Symposium on Labour Force Participation in Canada in the 1990s: An Introduction and Overview

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A major development in the Canadian labour market in the1990s has been the decline in labour force participation. This issue of *Canadian Business Economics* consists of a symposium of articles that explore this issue. The idea for this symposium came out of a December 1997 workshop on labour force participation organized by the Canadian Employment Research Forum. The Centre for the Study of Living Standards and Human Resources Development Canada then organized two sessions on labour force participation at the annual meeting of the Canadian Economics Association in May 1998 where these papers were first presented. The papers were then refereed and revised for publication. This introduction sets the context for the symposium that follow by presenting basic data on labour force participation rate trends and summarizing and synthesizing the key findings of the five articles.

Trends in Labour Force Participation in Canada in the 1990s

Trends by age-sex groups

After peaking at 67.5 per cent in 1989, the aggregate participation rate of the population 15 and over fell continually during the first six years of the 1990s to a trough of 64.8 per cent in 1997, before recovering slightly to 65.1 per cent in 1998. As the articles in this symposium attempt to explain the decline in labour force participation in the 1990s, it is the 2.7 percentage point decline in the aggregate participation rate between the 1989 peak and the 1997 trough that will be the focus of attention.

The aggregate participation rate is of course determined by trends in participation rates for various age-sex groups. Table 1 presents data on trends in labour force participation for the three major age groups: youth (15-24 age group), prime aged persons (25-54 years), and older persons (55 and over) for both sexes and males and females.

Of the three age groups, it was youth who experienced by far the largest decline in labour force participation, with a 9.4 percentage point decline in their rate from 70.6 per cent in 1989 to 61.2 per cent in 1997. Older workers experienced the second largest fall, 2.6 percentage points from 26.8 per cent to 24.2 per cent. Prime-age persons saw the smallest decline, only 0.4 percentage points from 84.2 per cent to 83.8 per cent. The contribution of the three age-groups to the overall fall reflects both their absolute decline in participation and their relative importance in the working age population (in 1989, the 15-24 age group represented 19 per cent of the working age population, the 25-54 group 56 per cent, and the 55 and over age group 25 per cent). Not surprisingly, it was youth that made the largest contribution to the decline in the aggregate participation rate in the 1990s: 67 per cent, followed by older age group (24 per cent), and prime-aged group (8 per cent).

In terms of more detailed age groups (see Table A1 in the appendix), it was teenagers aged 15-19 who experienced the largest absolute fall in their participation rate between 1989 and 1997 (11.9 points), followed by young adults aged 20-24 (5.7 points), the 60-64 age group (2.2 points), the 55-59 age group (1.9 points), the 25-29 age group (1.5 points), the 70 and over age group (0.6 points), the 35-44 age group (0.3 points), and finally the 25-29 age group (0.1 points). The participation rate for the 65-69 age group and the 45-54

Table 1 Participation Rates in Canada for Major Age-Sex Groups, 1989 and 1997

	BOTH SEXES				MALES				FEMALES			
	1989 %	1997 %	1989-97 change, % points	Age group contri-bution to total PR change, %	1989 %	1997 %	1989-97 change, % points	Age group contri-bution to total PR change, %	1989 %	1997 %	1989-97 change, % points	Age group contri-bution to total PR change, %
15 +	67.5	64.8	-2.7	100.0	77.1	72.5	-4.6	84.4	58.3	57.4	-0.8	15.6
15 - 24	70.6	61.2	-9.4	67.6	73.4	63.4	-10.1	36.5	67.8	59.0	-8.8	31.1
25 - 54	84.2	83.8	-0.4	8.5	93.8	91.1	-2.7	28.2	74.7	76.6	1.9	-20.0
55 +	26.8	24.2	-2.6	24.0	38.2	33.1	-5.1	21.3	17.2	16.6	-0.6	3.2

Source: Labour Force Survey, Statistics Canada

Note: contribution calculation based on 1989 working age population shares

Table 2 Participation Rates by Province, 1989 and 1997

	Participation Rate, %		Change in % point 1989-97	Provincial contribution, %
	1989	1997		
Canada	67.5	64.8	-2.7	100.0
Atlantic Prov.	59.8	58.8	-1.1	3.6
Newfoundland	56.0	52.5	-3.5	2.7
PEI	64.9	66.3	1.4	-0.2
Nova Scotia	61.5	60.2	-1.3	1.6
New Brunswick	59.9	60.1	0.2	-0.2
Quebec	64.4	62.1	-2.3	21.9
Ontario	70.3	65.9	-4.5	62.5
Prairies	70.0	69.6	-0.4	2.4
Manitoba	67.3	67.0	-0.3	0.5
Saskatchewan	66.4	66.4	-0.1	0.1
Alberta	72.6	71.8	-0.8	2.7
British Columbia	67.4	64.9	-2.5	11.2

Source: Labour Force Survey, Statistics Canada

Note: Contribution calculation based on 1989 working age population shares.

age group both increased (0.5 and 0.9 points respectively).

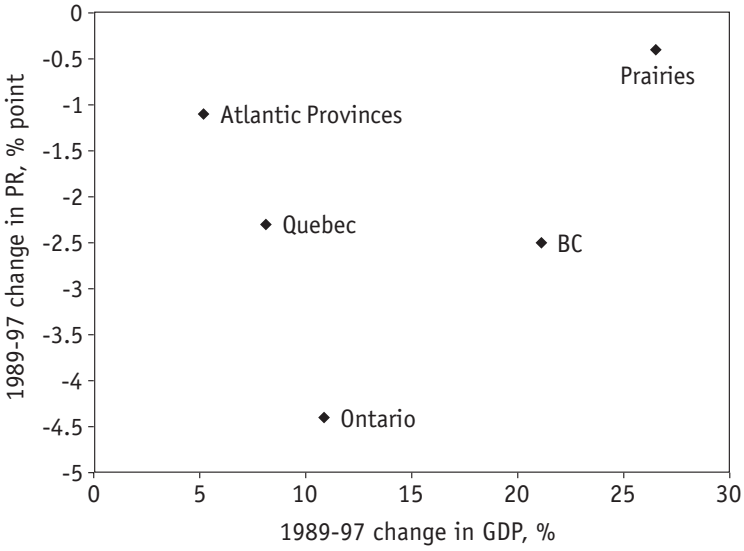
As age-specific participation rates can vary by sex, it is useful to examine trends in age-sex specific rates (Table 1). For all three age groups taken together, the fall in the male participation rate was five times that of the female rate (4.6 percentage points versus 0.9 points), meaning that declining male participation accounted for 83 per cent of the overall fall in labour force participation.

For youth the declines in male and female participation rates were relatively similar (10.0 and 8.8 percentage points respectively). In contrast, for the other two age groups, trends by sex differed markedly. For the prime-age group the female rate actually rose 1.9 points in the 1990s, while the male rate fell 2.7 points. For the 55 and over group, both rates fell, but the decline in the male rate was eight times greater than that experienced by the female rate (5.1 points versus 0.6 points).

In terms of contribution by age-sex groups to the overall decline in the aggregate labour force participation rate in the 1990s, male youth make the largest contribution at 37 per cent , followed by female youth (31 per cent), prime aged males (28 per cent), older males (21 per cent), and older females (3 per cent) As the participation rate of prime-aged women increased in the 1990s, this group made a significant negative contribution to the decline in the participation rate (20 per cent).

Table A1 in the appendix provides data on trends in labour force participation in the 1990s for nine five-year or ten-year age groups for both men and women (as well as data for five aggregated age groups). For the nine male age groups all but one (65-69 age group) experienced falls in the participation rate between 1989 and 1997, with teenagers experiencing the largest decline (13.0 points), followed by the 55-59 age group (6.0 points), the 60-64 age group (5.8 points), and young adults (5.7 points). For the nine female age groups, only two experienced declining participation in the 1990s: teenagers (10.8 points) and young adults (5.8 points). The participation rate of women aged 45-54 increased by a strong 4.8 points. These data illustrate the pervasiveness of the phenomenon of declining labour force participation among men and the limited extent of the phenomenon among women, confined to the under 25 age group.

Chart 1 Economic Growth and Participation Rates by Region, 1989-97



participation rates by province

Participation rate trends by province varied greatly in the 1990s, from a 4.4 points decline in Ontario between 1989 and 1997 to a 1.4 point increase in Prince Edward Island (Table 2). Indeed, only two provinces (Ontario and Newfoundland) experienced falls greater than the national decline in labour force participation (2.7 points). Given Ontario's large decline and large share of Canada's population, this one province accounted for 62 per cent of the overall decline.

Both Ontario and Newfoundland experienced below-average economic growth in the 1990s, with real GDP falling 1.7 per cent in Newfoundland and rising 10.9 per cent in Ontario between 1989 and 1997, compared to the national increase of 14.9 per cent (Chart 1). The Prairies, the region with the smallest decline in labour force participation in the 1990s (0.4 points) had by far the most robust economic growth (26.5 per cent).

Canada-U.S. participation rate comparison

In contrast to the 2.7 percentage point decline in the Canadian participation rate between 1989 and 1997, the U.S. participation rate rose 0.6 points (Table 3). The Canadian participation rate experienced a greater declines (or smaller increases) in the 1990s for all six major age-sex groups. This suggests that economy-wide rather

Table 3 Participation Rates in the United States, 1989 and 1997

	United States			Canada
	1989 %	1997 %	1989-97 % point change	1989-97 % point change
Both				
16+	66.4	67.1	0.6	-2.7
16-24	68.6	65.4	-3.1	-9.4
25-54	83.4	84.1	0.7	-0.4
55+	30.3	30.9	0.6	-2.6
Males				
16+	76.4	75.0	-1.4	-4.6
16-24	72.9	68.2	-4.7	-10.0
25-54	93.7	91.8	-1.8	-2.7
55+	39.6	38.9	-0.7	-5.1
Females				
16+	57.4	59.8	2.4	-0.8
16-24	64.4	62.6	-1.8	-8.8
25-54	73.6	76.7	3.0	1.9
55+	23.0	24.6	1.6	-0.6

Sources: Bureau of Labour Statistics, 1999; Statistics Canada, Labour Force Historical Review, 1998

Note: Canadian data are for the 15+ and 15-24 age groups.

