadians. Once the national Index has been constructed, we also plan to explore the possibilities of producing the Index for other industrialized countries.

The objectives of the project are:

- ◆ to accurately document levels of personal security in Canada and selected industrialized countries over the past decade and into the future;
- ◆ to provide a readily accessible and credible reference source on an annual basis in order to inform public policy and programs as well as local and civic initiatives that enhance the personal security of Canadians;
- ◆ to inspire action at the national, provincial, and local levels to make the personal security of Canadians an economic and social priority; and

- ◆ to stimulate research and exploration of personal security among Canadians and with citizens in other industrialized countries.

The CCSD proposes to publish the Personal Security Index each year in January in conjunction with the Insurance Bureau of Canada, and other funders. We envision a short report that would be accessible to a broad audience. We hope to develop a tone that strikes a balance between the technical nature of the material being presented and the accessibility necessary for the PSI report to serve as a useful tool for public education and policy-making.

Since the Second World War, governments have systematically collected statistical information about the health of the economy. In this time of social and economic change, it is equally as important to develop and monitor indicators such as personal security to accurately reflect the challenges facing Canadians today. The CCSD and IBC hope that this project will inform Canadians and motivate action to enhance personal security, a key measure of well-being and future prosperity. For public and private policy-makers, the Personal Security Index will be an important tool in assessing the impact of policies and of programs on the well-being of Canadians.

Defining Personal Security

The feeling of insecurity lies at the root of concerns about many single issues that are addressed almost daily in the media: public deficits and debts, population aging, privatization of health care, global warming, family breakdown, and violence. The concern is immediate and personal; Canadians are worried about the ramifications of these larger issues for their families, and their children's families.

What, then, makes people feel insecure? Being poor? Being sick? Losing one's job? Being isolated and lonely? Environmental threats? By contrast, what makes people feel secure? Owning a home? Having a registered retirement savings plan? Environmental regulations that ensure water quality?

There are arguably many dimensions of security. For the purpose of creating the Personal Security Index, we have decided to break the PSI down into two main components: economic security and physical security, and to choose subjective and objective indicators under each which measure those things that threaten, and conversely, enhance security. The intent of the PSI is to capture both the "perception" and "reality" of personal security in the lives of Canadians.

Economic security

Economic security refers to an assured and stable standard of living that provides individuals and families with a level of resources and benefits necessary to participate economically, politically, socially, culturally and with dignity in their community's activities.

Sub-components: adequacy of income; stability of income

Economic security is a leading concern of Canadians. Personal income, which is one element of economic security, is linked directly to the basics of life – shelter, food, clothing, education and health care. Individuals with greater financial resources generally have more secure living conditions and greater access to social, health, educational, occupational, and recreational opportunities for themselves and their families – important factors shaping health and well-being. The benefits are both immediate and long term. Adequate financial resources allows one to plan for the future, i.e., to purchase a house, to purchase insurance, or to plan for retirement.

In addition to adequate income, economic security refers to the stability of income. People who experience unemployment face a sudden drop in income, while many others who still have jobs are fearful of the continuing cycle of cutbacks and downsizing. Due to stubbornly high unemployment rates and the growth of non-standard forms of employment, many families feel insecure about their economic futures. Some accumulate

unmanageable debt in their efforts to keep afloat financially. These are key dimensions of economic security in the 1990s.

Physical security

Physical security refers to physical and mental well-being, the quality of natural and built environments and the status of one's personal safety.

Sub-components: physical and mental well-being; personal safety

Under this second component, we group concerns about one's current and long-term health, threats of physical security due to injury or environmental contamination, and threats from crime and violence.

Broadly speaking, physical security encompasses many different components. For our purposes, we concentrate on two questions: is my health at risk? and am I safe? Under the first subcomponent, we propose to look at perceived threats to health from the environment (i.e., water quality), morbidity (i.e., incidence of cancer) and injury in the home, workplace and in the community (i.e., motor vehicle accident rate).

Our second sub-component takes up public concern among Canadians about crime and violence. People are principally worried about volume and type of crime that takes place in their communities. This includes incidents which are reported to police, and thus included in national crime data, as well as threats to physical safety and property. We divide this component into two parts, one of which focuses on the threat of violent crime while the other focuses on the threat of property crime.

Our proposed model is summarized below.