Table 4 Determinants of GDP Per Capita Growth

					Average annual rates of change		% point change between 81-89 and 89-97
	1981	1989	1997	1998	1981-89	1989-97	
GDP per capita (1992$)	22,248	25,840	27,141	27,701	1.89	0.62	-1.27
Output per worker (1992$)	48,369	53,765	58,321	58,513	1.33	1.02	-0.31
Employment/ Total Pop, %	46.0	48.1	46.5	47.3	0.55	-0.41	-0.96
WAP/ Total Population, %	76.2	77.0	79.1	79.3	0.14	0.33	0.19
Employment/ WAP, %	60.4	62.4	58.9	59.7	0.42	-0.73	-1.15
Participation Rate, %	65.3	67.5	64.8	65.1	0.41	-0.50	-0.92
Unemployment Rate, %	7.6	7.5	9.2	8.3			
Empl/LF or (100-UR), %	92.4	92.5	90.8	91.7	0.01	-0.23	-0.23

Sources: National Accounts and Labour Force Survey, Statistics Canada

than age-sex specific forces were affecting labour force participation.

In terms of major age groups, youth were the only one to experience a decline in the United States (3.1 points), with the participation rate of prime-age and older groups rising (0.7 and 0.6 points respectively). But when the prime-age and older age groups are broken down by sex, one finds that the participation rate for males decreased for both age groups, in contrast to rising female rates.

The largest participation rate trend divergences between Canada and the United States in the 1990s were for youth (a 9.4 points decline in Canada versus 3.1 points in the United States) and older males (5.1 versus 0.7 points). In terms of levels, Canada's participation rate in 1997 was 2.3 points below the U.S. rate (64.8 per cent versus 67.1 per cent), with almost all the gap accounted for by lower participation rates for youth (4 percentage points) and older workers (7 points). These differences apply to both male and female participation rates.

Implications of the Decline in Labour Force Participation

contribution of falling participation to the decline in living standards

The rate of advance of Canadian living standards, as represented by trends in GDP per capita, plummeted in the 1990s, dropping from an average annual rate of increase of 1.9 per cent over the cyclically neutral peak-to-peak 1981-89 period to 0.6 per cent from the 1989 peak to 1997.

GDP per capita can be decomposed into two basic components: GDP per person employed and the employment/population ratio, in turn determined by the employment/working age population ratio (also known as the employment rate) and the ratio of the working age population to the total population. The employment rate in turn is determined by the unemployment rate and the participation rate.

The most important factor behind the drop in the growth in living standards in the 1990s was the collapse of the employment rate, not the deterioration of productivity growth (Table 4). Of the 1.3 percentage point fall in the rate of increase in GDP per capita, 1.0 points was due to a fall in the rate of increase in the employment/total population ratio and 0.3 points to slower productivity growth. The ratio of the working age population to the total population increased at a faster rate in the 1990s than the 1980s, reflecting faster growth in the working age population relative to the under 15 population. This development contributed 0.2 points per year more to GDP per capita growth in the 1990s than in the 1980s. Consequently, the deterioration of the employment/working age population ratio (-1.2 points) was greater than that of the employment/total population ratio (-1.0 points).

The most important factor behind the 1.2 point decline in the rate of increase in the employment/working age population in the 1990s was the fall in labour force participation, with the rate of growth 0.9 points lower in the 1990s than the 1980s (-0.5 per cent versus 0.4 per cent per year). The fall in labour force participation in the 1990s thus accounted for about two thirds of the overall decline in GDP per capita growth relative to the 1980s. The rise in the unemployment rate between 1989 and 1997 also contributed 0.2 points to the fall in the rate of growth of the employment/working age population ratio.

To gauge the impact of this decline in labour force participation on the economic well-being of Canadians (as opposed to GDP per capita), it is essential to know whether this development was voluntary or involuntary. As leisure contributes to economic well-being, if Canadians consciously choose to participate less in the labour force in order to enjoy more leisure time (e.g. early retirement), then, even with lower incomes, one could not conclude we were worse off. On the other hand, if the decline in participation was not by choice, then the resulting decline in incomes does represent a decline in economic well-being. Equally, if the fall in participation reflects a decision to invest in human capital and to foregone income now for higher income later, it is unclear whether from a life cycle perspective Canadians are worse off.

potential growth, the output gap and the conduct of macroeconomic policy

The causes of the decline in labour force participation have important implications for the measurement of potential output and the output gap, and the conduct of macroeconomic policy. If the decline in labour force participation in the 1990s has been a structural non-reversible phenomenon, then the potential growth rate of the Canadian economy has fallen, with the implication that the actual level of output may be close to the potential level, with little or no room for stimulative macroeconomic policy to increase output.

On the other hand, if the decline in labour force participation has been a cyclical development due to the weak labour market and can be reversed with strong demand growth, then the rate of potential output growth may not have fallen and the level of actual output may be well under the economy's level of potential output. The implication of such a situation would be that there is room for macroeconomic policy to increase output without inflation.

Summaries of Articles

This section of the introduction summarizes the five articles in the symposium. The first article by Pierre Fortin of the Université du Québec à Montreal and Mario Fortin of Université de Sherbrooke examines the trends and determinants of the participation rate for six demographic groups, three age groups (15-24, 25-54, and 55 and over) for both men and women. The second article by Irene Ip and Sheryl King of the Bank of Canada and Geneviève Verdier of the University of British Columbia provides a Canada-U.S. comparison of structural influences on labour force participation. The third article by Bob Dugan of WEFA Inc. and Benoit Robidoux of Finance Canada examines the impact of demographic shifts on labour force participation. The final two articles look at participation rate trends for particular groups. The fourth article by Paul Beaudry of the University of British Columbia, CIRANO, and CIAR and Thomas Lemieux of the Université de Montréal and CIRANO examines the labour force participation of women aged 25 to 64. The fifth and final article by Richard Archambault and Louis Grignon of Human Resources Development Canada looks at the factors behind the decline in youth labour force participation

Fortin and Fortin: participation rate equations for six demographic groups

Cyclical, policy changes, and structural factors have been put forward to explain the decline in labour force participation in Canada in the 1990s. In the first article in the symposium, Pierre Fortin and Mario Fortin attempt to determine the relative importance of these three types of factors by estimating a participation rate equation where the independent variables are an index of job availability (the Help-Wanted Index), the real wage, the real minimum wage, an index of unemployment insurance generosity, real social assistance benefits, and a time trend to capture other structural influences. The equation is estimated for six demographic groups (men and women 15-24, 25-54 and 55 and over) over the 1969-96 period. They find that the drop in the aggregate participation rate in the 1990s was equally due to the three factors: poor macroeconomic conditions, policy changes in unemployment insurance and the minimum wage, and structural transformations.

The explanatory power of the equations is found to be good for the younger and middle-age groups, but poor for the older groups. The equations show no significant shift over the 1990-96 sub-period, implying that the decline in the participation rate in the 1990s should not be attributed to a new structural relationship. In terms of the variables, the authors find that young people, and to a less extent, middle-aged persons, respond positively to cyclical variations in job opportunities, but older persons do not; minimum wages affect negatively the labour force participation of the younger age groups and middle-aged women; UI generosity affects positively only youth participation; and social assistance affects negatively the participation of middle-aged women.

The authors use their equations to simulate the impact of changes in cyclical, policy, and structural variables on labour force participation of the six groups in the 1990-97 period. The model can account for 2.6 percentage points of the total 2.7 per centage point decline in the aggregate participation rate between 1989 and 1997. Reduced job availability was responsible for 37 per cent of the

decline, increases in the real minimum wage 15 per cent, decreased UI generosity 19 per cent, falls in social assistance benefits made a 4 per cent negative contribution to the decline in participation, and structural factors accounting for the remaining 30 per cent of the decline. These structural factors included rising school attendance, the changing roles of men and women in society, the changing demand and supply of skills, the expansion of public pension plans, and the rising average age of the 55 and over group.

The simulations explained quite well the evolution of labour force participation for all groups except older males. Perhaps surprisingly, none of the large decline in participation of this group was found to be due to reduced job availability.

The finding that only about 40 per cent of the decline in labour force participation in the 1990s is cyclical has important implication for the path of potential output. The authors find that whatever the value of the non-accelerating inflation rate of unemployment (nairu), in an non-inflationary cyclical recovery, the participation rate is unlikely to rise more than 0.8 percentage points from the 1997 level of 64.8 per cent.

Ip, King and Verdier: structural influences on participation in Canada and the United States

As noted earlier, in contrast to the decline in labour force participation in Canada in the 1990s, the aggregate participation rate in the United States actually rose slightly (up 0.5 percentage points between 1989 and 1997). This US experience provides a useful benchmark for the analysis of the Canadian developments. In the second article of the symposium, Irene Ip, Sheryl King and Geneviève Verdier, while recognizing that cyclical influences have contributed significantly to the decline in labour force participation in the 1990s in Canada relative to the United States, focus on supply-side factors at play in the behviour of the participation rate in the two countries.

A key structural variable influencing youth labour force participation is enrolment rates. As the participation rate of students is below that of non-students, increased enrolment tends to reduce aggregate participation. Enrolment rates for teenagers increased 7 percentage points in Canada between 1989 and 1997, and 5 points in the United States; rates for youth adults increased 11 points in Canada and 7 points in the United States. As the U.S. economy enjoyed low unemployment in both 1989 and 1997, the rise in enrolment rates was related to structural factors, such as the growing recognition of the importance of education for success on the job market. Structural factors were undoubtedly at play in Canada . However, the authors suggest that the increase in enrolment rates beyond that experienced in the United States (29 per cent of the increase in enrolment rates for teens and 36 per cent for young adults) may be interpreted as a cyclical response to weak employment opportunities in Canada.

The authors find composition changes in the age structure of the population account for about one percentage point of the decline in the aggregate participation rate in Canada between 1989 and 1997, as the relative importance of low-participation rate groups has increased.

Based on an analysis of the factors affecting labour force participation of the major age-sex groups, the authors forecast a rise in the aggregate participation rate in Canada from 65.1 per cent in 1998 to 66.6 per cent in 2006. For the United States, the Bureau of Labor Statistics is forecasting a smaller increase, but from a higher level, to 67.6 per cent in 2006 from 67.1 per cent in 1998.

The authors expect increases in labour force participation for all age-sex groups in Canada. Between 1998 and 2006, the participation rate is forecast to rise 4.6 percentage points for older men (55 and over), 3.8 points for older women, 3.7 points for prime age women, 8.9 points for teenagers, 3.5 points for young adults, and even 1.0 points for prime-aged men. The 1.5 point increase in the aggregate participation rate is much smaller than almost all the increases in the age-sex group specific rates because of the changing age structure, in particular the increasing proportion of the population in older age groups.

Dugan and Robidoux: demographic shifts and labour force participation

Labour force participation vary greatly by age, with persons 55 and over having much lower participation rates than younger persons. Consequently, changes in the demographic composition of the population can exert a long-run effect on aggregate participation rates. In the third article of the symposium, Bob Dugan and Benoit Robidoux

examine the impact of demographic shifts on labour force participation in Canada. They use an accounting framework and plausible trend participation rates for 16 demographic groups with source population estimates to estimate an aggregate structural participation rate for Canada.

They find that the ageing of the population has already started to exert a downward pressure of the aggregate participation rate in Canada due to longer life expectancy and the resulting growing proportion of the population in the low-participation rate 65 and over age group. The movement of the baby boom generation into the 65 and over group in coming years will intensify this trend. Between 1989 and 1997 they find that the demographic composition effect reduced the aggregate participation rate by almost 1 percentage point, and that from now to 2030 it will reduce the participation rate by an additional 8.5 points. Of course, greater than expected trend increases in labour force participation rates by older age groups could offset some of this composition effect.

The authors point out that changes in demographic composition had virtually no effect on the participation rate in the 1990s in the United States as the share of the population 65 and over was stable. This situation reflects the fact the United States became an "older" society earlier than Canada due to an earlier and smaller baby boom and a higher average age for immigrants.

Dugan and Robidoux calculate a trend participation rate of 66.2 in 1997, 1.4 percentage points above the actual rate of 64.8 per cent. Based on this rate they conclude that about one half of the 2.7 point decline in the participation rate in the 1990s was structural and one half cyclical.

Beaudry and Lemieux: cohort effects and female participation

The participation rate of women aged 25-64 rose greatly in the 1970s and 1980s, but has stagnated in the 1990s. In principle, this development could reflect either the poor growth performance of the economy this decade or the completion of the integration of women into the labour force. In the fourth article of this symposium, Paul Beaudry and Thomas Lemieux use a cohort analysis to shed light on the explanation of this stagnation in female labour force participation.

Using data from the Survey of Consumer Finances for the 1976-94 period, the authors track the participation rates over time of representative groups of women who entered the labour force at different points in time. They decompose a cohort's participation rate into three effects: a macroeconomic effect common across cohorts linked to factors such as recessions and employment insurance generosity; an age or life-cycle effect; and a cohort-specific effect which shows the differences between cohorts for a given age and macroeconomic effect.

The authors find that the cohort effects are likely the dominant factor in explaining the recent stagnation of female participation, just as it explained the large increases in the 1970s and 1980s. The recession of the early 1990s, which according to the authors reduced the female participation 1 percentage point, merely amplified the stagnation phenomenon. As the cohort effects stabilize with the narrowing of the gap between male and female participation rates, the stagnation would have occurred, albeit later in the 1990s, even if more favourable macroeconomic conditions had prevailed.

The authors conclude that there is still room for a 2-3 percentage point increase in the participation rate of women 25-64, but the magnitude of the increases of the 1970s and 1980s is not possible as the cohort effects that prevailed then no longer exist.

The authors stress that their results are dependent on the amount of flexibility used to capture the cohort effect so that the age profile and its slope can trace both the rise and the flattening of the participation rate by age. They point out that over time participation behaviour of women 25-64 is converging toward that of men, namely, high and flat participation profiles to at least age 55. They also note that the much smaller increase in the female participation rate in the United States in the 1990s relative to the 1970s and 1980s despite the robust U.S. labour market supports their findings as the cohort effects were also levelling out south of the border.

Archambault and Grignon: factors behind the decline in youth participation

Of the three major age groups, youth (aged 15-24) experienced the largest fall in labour force par-

ticipation and accounted for the lion's share of the aggregate decline. Consequently, an understanding of the factors behind this development is essential to an overall understanding of the fall in labour force participation in the 1990s in Canada.

In the fifth and final article in the symposium, Richard Archambault and Louis Grignon examine the causes of this large fall in youth labour force participation in Canada in the 1990s. They disaggregate the youth participation rate into three components: the student participation rate, the non-student participation rate, and the school enrolment rate. The aggregate youth rate is the sum of the student and non-student rates weighted by their respective shares of the population (the enrolment rate for students). Such an approach makes it possible to take account of behavioural differences between students and non-students and to treat the enrolment rate as a phenomenon to be explained rather than a determinant of the participation rate.

All three variables are modelled as a function of a cyclical variable and a number of structural variables- the real wage, the relative minimum wage, employment insurance, social assistance, and a time trend. The results show the importance of economic conditions and the modest effect of public policy programs on the decision to participate in the labour market and go to school.

Based on the estimated equations estimated for the 1976-96 period, a dynamic simulation was conducted over the 1990-96 period to account for the impact of the variables on the student and non-student participation rates and enrolment rate. According to the equations estimated for the 15-24 age group, the cyclical variable accounts for about one half of the decline in the youth participation rate between 1990 and 1996, two thirds of the decline in the student participation rate, and about one third of the fall in both the non-student participation rate and rise in the enrolment rate. The remaining decline in the two participation rates and rise in the enrolment rate are not to any significant degree explained by the four structural variables, but rather are either captured by the time trend or not explained at all. Given these results, the authors conclude that we have a poor understanding of the non-cyclical forces that account for up to one half of the decline in youth labour force participation in the 1990s.

Synthesis of Symposium Research Findings

The aggregate participation rate in Canada fell 2.7 points between 1989 and 1997, in contrast to a 2.2 point rise between 1981 and 1989. For a number of structural reasons, the pace of participation rate increase in the 1970s and 1980s was unsustainable in the 1990s. The key structural factors at play in the 1990s that lowered trend participation rate growth are highlighted below.

- The leveling off of cohorts effects, reflecting the narrowing of the gap between male and female participation rates, has meant that the large increases in female participation experienced in the 1970s and 1980s were no longer possible;
- The rising school enrolment rate, reflecting the increased recognition of education for labour market success, acted to reduced the youth participation rate as the participation rates for students is well below that of non-students.
- The changing demographic composition of the population, and in particular the growth in the share of the population 65 and over, reduced the aggregate participation rate by nearly 1 percentage point in the 1990s as older age groups have much lower participation rates than the 25-54 age group.

The first two of these factors were also at play in the United States, reducing the rate of increase in the trend participation rate in that country despite that country's tighter labour market. Indeed, the rise in the U.S. enrolment rate can serve as a benchmark for the rise in the structural component of the enrolment rate in Canada. On the other hand, changes in the demographic composition of the population appear to have had no effect on the trend participation rate in the 1990s in the United States.

Structural factors can account for the deceleration of participation rate growth in the 1990s relative to the 1980s in Canada (as also happened in the United States from a 2.6 point increase in the 1980s to 0.5 points in the 1990s). They may even account for a moderate decline in the Canadian participation rate given the existence in this country of a negative demographic composition effect not present in the United States. However, it is un-

likely that these structural factors can account for the complete 2.7 point fall.

The weak cyclical conditions in Canada also played an important role in reducing labour force participation, particularly among youth, but also among older male workers. It is no accident that the years with the largest falls in output and employment, namely 1990, 1991, and 1992, were those with the largest declines in the participation rate. The stronger U.S. economy in turns explains why the participation rate did not follow the same path south of the border.

While one can with reasonable certainty conclude that the failure of the participate to rise in Canada in the 1990s reflects the influence of the three structural factors noted above, the apportioning of the actual 2.7 point decline in the participation rate between structural and cyclical factors is more difficult. The only paper that attempts to address this issue for the decline in the aggregate participation rate is that by Fortin and Fortin and they tentatively conclude that only 40 per cent of the decline was cyclical.

The recent improvement in economic conditions has produced a significant rebound in the participation rate in 1998 and in 1999. Indeed, in the first five months of 1999 the seasonally-adjusted participation rate has averaged 65.8 per cent, recovering 1.0 point or 37 per cent of the 2.7 point decline between 1989 and 1997. The youth participation rate has recovered 30 per cent, the participation of persons 55 and over has recovered about a quarter and the participation rate of prime-aged individuals has more than recovered the ground lost over the 1989-97 period. The participation rate for prime-aged women in particular was 1.3 percentage points higher than in 1989 as both cyclical and structural factors (remaining cohort effects) pushed up participation for this group.

The pick-up in the participation rate that has already taken place since 1997 and the likelihood that the expansion will continue through 1999 and beyond suggest that the scope for a rebound in participation could be somewhat greater than suggested in some of the articles in this symposium. This is a welcome prospect for the Canadian labour market since a rise in participation rate increases potential output, reduces the risk of increased inflation and contributes to higher standards of living.