Indicator model: Subjective and objective indicators	
1. Economic security	
	Adequacy of income Stability of income
2. Physical Security	
	Physical and mental well-being Personal safety: Violent crime; Property crime

Indicator Selection Criteria

At its most basic level, an indicator reflects or represents a more complex whole; it is a proxy for a larger concept or condition. Indicators are used to measure repeatedly the same phenomena over time. Rossi and Gilmartin define indicators as a “time series allowing the identification of long term trends, periodic change, and fluctuations in rates of change.” (1980: xiii) Similarly, indicators can be used to highlight possible directions of future change.

In this project, our task is to select indicators that accurately capture subjective and objective dimensions of personal security. To this end, we propose the following criteria to guide the selection process.

- ◆ indicators should measure the personal security of *adults and their family members*.
- ◆ subjective indicators should measure each individual’s *personal experience of security*, rather than their perceptions of the general level of security in Canada.
- ◆ indicators should be *meaningful* in that they are descriptive of the personal security of Canadians at a given point in time. They should be relatively *easy to understand* and *compelling* for the general population.
- ◆ indicators should be *valid*, that is well-recognized in the research literature.
- ◆ indicators should be *responsive to change* over time and among different populations where possible. Indicators should show a degree of *variability*.
- ◆ indicators should measure those things that have a *high probability* of influencing an individual’s personal security.
- ◆ indicators should take into account *sources of “extraneous variation”*, that is, changes in the population over time, changes in the time period during which measurements are made, and changes in monetary values over time.
- ◆ indicators should be available ideally on an *annual* basis. The most recently available data will be used in constructing the PSI.
- ◆ indicators should be available at the *national* level and for selected *demographic groups and geographic areas*. Ideally, the objective indicators should be available for other selected countries as well.
- ◆ indicators should be readily *available* from established data sources.

Proposed Indicators

Economic security

Adequacy of income	<i>Objective</i> ◆ Median household income (after tax) ◆ Proportion of households with low incomes (i.e., under LIM) ◆ Household savings <i>Subjective</i> ◆ Adequacy of household income to meet family's basic needs ◆ Adequacy of income to meet unforeseen contingencies ◆ Satisfaction with economic outlook
Stability of income	<i>Objective</i> ◆ Unemployment rate (incidence times average duration) ◆ Proportion of individuals / households who experience a drop / increase in income one year to next ◆ Proportion of individuals / households with "significant" consumer debt; student debt; personal bankruptcies <i>Subjective</i> ◆ Proportion who fear job loss ◆ Subjective probability of finding an equivalent job in the event of job loss ◆ Confidence in income security programs in the event of job loss

Physical security

Physical and mental well-being	<i>Objective</i> ◆ Proportion of adult population with at least one health problem ◆ Rate of non-intentional deaths among adults ◆ Incidence of cancer <i>Subjective</i> ◆ Proportion of persons who do not perceive themselves to be in good health ◆ Proportion who report living under stressful conditions ◆ Proportion who believe they would get adequate care in case of illness
Personal Safety	Violent Crime <i>Objective</i> ◆ Violent crime (number of founded incidents) ◆ Number of homicides/murders (all criminal incidents resulting in death); Number of Level 3 assaults <i>Subjective</i> ◆ Individual perception of level of violent crime in their communities (i.e, during the last five years, do you think your neighbourhood has a higher amount of violent crime, about the same or a lower amount of crime? how safe do you feel (or would you feel) walking alone in your area after dark?) Property Crime <i>Objective</i> ◆ Property crime (number of founded incidents) ◆ Number of residential, commercial, auto break-ins; Number of motor vehicle thefts <i>Subjective</i> ◆ Individual perception of level of property crime in their communities (i.e, during the last five years, do you think your neighbourhood has a higher amount of property crime, about the same or a lower amount of crime?)

Proposed Model

For the most part, research into social indicators points out the difficulties in constructing composite measures. While we have monetary units for describing economic transactions, and energy units such as calories for describing different sorts of physical activities, a social index - by definition - involves combining dissimilar factors or phenomena such as air quality and crime rates. In order to develop a social index, it is *first* necessary to link the individual variables into a common conceptual framework within which the combination makes sense. *Second*, a method is needed to transform each variable into units on a common scale so that they can be combined (Rossi and Gilmartin, 105).

We have already detailed our conceptual model and its suggested component parts above. In this section, we would like to propose a method for creating the PSI based on a review of existing models such as the Human Development Index, the Fordham Index, and the new Ontario Quality of Life Index.