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Appendix

Table A1 Participation Rates by Detailed Age-Sex Groups, 1989 and 1997

	BOTH SEXES			MALES			FEMALES		
	1989, %	1997, %	1989-97 change, % points	1989, %	1997, %	1989-97 change, % points	1989, %	1997, %	1989-97 change, % points
25 +	66.7	65.5	-1.2	78.0	74.4	-3.6	56.1	57.1	1.1
45 +	45.2	46.4	1.2	58.0	56.2	-1.8	33.7	37.5	3.8
65 +	7.0	6.4	-0.7	11.0	10.2	-0.8	4.1	3.5	-0.6
70 +	4.2	3.6	-0.7	7.1	6.2	-1.0	2.2	1.7	-0.5
25 - 44	85.6	85.1	-0.5	94.4	92.0	-2.4	76.8	78.2	1.4
15 - 19	58.7	46.8	-11.9	60.6	47.6	-13.0	56.7	45.9	-10.8
20 - 24	81.3	75.6	-5.7	84.9	79.2	-5.7	77.6	71.8	-5.8
25 - 29	85.7	84.2	-1.5	93.5	90.5	-3.0	77.8	77.9	0.1
30 - 34	85.0	84.9	-0.1	94.8	92.2	-2.6	75.2	77.5	2.3
35 - 44	86.0	85.7	-0.3	94.7	92.6	-2.1	77.2	78.8	1.6
45 - 54	79.7	80.6	0.9	91.7	88.8	-3.0	67.6	72.4	4.8
55 - 59	61.9	60.0	-1.9	78.5	72.5	-6.0	45.5	47.6	2.1
60 - 64	37.2	35.1	-2.2	52.6	46.8	-5.8	23.1	23.8	0.7
65 - 69	11.9	12.4	0.5	17.0	17.5	0.5	7.6	7.7	0.1

Source: Statistics Canada, Labour Force Historical Review, 1998

The Changing Labour Force Participation of Canadians, 1969-96: Evidence from a Panel of Six Demographic Groups

*Mario Fortin and Pierre Fortin**

After rising almost without interruption for four decades, the aggregate labour force participation rate in Canada fell every year in the first half of the 1990s, slumping to 64.8 per cent in 1995-98 from its 1989 peak of 67.5 per cent. Given the definitional identity linking the employment-population ratio (E) to the unemployment rate (U) and the labour force participation rate (L):

(1) $E = (1 - U)*L$,

the sudden large drop in participation combined with the sustained high level of unemployment account for the depression in Canadian employment in this decade. The percentage of working-age Canadians holding jobs fell from 62.4 per cent in 1989 to 58.2 per cent in 1993; by 1997 it had only recovered to 58.9 per cent.

Today, the central macroeconomic question for Canada is: what proportion of this slump in participation and employment is cyclical in the sense that it can be eliminated without bringing ever-rising inflation? To answer this question, we need first an explanation of labour force participation, and second an explanation of the NAIRU — the critical level of unemployment (U*) below which inflation begins to increase without limit. The participation rate (L) depends on perceived employment opportunities as represented by the employment rate (E), and both it and the NAIRU depend on structural factors (S), such as demographic change and social policy. Formally, we have:

(2) $L = L(E, S)$

(3) $U^* = U^*(S)$.

Once these two functions are well-specified, they can be inserted into equation 1 and combined with population projections to give an estimate of potential, non-cyclical employment and participation. Potential employment can, in turn, be combined with trend labour productivity to yield an estimate of potential output.

In this symposium, the focus is on the aggregate labour force participation shown in equation 2. We set ourselves the task of specifying and estimating this equation directly and deriving some of its implications. To this end, we use a 28-year period of macroeconomic observations (1969-96) for six broad demographic groups: men and women aged 15-24, 25-54, and 55 and over. In contrast with the other two econometric papers in this symposium (Archambault and Grignon, 1999; Beaudry and Lemieux, 1999), our particular angle is to cover all demographic groups, emphasize theoretical consistency as well as empirical flexibility, and pay careful attention to the role of social policy (unemployment insurance, social assistance and the minimum wage) among structural factors.

However, because the aggregate data we use are too coarse and degrees of freedom scarce, we do not attempt to distinguish precisely between the specific impacts on labour force participation of several other structural factors that have been mentioned in the literature, such as rising school attendance, the plateauing of women's participation, better income protection and rising average age for older men and women, and worsening employment prospects among the low-skilled. While we believe our analysis offers a reasonable 'explanation' of past and present, our reliance on trend variables naturally implies that we cannot project our results mechanically into the future. We can 'explore' the future, but not predict it.

Our statistical results attribute the drop in Canadian labour force participation about equally to three factors: very poor macroeconomic conditions, major policy changes in unemployment insurance and the minimum wage, and broad-based structural transformations. In the short run, we find it unlikely that even the best macroeconomic prospects can allow the aggregate participation rate to recover more than one-third of its 2.7-percentage-point drop between 1989 and 1997. Prospects for a recovery of the employment-population ratio are better if one believes — as we do — that equilibrium unemployment has declined since 1989.

The paper is organized as follows. Section 1 develops our theoretical model of labour force participation and presents the data used to test it. Section 2 explains the empirical methodology and reports the estimation results. Section 3 tells how these results explain the recent decline in labour force participation. Section 4 explores their implications for the future. Section 5 summarizes the paper and concludes.

Theory and Measurement

The labour force participation rate of each of the six demographic groups is the percentage (L_i) of group population i who want to work according to Labour Force Survey criteria. Following the standard classical framework, we reason that L_i depends on three sets of factors: individual/family preferences and the demographic composition of the group; economic conditions, including wealth and non-labour income, wage and employment opportunities, attractiveness of schooling, and so on; and income security programs, such as unemployment insurance, social assistance and pension benefits.

Our particular implementation of this general framework will have L_i depend on six influences:

(4) $L_i = L_i(J, W/P, W_m/P, rD/M, B/P, T)$

where:

J = index of job availability,

W/P = average real wage,

W_m/P = average real minimum wage,

rD/M = index of unemployment insurance generosity,

B/P = average real social assistance benefit and

T = quadratic annual time trend.

We provide intuition for the impact of each of these variables on labour force participation.

First, better job opportunities (J) on the demand side raise the subjective probability of successful job search and, hence, the expected payoff to labour force participation. Therefore, L_i must be an increasing function of J. We measure job opportunities by the ratio of Statistics Canada's help-wanted index to the total working-age population. This index is a good instrument because it is highly correlated with the (demand-side) probability of finding a job and appears to be insensitive to (supply-side) participation rate shocks (Archambault and Fortin, 1997).[1] Equations 1 and 2 above make clear alternative indexes of labour market pressure such as the unemployment rate or the employment-population ratio are unacceptable as such, because they are endogenous to the employment-participation behavioural system.[2]

Second, the average real wage (W/P) has an uncertain impact on labour force participation. It is true that, as a payoff to working, a higher real wage should draw more people into the labour force. However, it is also true that a higher real wage allows workers to achieve a given income target by participating in the labour force less frequently or for shorter durations. Moreover, in families where income is shared, the real pay raise obtained by one member can act as a deterrent to labour force participation of other members, by increasing their 'reservation wage.' We measure W/P by dividing the average wage for the entire economy (W) by the consumer price index (P).[3]

Third, the average real minimum wage (W_m/P) also has an uncertain impact on labour force participation. For a given level of the average wage in the economy, a higher minimum wage by itself increases the attractiveness of labour force participation for minimally qualified workers. But it may, at the same time, reduce the perceived probability of successful job search and deter labour force participation by objectively reducing the availability of jobs (Mincer, 1976). We measure W_m/P through division of the weighted average of provincial hourly minimum wages (W_m) by the consumer price index (P).

Fourth, more generous unemployment insurance (UI) regulations and benefits should encourage at least some positive degree of labour force

participation. This is because the broad payoff to participation not only includes the wage when working, but also the availability and level of UI compensation when out of work. UI generosity was substantial in Canada in 1972-89. For example, in 1978-89, whenever the regional unemployment rate exceeded 11.5 per cent, the '10/42' rule applied. A minimum qualifying period (M) of 10 weeks triggered eligibility of 42 weeks of maximum benefit duration (D) compensated at the rate (r) of 60 per cent of the previous weekly wage. Thus, potential benefits, represented by rD/M, were 252 per cent of the labour income earned during the minimum qualifying period. This implicit wage subsidy amounted to a powerful incentive to join and stay in the labour force. A measure of the severity of federal restrictions imposed on UI in 1990, 1993, 1994 and 1996 is that, at unchanged levels of regional unemployment rates, the implicit wage subsidy fell to 62 per cent in 1997 from 180 per cent in 1989.

We use the implicit wage subsidy thus defined (rD/M) as our measure of UI generosity (Fortin, 1984; Sargent, 1996). We hypothesize that increased generosity in the 1970s raised labour force participation, and this effect was partly reversed by the restrictions of the 1990s. This wide swing in social policy has been specific to Canada; it has not occurred in the United States. Naturally, a test of this hypothesis requires extending our sample of observations on labour force participation back to the 1960s. We also allow labour force participation to respond gradually over several years to changes in UI generosity.

In calculating the national UI wage subsidy, rD/M, the wage replacement rate, r, is set at the common national value. The minimum work requirement, M, and the maximum benefit duration, D, are calculated national averages not of actual, but of standardized provincial values. These standardized values are those M and D would have taken, given the existing legislation, if provincial unemployment rates had remained constant (and equal to their sample averages) throughout the estimation period. This "instrumentation" procedure makes the standardized values of M and D responsive to legislative changes, but not to cyclical changes in regional unemployment rates. It cuts off the correlation that would otherwise arise between random shocks to labour force participation and the actual UI wage subsidy measure. If not removed, this correlation would bias upwards the estimated impact of UI generosity on participation.

Although greater UI generosity tends to induce more people to enter and stay in the labour force, it may nevertheless also operate as work disincentive for those already participating. Essentially, by reducing the marginal cost of not working, more generous UI discourages participation through negative income and substitution effects.

To summarize, UI has two conflicting effects on labour force participation: it brings more people into the labour force, but it may reduce the extent of participation of those already working. Therefore, the net effect of UI generosity on participation could be positive for some groups and negative for others.[4]

Fifth, an increase in the average real social assistance (SA) benefit should weaken labour force participation by reducing the net payoff to going from welfare to work. However, the estimated impact could be muted by the fact that provinces require employable welfare recipients to be available for work. This could bias their responses to the LFS in favour of participation. We measure B/P through division of the average benefit (B) by the consumer price index (P). The average benefit is in turn obtained through ex post division of the sum of all provincial expenditures on general social assistance by the corresponding total number of recipients.

Sixth, we use an annual time trend (T = 0, 1,..., 27 in 1969, 1970,..., 1996) to capture all other smoothly changing variables affecting labour force participation in the sample period. We make this trend quadratic (and later test whether it is cubic) to allow the growth rate of participation itself to change over time. It will catch social, economic, policy, and other unspecified influences as well. Among the developments that have been mentioned in recent literature are the rising rate of school attendance, the changing roles of men and women in society, the changing demand and supply of skills, the development of private and public pensions, and the rising average age of the 55-plus age group.