Steps for Creating the PSI

1. Final Indicator Selection

The Personal Security Index will be comprised of two major components (economic security and physical security), each of which is broken down into two main subcomponents, detailed on pages 3 and 4. Three objective indicators and three subjective indicators have been proposed for each subcomponent of economic security, for a total of 12. Under physical security, three objective and three subjective indicators for physical and mental well-being, and three indicators (two objective, one subjective) for each of violent crime and property crime have been selected (again for a total of 12).

The objective indicators will be selected from published surveys and micro databases (please see suggested sources in the Appendix). The CCSD will undertake to produce the Canadian data, and seek comparable information for four countries: United States, United Kingdom, Germany and France. (Additional countries may be added in the future.) The most recently available data will be used in the construction of the PSI. Where a data point is missing for a specific year, the last known value will be incorporated.

The subjective indicators will be drawn from representative surveys of public opinion. The CCSD plans to develop and commission eleven questions on public perceptions of personal security at the end of each year. (The CCSD will also determine the feasibility of polling in the countries identified above). Ideally, polling questions will be worked into an existing survey to reduce costs; questions from past opinion polls might be used, if appropriate, to establish historical trends in personal security. In identifying subjective indicators and commissioning opinion research, cost, size and representativeness of the sample, and reliability of the findings will be guiding considerations, especially in seeking comparable cross-national data.

In order to select the final 24 indicators, the CCSD submitted the list of proposed variables to a group of experts (including the members of our Advisory Expert Panel) and had these individuals select and rank those indicators which best captured the different dimensions of personal security, taking the criteria outlined above into account. (Please see Proposed Indicators)

Once the objective and selective indicators have all been selected, the significance of the direction of change for each indicator will be clearly established. For example, a rise in unemployment would be interpreted as negative, while a decline in the crime rate would be interpreted as positive.

2. Base Year Data Collection

The PSI will use 1998 as the base year against which past and future trends in personal security will be compared. The composite index for all selected indicators for 1998 will be set at a score of 100 and future composite index scores will be compared to the 1998 baseline.

In the first report to be published in 1999, data will present an assessment of personal security in 1998 and, if data permit, the past ten years in order to establish recent trends among Canadians.

3. Weighting

Once the individual indicators are selected, the next step is to determine the relative value of each indicator within the composite index. Do some indicators weigh more importantly in the personal security considerations of Canadians than others, and how should differences in the relative importance of various indicators be accounted for?

As noted above, the value of the PSI in our base year - 1998 - will be set at 100. In order to assign the weights to the individual indicators, the CCSD proposes to conduct a survey of Canadians regarding their top personal security concerns, specifically asking individuals to weigh each of our four subcomponents every year. We propose to vary the weights of the subcomponents across time (and by selected demographic characteristics if data permit) in order to capture changing public sentiment about personal security. The individual indicators under each subcomponent will be weighted equally. The chosen weighting method will be clearly detailed in the each report of the PSI.

4. Creating the Index

The next step in calculating the Personal Security Index is to transpose the raw data into common units of analysis so that changes in all 24 indicators can be added into an overall score. As stated above, the Index will be set at 100 in our base year. In subsequent years, change in the value of individual indicators will be converted into standard deviation units (z scores) and then assigned their appropriate weights (derived through the

consultation process outlined above). Change in the overall value of the Index from one year to the next will tell us whether Canadians are feeling more, or less, secure over time.

5. Three Level of Analysis

In the report, there will be three levels of analysis. First, the report will track the performance of the 24 individual indicators each year. Second, individual indicators will be rolled up into four sub-indices: an objective economic security and physical security sub-index and a subjective economic security and physical security sub-index. We have chosen to present the objective and subjective sub-indices in order to look at the question of perception versus reality: does the sub-index of objective measures reveal similar trends as the subjective sub-index? or do they produce contradictory results? Lastly, the indicators will be rolled up into the overall PSI.

We will also explore the possibility of deriving the overall index for different demographic groups and regions of the country. This analysis will identify which groups - youth or women, for example - are feeling more secure than others. This analysis will help us to understand the complexity of issues and perceptions around personal security which could be obscured if only the overall index number were reported.

6. Testing and Reliability

Over the course of the project, indicator performance will be assessed regularly. The CCSD proposes to review the 24 indicators periodically to determine whether they still adequately reflect different dimensions of personal security, are reliable, and readily available. In some cases, indicators may be modified or eliminated all together, keeping in mind the integrity of the index over time.

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Appendix

Indicator Charts: Objective Indicators

Indicator	Level of Aggregation	Source / Background
<i>Economic Security: Objective Indicators</i>		
Median household income (before and after tax)	National, provincial	SCF, SLID
Proportion of individuals with low incomes / low earnings (i.e. under LICO, LIM)	National, provincial	SCF, SLID
Income disparity (i.e. Gini coefficient, income disparity between top quintile and bottom quintile of earners)	National, provincial	SCF, SLID
Unemployment rate, average duration of unemployment	National, provincial, CMAs	LFS
Proportion of individuals / households who experience a drop / increase in income one year to next	National, provincial	SLID
Proportion of workforce under-employed (involuntary part-time, prefer to work more hours, prefer permanent employment)	National, provincial	SCF, SLID, SWA, LFS
Proportion of households with multiple earners	National, provincial	SCF, SLID
Proportion of individuals / households with “significant” investment income (or track total investment income)	National, provincial	SCF, SLID
Proportion of individuals / households who own their homes	National, provincial	SCF, SLID, HIFE
Proportion of individuals / households with “significant” consumer debt; student debt; personal bankruptcies	National, provincial	Bank of Canada, Industry Canada

Proportion of workforce who have registered private pensions, RRSPs (amount invested, withdrawal rates)	National, provincial	SCF, SLID
Physical Security: Objective Indicators		
Proportion of adult population with at least one health problem	National, provincial	NPHS
Rate of non-intentional deaths among adults, by age	National	Causes of Death
Suicide rate	National	Vital Statistics
Incidence of cancer, other selected illnesses	National, provincial	NPHS; National Cancer Incidence Reporting System; morbidity surveys
Proportion of population sustaining injuries that require medical attention	National, provincial	NPHS
Proportion of population with a long-term disability	National, provincial	HALS, Census, NPHS
Motor vehicle accident victim rate	National, provincial, regional	Accident Report Registry, Transport Canada (annual)
Proportion of motor vehicle occupants using a restraining device	National, provincial	Transport Canada surveys (annual)
Incidence of workplace injuries, fatalities	National, provincial; by occupation	WCB, Labour Canada - Occupational Injuries Database
Air quality (number of days in selected cities with airborne particles exceeding national levels); water quality (proportion population with wastewater treatment)	National, provincial	Air Quality Research Branch of Environment Canada; Canadian Institute for Health Information (CIHI)
Total government spending on health care, accessibility (% GDP)	National, provincial	CIHI
Youth, adult crime rate (number/rate of criminal incidences known to police)	National; type of crime, by most serious crime within incident	UCR
Property crime rate: residential break-ins, thefts from motor vehicles	National	UCR
Violent crime rate: homicides, serious assaults	National	UCR

Data Sources

The success of the Personal Security Index rests ultimately in the timely availability of quality data. We plan to draw on two principal sources of data: published surveys and micro databases; and opinion polling. In choosing data sources and commissioning opinion data, we have used a number of criteria:

- ◆ data sources should be representative of the Canadian adult population (i.e. by region, sex, age).
- ◆ data sources should rely on relatively large surveys that ensure the statistical reliability of findings.
- ◆ data sources should be available at least on an annual basis. The most recently available data will be used in constructing the Index.
- ◆ data sources should be credible, compiled in compliance with recognized standards of quality (i.e., high response rates, high confidence levels).

Below, we outline the possible sources of data for our objective indicators.

Source	Methodology	Timing	Comments
<i>Economic Security</i>			
*Labour Force Survey (LFS)	Direct, sample survey, cross-sectional; national, provincial, sub-provincial/CMA, economic regions. Sample size approx. 62,000 households or 115,000 individuals	1945 to 1997, consistent since 1975. Monthly collection of data; published monthly, annually. Released within 13 days of collection	Gives current labour force statistics (actual hours worked, type of employment, occupation, duration of unemployment, "discouraged workers"). Long time series
*Survey of Consumer Finances (SCF)	Cross-sectional; national, provincial, sub-provincial/CMA. Sample size approx. 45,000 households (supplement to LFS)	Annual since early 1970s. Reference period is previous calendar year.	Excellent source of data on individual and family structure, labour market activity and income characteristics. Good source of data on income adequacy and inequality
*Survey of Labour and Income Dynamics (SLID)	Longitudinal; national, provincial (excluding Yukon, NWT). Sample size approx. 15,000 households, 31,000 individuals	1993, 1994. 1995 data will be released in spring 1998. Data gathered twice a year (labour force in January, income in May)	Longitudinal data tracking labour market and income characteristics of individuals over a 6 year period. Looks at employment and unemployment dynamics, life cycle transitions, job quality, and economic mobility