Estimation Methodology and Results

We implement the six equations explaining the labour force participation rates of the six demographic groups as follows:

$$(5)\quad \Delta\log(L_i) = \beta_{i0} + \beta_{i1}\,\Delta\log(J) + \beta_{i2}\,\Delta\log(W/P) + \beta_{i3}\,\Delta\log(W_m/P) + \beta_{i4}\,\Delta\log(1+r\,D/M) + \beta_{i5}\,\Delta\log(B/P) + \beta_{i6}T + \varepsilon_i.$$

Here, i indexes demographic groups (i = men 15-24, men 25-54, men 55 and over, women 15-24, women 25-54, women 55 and over), ε_i is an additive zero-mean random error, and the β_{ij}'s are the coefficients to be estimated (j = 0, 1,...,6). The annual time subscript is omitted everywhere for simplicity.

The log-linear form of the equations allows the β_{ij} coefficients to be interpreted as elasticities. Our theoretical expectations are that we must have $\beta_{i1} \geq 0$ and $\beta_{i5} \leq 0$. The annual differencing of the equations reflects our attempt to eliminate spurious correlations between jointly trended variables. It is made necessary by the fact all six participation rates display strong upward or downward trends in our 28-year sample.[5] In particular, since the level equations have been assumed to be quadratic in the annual time trend T, the above difference equations will be linear in T. A negative value of β_{i6} means that the rate of change in labour force participation L_i itself falls over time. It is well-known, for example, that the labour force participation rate of middle-aged women increased more and more slowly from the 1970s to the 1990s — so β_{i6} should indeed be negative in this case.

For each difference equation, our sample covers the same 28 years of macroeconomic observations, 1969-96. The basic constraint on this time span comes from social assistance data, which begin in 1968 and end in 1996. All variables except the UI generosity variable are measured in current-year values. Our UI generosity variable is a moving average of current- and past three-year values of the basic index. This distributed-lag specification is motivated by the existing Canadian and international evidence on delayed labour market reaction to changes in unemployment insurance legislation (e.g. Fortin, 1994; the Organization for Economic Co-operation & Development, 1994; Lemieux and MacLeod, 1998). It is empirically supported by minimization of the Akaike information criterion.

Statistical estimation of the six equations is based on Zellner's 'seemingly-unrelated-regression' method. This estimation technique improves upon precision of the traditional 'ordinary-least-squares' method by taking advantage of the likely presence of contemporaneous intercorrelation between the unmeasured ε_i error terms of the equations.[6] More details on variable definitions are provided in the data appendix.

Table 1 reports estimation results for equation 5 that exclude the economy-wide average real wage variable W/P. This exclusion is motivated by prior estimation and tests showing this variable plays a statistically negligible role in every equation.[7] Every other variable has a significant impact on participation for at least two demographic groups.

With R^2 statistics ranging between 0.66 and 0.85, the overall explanatory performance of the estimated equations is good for the younger and middle-aged groups, particularly given that estimation is in annual difference form. However, it is not so good in the case of older groups, where the R^2 statistics fall below 0.30 and much unexplained variation remains. Nevertheless, all equations do well when subjected to a battery of diagnostic tests for serial correlation (Durbin-Watson, Breusch-Pagan), omitted variables (RESET) and structural change (Chow, CUSUM). We are, in particular, unable to detect any significant shift in the regression constant and the time trend coefficient of any equation over the 1990-96 subperiod.[8]

One important implication of statistical stability is that the declining aggregate participation rate of the 1990s should not be attributed to some new structural relationship, but to continuation of the same modes of labour market behaviour (including continuation of the same unspecified trends) as were observed over the previous 25 years. This raises our confidence that the recent participation decline can be understood in terms of the particular outcomes for the explanatory variables in this decade.

Before working through how the equations explain developments in the 1990s, we focus on key aspects of the estimated structure.

Table 1 Annual equations for log changes in labour force participation rates, estimated with panel data for six demographic groups, Canada, 1969-1996

	Demographic Groups					
	15-24		25-54		55 and over	
Explanatory Factors	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
CONSTANT	0.89*	2.52*	0.06	5.31*	-0.47	1.99*
	(0.44)	(0.53)	(0.12)	(0.34)	(0.73)	(1.10)
INDEX OF JOB AVAILABILITY	0.060*	0.038*	0.014*	0.010*	-0.000	0.017
	(0.008)	(0.010)	(0.002)	(0.006)	(0.014)	(0.020)
AVERAGE REAL MINIMUM WAGE	-0.167*	-0.164*	-0.010	-0.075*	-0.009	0.197*
	(0.040)	(0.048)	(0.011)	(0.031)	(0.066)	(0.099)
AVERAGE UI WAGE SUBSIDY	0.086*	0.086*	-0.002	0.013	-0.004	-0.120*
	(0.022)	(0.027)	(0.006)	(0.017)	(0.037)	(0.056)
AVERAGE REAL SA BENEFIT	-0.015	-0.072	-0.013	-0.111*	-0.117*	-0.144
	(0.040)	(0.048)	(0.011)	(0.031)	(0.066)	(0.099)
TIME TREND	-0.053*	-0.120*	-0.012*	-0.190*	-0.081*	-0.140*
	(0.026)	(0.031)	(0.007)	(0.020)	(0.043)	(0.065)
Summary statistics						
Standard error of regression	0.85	1.03	0.23	0.66	1.41	2.13
R^2 statistic	0.84	0.78	0.66	0.85	0.16	0.26
Durbin-Watson statistic	1.98	2.26	2.62	2.06	2.66	2.94

Note: The theoretical background for the equations and variable definitions are presented in the text and the data appendix. As indicated in text equation 5, all variables except the time trend are expressed in annual log difference form. Regression constants, time trend coefficients and standard errors of regressions are expressed in log points. The other coefficients are interpreted as elasticities. The estimation method is Zellner's iterative seemingly-unrelated-regression method. Numbers in parentheses below the estimated coefficients are their estimated standard errors. An asterisk indicates that the zero-coefficient hypothesis is rejected at the 90 per cent confidence level.

Source: Authors' calculations; see text for explanations.

First, the participation rates of all younger and middle-aged groups respond positively and significantly to cyclical variations in job opportunities (J). But there are large differences in amplitude. The estimated cyclical elasticity of participation ranges from 0.060 for young men to 0.010 for middle-aged women. Basically, younger groups (15-24) respond four times more than middle-aged groups (25-54) of the same gender, and men respond 50 per cent more than women of the same age group. By contrast, the older groups (55 and over) do not appear to change their participation behaviour in response to cyclical changes in job availability.

Second, changes in the minimum wage influence labour force participation among the younger groups and women, but not among middle-aged and older men. This pattern is consistent with the fact almost 90 per cent of minimum-wage workers are young or female. The estimated participation elasticities are negative among the younger groups (-0.16) and middle-aged women (-0.08, half as large); it is positive and quite large among older women (0.20).

Third, the positive response of labour force participation to UI generosity is concentrated among the two younger groups, with significant elasticities of 0.09 for young men and women. The two middle-aged groups and older men do not seem to be affected much by changes in UI regulations. For their part, older women seem to react negatively to UI generosity, with a large and significant elasticity of -0.12.

Fourth, increases in social assistance benefits are found to affect negatively participation both for middle-aged women (among whom the phenomenon of single parenthood is concentrated), and older men. The two estimated elasticities are equal to about -0.1. No significant reaction is detected among the younger groups, middle-aged men and older women. It is important to point out that traditionally most provinces have imposed strict controls on the eligibility of young adults for social assistance and kept young welfare recipients under closer supervision than older ones. Since the extent of controls and supervision is likely to increase with the level of benefits, it is not surprising the labour force participation rates of younger groups turns out to be unresponsive to changing benefit levels.

Fifth, all time trend coefficients have significant negative estimated values. The slowdown has been most pronounced among women of all age groups, who started the period with rapidly increasing participation rates. Based on the estimated coefficients for the constant and the time trend, we estimate the trend participation rate began to decline in the mid-1980s for older women, in the late 1980s for younger women, and in the late 1990s for middle-aged women.[9] The rate also declined throughout the sample period for middle-aged and older men, but much more rapidly among the latter than the former. The participation of younger men followed the same pattern as that of younger women, rising up to the late 1980s and declining afterwards.

The slowing growth rate of trend labour force participation has been a broad-based phenomenon, but the reasons no doubt differ between demographic groups. As explained earlier, our statistical analysis does not attempt to identify the various determinants of those trends across demographic groups, but on the basis of the existing literature the following presumptions look reasonable. First, rising school attendance has depressed participation rates among younger men and women (Archambault and Grignon, 1999). Second, the diffusion of labour force participation as a sociological phenomenon has been approaching maturity among women of all ages (Beaudry and Lemieux, 1999). Third, better income protection and rising average age have played a role among older men and women (Baker and Benjamin, 1997). Fourth, declining employment opportunities and worsening working conditions have led to labour force withdrawals among the low-skilled population in general (Murphy and Topel, 1997).

How do our estimated equations explain the decline in aggregate labour force participation in the 1990s? To answer this question, we use the estimated coefficients reported in Table 1 and simulate the impact of the accumulated change in each explanatory factor on the participation rate of each demographic group in 1990-97. This makes 1989 the base year of the simulation.

We calculate two types of aggregate statistics. First, we sum up the simulated impacts of all explanatory factors on the participation rate of each individual group. The actual change in the group-specific labour force participation rate over the period is by definition the sum of this simulated change and the residual prediction error. Second, we calculate the population-weighted average of the simulated group-specific impacts of each factor to obtain its effect on the participation rate of the entire population. The actual change in the aggregate participation rate over the period (2.7 percentage points) is by definition the sum of these population-weighted averages of factor-specific impacts, prediction errors and the effect of shifting population weights.

Formally, as a weighted average of group participation rates, the aggregate participation rate can be written as:

$$(6) \quad L = \Sigma A_i L_i ,$$

where A_i is the population weight of group i. From this definition, the change in L from 1989 to 1997 can be expressed in exact form as:

$$(7) \quad \Delta L = \Sigma \overline{A}_i \Delta L_i + \Sigma \overline{L}_i \Delta A_i ,$$

provided $\overline{A}_i$ and $\overline{L}_i$ are defined as simple averages of the 1989 and 1997 values of A_i and L_i, respectively.

The first term on the right-hand side of equation 7 is the population-weighted average of the group-specific changes in participation rates,

Table 2 Simulated impacts of cyclical, policy and other structural changes on the labour force participation rates of six demographic groups, accumulated in Canada, 1990-97
(percentage points)

	Demographic Groups						
	15-24		25-54		55 and over		Total[a]
Types of Changes	Men	Women	Men	Women	Men	Women	
JOB AVAILABILITY	-3.4	-2.0	-1.0	-0.6	0.0	-0.2	-1.0
MINIMUM WAGE	-1.5	-1.4	-0.1	-0.7	0.0	0.4	-0.4
UI GENEROSITY	-3.1	-2.8	0.1	-0.5	0.1	1.0	-0.5
SOCIAL ASSISTANCE	0.0	0.2	0.0	0.3	0.2	0.1	0.1
OTHER STRUCTURAL[b]	-2.4	-2.2	-1.7	4.0	-6.8	-1.9	-0.8
TOTAL SIMULATED[c]	-10.4	-8.2	-2.7	2.5	-6.5	-0.6	-2.6
SIMULATION ERROR	0.4	-0.6	0.0	-0.6	1.5	0.0	-0.0
TOTAL ACTUAL[d]	-10.0	-8.8	-2.7	1.9	-5.0	-0.6	-2.7[e]

Notes
a Weighted average of the six columns, with weights equal to group population shares. From left to right, these shares are equal to 0.091, 0.088, 0.285, 0.285, 0.115 and 0.136.
b Simulated impact of time trend. The various unspecified influences subsumed under this catch-all variable include the rising rate of school attendance, the changing roles of men and women in society, the changing demand and supply of skills, the development of pension plans, and the rising average age of the 55-plus age group.
c Sum of five above lines.
d Sum of two above lines.
e Includes the small aggregate impact (-0.1 point) of population shifts among the six demographic groups.

Source: Authors' calculations based on Table 1 data; see text for explanations.

which depend on simulated factor effects and residual prediction errors. The second term is what we have just termed the effect of shifting population weights. (Dugan and Robidoux (1999) call it the demographic composition effect). We calculate this effect generated a small reduction of 0.1 of a percentage point in L in 1990-97.[10]

Table 2 reports the factor- and group-specific simulated impacts on participation rates accumulated over the period. Needless to say, the numbers should be taken as orders of magnitude, not as precise figures. In particular, simulations for older men and women retain the same degree of imprecision as the Table 1 regressions on which they are based.

In interpreting these results, it is important to keep in mind the size and timing of the simulated factor changes. The index of job availability dropped from 100 in 1989 to 40 in 1992, then remained almost unchanged in 1992-97. The average real minimum wage was roughly constant in 1989-91, then increased by 13 per cent in 1991-97. The standardized implicit UI subsidy decreased sharply and continuously from 180 per cent of the wage in 1989 to 62 per cent in 1997. The index of average real SA benefit first increased from 100 in 1989 to 107 in 1992, then fell to 96 in 1996.[11] Two facts stand out: the cyclical drop was concentrated in the first half of the period, policy changes in the second half; and the saw-tooth movement in SA benefits did not result in much net change over the period. The only policy developments that really mattered were the large accumulated changes in UI and the increase in the real minimum wage.

The aggregate factor and group statistics in Table 2 give two unambiguous messages. First, across factors the three types of changes contrib-

uted about equally to the decline in the aggregate labour force participation rate. Of the 2.7-percentage-point drop in aggregate participation in 1989-97, cyclical reduction in job availability contributed one point, UI restrictions 0.5 of a point, the higher minimum wage 0.4 of a point, and other structural changes 0.8 of a point. Second, across groups the decline in participation was, on the contrary, uneven. Younger men and women reacted most strongly, with their participation rates falling by 10 and 8.8 points, respecitvely. The rates for middle-aged and older men decreased by 2.7 and five points. The participation rate fell only a bit among older women, and it continued to pull ahead among middle-aged women. However, the increase in the latter case was much smaller in the 1990s (1.9 points) than in the 1980s (14.1 points).[12]

At the detailed level, Table 2 shows the younger groups dominated the decline in participation arising from both cyclical and policy changes. Middle-aged men and, to a lesser extent, middle-aged women also reacted negatively to cyclical changes. Middle-aged and older women showed some sensitivity to policy changes, but in opposite directions. For all groups other than younger men and women, other structural changes were the dominant force behind changes in participation. Trend participation increased rapidly (but, again, at a slowing rate) among middle-aged women, and decreased sharply among older men. Among all other groups, trend participation fell moderately.

Exploring the Future

How informative are our estimated equations on the future outlook of labour force participation? We think they can be useful in projecting cyclical and policy-induced developments, but not very helpful in forecasting other structural changes.

Policy-induced developments are the easiest to handle. We believe the major overhaul of recent years in Canadian social policy has been completed, and the next decade will see a lot more stability in this area. We foresee stable real minimum wages and SA benefits, and no significant additional amendment to the Employment Insurance Act. A further reduction of about 0.1 of a percentage point in the aggregate participation rate will occur as a lagged response to past changes in UI regulations, but no more. This would bring the participation rate decline on account of accumulated UI restrictions to 0.6 of a percentage point. Little else is likely to happen in these three areas. The major policy changes of coming years will instead centre on pension policy, a factor our statistical measurement has included in the 'other structural' category.

Concerning cyclical developments, our estimated equations have established quantitative links between the job availability index and group-specific participation rates. But to form an estimate of how much increase in participation would accompany a full economic recovery requires knowledge of the equilibrium, non-inflationary value of the job availability index. This equilibrium value in 1998 and beyond could be different from the actual 1989 value of the index. To determine its level amounts to specifying the level of the NAIRU, beyond the scope of this paper.

In these circumstances, a practical approach consists of estimating how much the aggregate participation rate and the aggregate employment-population ratio would have to increase from their 1997 levels to achieve a range of realistic levels of the NAIRU. Formally, we simulate equations 1 and 2 in log difference form as follows:

$$(8) \quad \Delta\log(E) = \Delta\log(1 - U) + \Delta\log(L) ,$$

$$(9) \quad \Delta\log(L) = \beta_1\Delta\log(E) + \text{etc.},$$

where β_1 is a weighted average of the six estimated β_{i1} coefficients with weights equal to the 1997 labour force shares.[13] These β_{i1} coefficients are obtained from re-estimation of equations 5 with the aggregate employment-population ratio (E) replacing the job availability index (J) as the cyclical variable in every group equation.[14] The 'etc.' in equation 9 stands for the sum of all policy and other structural influences.

We consider equations 8 and 9 as a two-equation system that can be solved out for $\Delta\log(E)$ and $\Delta\log(L)$ as functions of $\Delta\log(1 - U)$ and structural variables. We obtain:

$$(10) \quad \Delta\log(E) = [1/(1 - \beta_1)]\Delta\log(1 - U) + \text{etc.}$$

$$(11) \quad \Delta\log(L) = [\beta_1/(1 - \beta_1)]\Delta\log(1 - U) + \text{etc.}$$

Our estimate for β_1 is 0.25. Given the 1997 value of the unemployment rate was 9.2 per cent, equations 10 and 11 can be used to calculate how much higher the employment-population ratio

Table 3 Simulated reactions of the aggregate labour force participation rate and the aggregate employment-population ratio to bringing down the national unemployment rate to various hypothesized NAIRU levels Canada, 1997 basis
(percentage points)

Unemployment	Participation Rate		Employment-Population Ratio	
From 9.2 per cent to	Increase From 64.8 per cent to		Increase From 58.9 per cent to	
9 per cent	0.0	64.8	0.2	59.1
8 per cent	0.3	65.1	1.0	59.9
7 per cent	0.5	65.3	1.9	60.9
6 per cent	0.8	65.6	2.8	61.7

Note: The NAIRU is the non-accelerating-inflation rate of unemployment. It is the lowest level of unemployment for which inflation does not tend to rise without limit. The 9.2 per cent, 64.8 per cent and 58.9 per cent figures for the unemployment rate, the participation rate and the employment-population ratio are their 1997 actual values. Their respective 1989 actual values were 7.5 per cent, 67.5 per cent and 62.4 per cent.

Source: Authors' calculations; see text for explanations.

and the participation rate would have been in that year if the unemployment rate had been at its NAIRU level and structural variables had been the same.

Table 3 presents the results of these simulations for four alternative NAIRU values (6 per cent, 7 per cent, 8 per cent and 9 per cent), which cover a wide range of opinion on its true value. The 9 per cent upper limit is a figure preferred by those who think that the Canadian output gap has already been closed and the Canadian economy was already overheating in 1998, a fact that could be temporarily hidden by the current world commodity price deflation.

The 6 per cent lower limit can be rationalized as follows. Starting from the 8 per cent estimate produced by the Bank of Canada Research Department in the late 1980s (Rose, 1988), three structural developments since then can be thought of having reduced equilibrium unemployment. First, the share of the high-unemployment 15-24 age group in the labour force has fallen from 21 per cent to 16 per cent. Given the five-point difference between the youth and adult unemployment rates observed in the high-employment years 1988-89, a mechanical reduction of 0.25 of a percentage point in aggregate unemployment must have followed.

Second, we have just estimated that the string of federal restrictions to UI eligibility and benefits will probably have reduced aggregate labour force participation by 0.6 of a percentage point by the end of the 1990s. If most of this drop has essentially shifted some non-employment from the unemployment category to the out-of-labour-force category, as suggested by the analysis of Card and Riddell (1996), then, based on equation 8, the consequence has been a further reduction of 0.8 of a percentage point in structural unemployment.