*Survey of Work Arrangements (SWA)	Sample survey, cross-sectional; national, provincial, CMAs. Sample size approx. 59,000 households or 102,000 individuals (subset of LFS)	1991, 1995	Excellent source of data on jobs, employment relations, wages, benefits, hours, working schedules, overtime
*General Social Survey (GSS)	Sample survey, cross-sectional; national, regional, provincial. Sample size approx. 10,000 households	Annually since 1985. Core questions repeated every year, with various cycles on specific topics every five years (crime/victimization, work, education, family)	Rich source of qualitative data, including attitudinal surveys
Bank of Canada			
Insurance Bureau of Canada			
Physical Security			
Uniform Crime Reports (UCR)	Direct; national, provincial, CMAs. UCR2 (computerized format) used by 210 police departments; UCR (paper format) used by 1,590 police departments. 1,800 total	Monthly, annual data gathered since 1962, switched to UCR in 1988. Special revised UCR Survey conducted in 1992 (non-random sample of 46% of criminal incidents). 1988 to 1995 complete	Characteristics of accused, victim, incidents. All offenses reported / known to police (count of charges, not individuals). Some data not easily captured (e.g. domestic violence). Variation in programs, record-keeping per province
*National Population Health Survey (NPHS)	Longitudinal; national, provincial (data available for smaller areas). Core sample size 20,000 households	Produced on two year cycle. Data collected quarterly, released 6 months after final collection of data for period	Longitudinal survey on physical/emotional health; frequency / type of illness; alcohol / drug use; disability; workplace-related stress. Also demographic information

Adult Correctional Services Survey (ACSS)	Direct; national, broken into federal and provincial jurisdictions (excluding QC, NWT, YT)	Annual. Since 1978. 1980 to 1994 (complete)	Looks at information for different facilities. Inmate demographics, crime, release, etc. Cannot do cross-jurisdictional analyses due to definitional inconsistencies, administrative policies.
Homicide Survey (HR)	Direct; national and provincial, by police department	Annual. Since 1961. 1961 to 1993 (complete). Continuous collection. Published 10 months after end of reference calendar year	Depicts nature and extent of all known homicide incidents, victims, perpetrators. Some US-Canada comparisons
*Census	Cross-sectional; quinquennial. National, provincial, CMAs, census tracts; 100% (general) and 20% (long-form)	Since 1901, labour force data since 1952 and income data since 1961. 1971, 1976, 1981, 1986, 1991, 1996	Detailed demographic information, family income, education, ethno-cultural background, disability, immigration.
Canadian Association of Workers' Compensation Boards (WCB)	National, provincial	Annual. Labour Branch of HRDC compiles national data on occupational injuries. Collected from provincial WCBs and Statistics Canada (industries under federal jurisdiction). Injury rate is adjusted to reflect employment levels of census; interim years uses LFS	Reports on fatalities, time loss and non-time loss injuries and associated costs paid to workers and their families
*Absence from Work Survey (AWS)	Cross-sectional; national, provincial. Sample size approx.. 31,000 households (supplement to LFS)	Since 1970s. 1990-1994 (complete). Data collected Feb., released mid-summer, on previous calendar year information	Report of absence from work due to pregnancy, illness; compensation paid out, hours worked, etc. Can be linked to LFS data

*Household Income Facilities and Equipment (HIFE)	Survey; national, provincial, regional	Subset of SCF. HI: 1991, 1993, 1994; FE: 1991, 1992, 1994, 1995; and Environment: 1994	Automobile ownership, information on purchases of household goods (alarm systems), state of dwellings, recycling programs
Automobile Registration	National, provincial, city	Annual	Number of automobiles registered
Accident Report Registry	National, provincial, city	Annual	Number of reported MV accidents. Up to officer to determine degree of "injury". Not all accidents reported
*Annual Demographic Statistics	National, provincial. Projections based on Census data	Released each winter on previous calendar year	Population size, mortality rate, birth rate, major illnesses, immigration
*Report on the Demographic Situation in Canada	National, provincial, CMAs, census tracts. Projections based on Census data	Released 6 months after end of previous calendar year	Population change (birth, deaths, immigration, emigration), family type
*Causes of Death		Annual	Must buy data directly from Statistics Canada. General information released on-line
State of the Environment, Environment Canada	National, provincial	Every five years	
Air Quality Index			Three to four years behind

* produced and published by Statistics Canada

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