Third, the recent performance of the U.S. economy at full employment may indicate that increased domestic and international competitive pressure in labour and product markets arising from deregulation, globalization and freer trade has cut structural unemployment by up to one percentage point in North America. Official estimates of the U.S. NAIRU currently put it in the 5 per cent-5.5 per cent range, which is one percentage point lower than the 6 per cent-6.5 per cent range estimated only 10 years ago (Stiglitz, 1997; United States President, 1998).[15]

Whatever the exact level of the Canadian NAIRU, the key result in Table 3 is that, in any future non-inflationary cyclical recovery, the aggregate participation rate is currently unlikely to rise more than 0.8 of a percentage point. The current equilibrium value of the participation rate would not seem to exceed 65.6 per cent. Similarly, the employment-population ratio is unlikely to rise more than 2.8 percentage points in any non-inflationary cyclical recovery. Its current equilibrium value would not seem to exceed 61.7 per cent.

In conjunction with working-age population numbers, this constitutes useful information in estimating potential employment and the employment gap in Canada. If the current level of the NAIRU is 8 per cent, say, the equilibrium employment-population ratio according to Table 3 is 59.9 per cent. This is just 0.4 of a percentage point higher than the actual mid-1998 employment-population ratio. Given our 24 million working-age population, the implied current employment gap would be only 96,000 jobs. If instead the current NAIRU is 6 per cent, the equilibrium employment-population ratio is 61.7 per cent. The resulting 2.2-percentage point differential with the actual mid-1998 employment-population ratio translates into a much larger employment gap of 528,000 jobs.

Finally, our statistical results are ill-suited for appraising future structural developments in labour force participation. There are three main reasons for this. First, our modelling of past non-policy structural change by equation 5 is based on mechanical annual time trends that are mute on the nature and relative contribution of underlying structural factors. Statistical tests reported above have confirmed the reliability of these trends for 1990-96, but projecting them blindly into the future would be foolhardy.

Second, assuming continuation of the past estimated trends reported in Table 1 leads to the absurd prediction that group-specific and aggregate labour force participation rates in Canada are going to fall at an accelerating rate in coming years. In particular, the participation rate of middle-aged women would be projected to drop from its current 77 per cent to the Stone Age level of 45 per cent before 2020. This does not make much sense.

Third, available data indicate that, contrary to the pattern of accelerating decline reflected in our estimated equations, all group-specific participation rates except for young men have stopped declining or begun to rise again since 1995. In this respect, the papers by Ip, King and Verdier (1999) and by Dugan and Robidoux (1999) in this symposium represent useful attempts to escape from pure projections of past trends. Their analysis based on systematic comparisons between Canada and the United States takes off where our econometric study ends.

Conclusion

The 2.7-point drop in its aggregate labour force participation rate that Canada suffered from 1989 to 1997 is both a puzzle and a cause for concern. The puzzle is that this occurrence was totally unexpected and unprecedented in the past half-century, and has remained mysterious to this day. The concern is that, if the drop in participation is not reversed or at least offset by some concomitant decline in the equilibrium unemployment rate, Canada will suffer from a permanent reduction of its national standard of living. There will be permanently less employment, production and real income per capita.

So, should the drop in Canadian labour force participation be a cause for concern? Yes and no. First, poor macroeconomic conditions in the 1990s have been unambiguously bad for participation and income, but this can be reversed if and when the Canadian economy recovers to full employment. Also worrisome is the high labour force dropout rate among the low-skilled, which can only be reduced by education, training or other long-term structural intervention. In addition, the welfare implications of other participation-reducing factors, such as minimum wage increases, restricted access to unemployment insurance benefits and more generous public pensions, are controversial. To decide whether those developments are good or bad requires a value judgment about the relative merits of their implications for efficiency and equity. To the extent that they result from free choice, the rising school enrolment rate and the stabilization of women's participation rate should be viewed as welfare-enhancing. In particular, it is worth pointing out that students who participate less in the labour force today are likely to participate more, and more productively, later.

We do not anticipate that aggregate labour force participation in Canada will return to its late-1980s level in the foreseeable future. Minimum wage, unemployment insurance, and social assistance policies seem to have reached a stable plateau, and any changes in pension policy will have effects only over the long run.

The current non-inflationary recovery from the slump of the last decade will lead to some increase in participation and employment. But even moderately optimistic estimates of the non-inflationary level of the unemployment rate (the

NAIRU), such as 6 per cent, would raise the aggregate participation rate only one third of the way back to where it was 10 years ago. If a non-inflationary decline of unemployment to 6 per cent indeed occurs, it would in fact offset much of the impact of the drop in participation on employment. We estimate that, within the current (1997) structural setting, a 6 per cent NAIRU would imply a 65.6 per cent aggregate participation rate, a 61.7 per cent employment-population ratio, and a remaining short-term employment gap of more than 500,000 jobs.

The type of statistical analysis in this paper is not well-suited for appraising future non-policy structural developments in labour force participation. Our study should be seen as complementary to other papers in this symposium that examine this problem with alternative methodologies.

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Notes

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1. We are aware that Statistics Canada's survey methodology, the composition of job offers, and the extent of labour market mismatches may have changed the meaning of the help-wanted index over the 28-year period studied. The statistical implication of this measurement error is that, in the regressions in first-differences reported below, the impact of the true change in job availability on the change in labour force participation will be somewhat underestimated. However, given the high simple correlation (90 per cent) between changes in the help-wanted index and changes in the employment-population ratio, we trust that the measurement signal-to-noise ratio is large and the estimation bias is therefore small.

2. One acceptable alternative is to rely on the change in the help-wanted index as instrument to exogenize the change in the employment-population ratio and use the projection to measure ΔJ and estimate equation 4 (in first-difference form). Introducing the change in real gross domestic product or the change in any measure of the output gap as second instrument adds no further explanatory power. We will employ this projection of the employment-population ratio in the simulations reported in the section looking to the future.

3. Wage relativities (e.g. women versus men, younger versus older, low-skilled versus high-skilled) also matter in principle for the labour force participation decision, but we do not have good macroeconomic measures of these variables. We assume that their influences are captured indirectly through other variables in our model equation 4.

4. In addition to the UI wage subsidy variable just defined, we experimented with two other UI program parameters: the national replacement rate (separately), and the ratio between maximum insurable and average earnings. Their estimated effects on participation were never statistically different from zero. We did not try to use the disqualification rate for quitters as a proxy for legal and administrative pressure on UI claimants, because this is a strongly endogenous variable for which there is currently no obvious instrument. We thank one of our referees for insisting that we test alternative UI variables.

5. This is shown by formal tests of unit roots based on the 'augmented Dickey-Fuller' statistical procedure.

6. In our particular application, where the regressors are the same in all equations, Zellner's method gives the same estimated coefficients as the ordinary-least-squares method, but smaller standard errors around these coefficients.

7. In view of the simultaneous feedback between labour force participation and wages, the equations including $\Delta\log(W/P)$ were estimated with the three-stage-least-squares method. Identifying instruments were past real wage growth, past CPI inflation, and a dummy variable meant to capture the productivity slowdown of the past 20 years. The joint hypothesis that the β_{i2} coefficients for $\Delta\log(W/P)$ estimated by this method are zero for all six groups cannot be rejected at standard levels of confidence. The probability value of the calculated chi-square statistic is 0.40.

8. We checked this in two ways. First, we added two variables to the list of regressors of the six equations: a dummy variable equal to 0 before 1990 and to 1 in 1990-96, and a new trend variable equal to 0 before 1990 and to 1, 2,...,7 in 1990-96. Each of the 12 estimated coefficients turns out to be statistically negligible. Second, we added a quadratic time trend term in each of the six difference equations, which amounts to introducing a cubic term in the level-form equations 4. Again, each of the six estimated coefficients turned out to be statistically negligible.

9. With given job availability and social policy, female participation rates stop rising when their associated $\Delta\log(L_i)$ declines to zero. This occurs in year $t_0 = 1969 - \beta_{i0}/\beta_{i6}$. For example, since Table 1 estimates for middle-aged women are $\beta_{i0} = 5.31$ percentage points and $\beta_{i6} = -0.190$ percentage point per year, their participation rate is estimated to become flat in year $t_0 = 1997$.

10. The contradiction with Dugan and Robidoux (1999), who find a much larger demographic composition ef-

fect, is only apparent. It occurs for two reasons. First, they use 1989 labour force weights instead of our average of 1989 and 1997 weights. Second, they break down the labour force into 16 demographic groups, whereas we use only six. As a result, part of their estimated demographic composition effect is captured by our estimated within-group trend effects.

11. Our simulations assume this SA benefit index remained unchanged in 1997 from 1996.

12. Beaudry and Lemieux (1999) present a finer analysis of the diffusion of labour force participation across successive cohorts of women in 1976-94.

13. In the absence of population shifts, equation 7 simply reads $\Delta L = \Sigma A_i \Delta L_i$, where the A_i's are the population shares. It follows that $\Delta \log(L) \approx \Delta L/L = \Sigma (A_i L_i/L)(\Delta L_i/L_i) \approx \Sigma F_i \Delta \log(L_i)$, since for each group i the expression $A_i L_i/L$ simplifies to its labour force share F_i. Hence the result $\beta_1 \approx \Sigma F_i \beta_{i1}$, that the cyclical elasticity of the aggregate participation rate (β_1) is approximately equal to the labour-force-weighted average of the cyclical elasticities of the group participation rates (β_{i1}).

14. With this replacement, we have estimated the six group equations by three-stage least squares to get around the simultaneous feedback between participation and employment. The identifying instruments used are last year's log change in E and the current growth rate in real GDP. This procedure gives statistical results almost identical to those reported in Table 1.

15. Achieving a 6 per cent unemployment rate in Canada may further require that the inflation rate be allowed to stabilize close to 3 per cent instead of around 1 per cent. Wage resistance and liquidity trap constraints on achieving the NAIRU have been emphasized recently by researchers such as Summers (1991), Tobin (1995), Akerlof, Dickens and Perry (1996), and Krugman (1998).

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Data Appendix

Labour force participation rates (L_i): Proportion of group population i (i = men 15 to 24, women 15 to 24, men 25 to 54, women 25 to 54, men 55 and over, women 55 and over) who have a job or who are actively looking for one. Data come from Statistics Canada's monthly Labour Force Survey and are extracted from the CANSIM database. For 1977-97, the log change in L_i is calculated from the most recent revised series for 1976-97; for 1969 -76, the previous series for 1968-76 is used.

Index of job availability (J): Ratio of help-wanted index to total population aged 15 and over. The help-wanted index comes from Statistics Canada's monthly measurement of newspaper job offers. We have put together a continuous series for 1968-97 by linking successive published revisions of the index. The population aged 15 and over comes from the monthly Labour Force Survey. All data are extracted from the CANSIM database.

Average real wage (W/P): Ratio of the average wage (W) to the consumer price index (P). For 1983-97, the average wage is the new series for the fixed-weight index of average hourly earnings of all employees; for 1968-82, it is the old series for the average weekly earnings of all industries. The two series overlap in the first three months of 1983 and are linked on that basis before the log change is calculated. Data come from Statistic Canada's monthly establishment Survey of Employment, Earnings & Hours. The consumer price index comes from Statistic Canada's monthly Consumer Price Survey. All series are extracted from the CANSIM database.

Average real minimum wage (W_m/P): Ratio of the average minimum wage (W_m) to the consumer price index (P). The average minimum wage is a fixed-weight average of individual provincial minimum wages, with weights equal to the 1991 provincial labour force shares. Data come from the Department of Human Resources Development.

Average UI wage subsidy (rD/M): Standardized product of the wage replacement rate (r) by the maximum duration of UI benefits available to the minimally qualified worker (D weeks), divided by the length of the minimum qualifying period (M weeks). The replacement rate is set at the statutory national value. In relevant years, it is a fixed-weight average of the general rate and the rate for claimants with family responsibilities. The replacement rate is also adjusted to reflect the non-taxability of UI benefits before the June 1971 UI Act. For the period before June 1971, the D/M ratio is a fixed-weight average of the nationally set regular and seasonal ratios. For the period after June 1971, M and D are national fixed-weight averages of standardized provincial values. These standardized values are those M and D would have taken under existing legislation with provincial unemployment rates fixed at their sample averages. For 1997, M is calculated under the assumption of a 30-hour standard work week. Data come from the various UI/EI Acts, and from Statistic Canada's quarterly reports on UI (cat. no. 71-001 and 73-001).

Average real SA benefit (B/P): Ratio of the average SA benefit (B) to the CPI (P). The average SA benefit is the ratio of the sum of all provincial expenditures on general social assistance to the corresponding total recipient population. For any given year, the latter is approximated by the average of current- and next-year March observations. Data come from the Department of Human Resources Development.

Time trend (T): Variable equal to 0 in 1969, 1 in 1970, 2 in 1971,..., 27 in 1996, 28 in 1997.

Structural Influences on Participation Rates: A Canada-U.S. Comparison

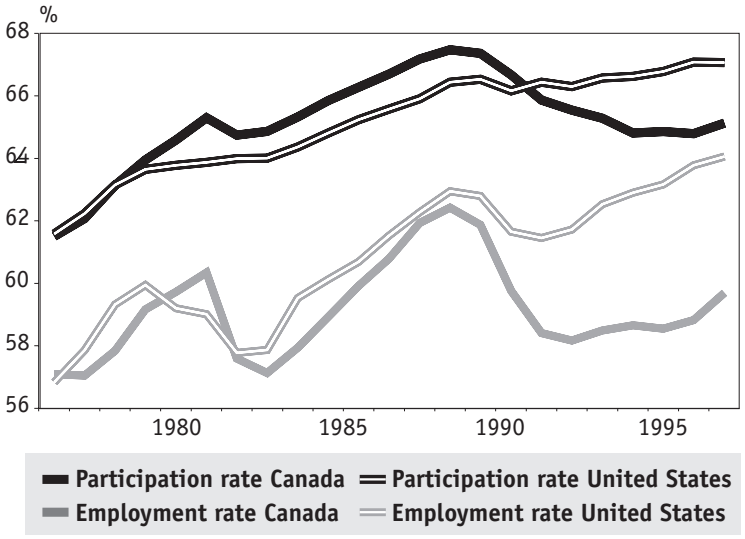
*Irene Ip, Sheryl King and Geneviève Verdier**

An understanding of what drives the participation rate is necessary for the projection of labour force growth, a key input into the determination of the economy's production potential.[1] The sharp drop in the participation rate in Canada in the 1990s has given rise to considerable debate about its cause and if it was reasonable to have expected it to have returned to its pre-recession peak. If that peak is the appropriate reference point, then the implications are that labour market slack is considerably larger than the present unemployment rate suggests.

While the severity of the 1990-91 recession in Canada and the subsequent underachievement of real GDP relative to potential caused much of the decline and subsequent stagnation of the aggregate participation rate, structural developments and compositional shifts among various subgroups of the population of labour force age, which were under way before 1989, also exerted downward pressure. The purpose of this article is to identify those supply side developments that could have accounted for part of the decline in the participation rate since 1989.[2] Although this approach does not include an analysis of demand side factors, cyclical effects are noted. The much worse performance of the Canadian participation rate than its U.S. counterpart in the 1990s, after the similarities of the preceding 15 years, suggests that using the U.S. labour market experience as a benchmark for Canada may shed some light on the situation, especially since the United States has been operating at full capacity for some time.

Econometric estimation of participation rates is hampered by the presence of many influences that are difficult to measure, such as changes in the availability of private and public pension plans, family relationships and structures, and the costs of and subsidies to education.[3] If these influences cannot be specifically modelled, projections based on such estimations will be unreliable. Fortin and Fortin (1999) estimated the aggregate participation rate, using a quadratic time trend to capture the effects of such influences, but they noted the problems of this technique in "appraising future non-policy structural developments in labour force participation." Thus, predictions based on econometric estimation must often be supplemented by judgment. In this paper, judgment about the effect of the various supply side factors on the participation rates of the major sub-groups, leads to projections of these rates, given a moderately expanding economy.

Chart 1 Participation rates and employment rates, Canada and the United States



From the mid-1970s to the end of the 1980s, the behaviour in the aggregate participation rates of both Canada and the United States were broadly similar (Chart 1), rising to record highs by the end of the 1980s with only one significant interruption in the early 1980s.[4] The dominant influence on the aggregate participation rates of both countries was the strong upward trend in women's participation rates that had begun in the 1950s (Chart 2).

Chart 2 Female participation rates in Canada and the United States

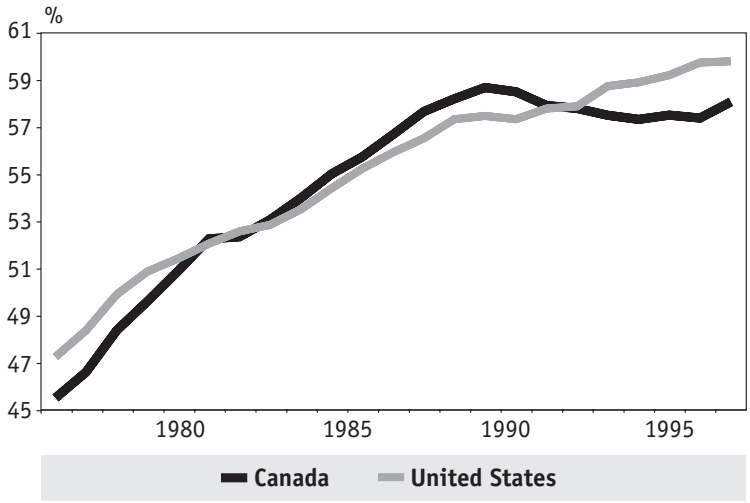
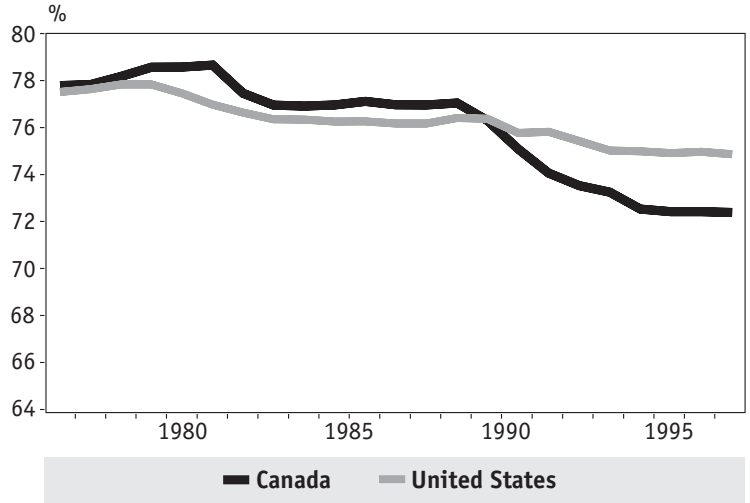


Chart 3 Male participation rates in Canada and the United States



Male participation rates fell slightly over the 1980s (Chart 3).

The 1990s, however, appear to have initiated a radical departure in the evolution of the participation and employment rates in the two countries. Both these rates fell more in Canada than in the United States during the 1990-91 recession, partly because economic growth was relatively stronger in Canada than in the United States before 1990 and the recession of 1990-91 was more severe. However, while the U.S. participation rate had begun to recover by 1994 and has since risen to a new high, the Canadian rate continued to fall until 1995 and showed no sign of recovery until 1998. In the United States, female rates are once again responsible for the rise in the total participation rate as those for male rates have drifted down since 1992. The rate of increase of the female participation rate has, however, been considerably lower than in the 1980s. In Canada, female rates were almost one percentage point higher in 1998 than in 1995 but the further slippage in male rates offset much of this uptick.

Cyclical influences can account for short-run changes in the both male and female participation rates in the two countries. For example, over the past two decades or so, the rates either fell or stalled in the recessions. The response to recoveries is, however, less clear. In the United States, the rate of increase in female rates slowed in each of the expansions of the 1980s and the 1990s, while at the same time male rates continued to decline. In Canada, female rate increases also moderated during the vigorous expansion of the 1980s, while male rates stalled and both have been fairly flat since 1994. Structural factors are more likely to have been behind such longer term developments.

We examine first some of the demographic factors that may have influenced the aggregate participation rate. We then undertake a disaggregrated analysis of some of the possible structural influences on major age and gender groupings for both Canada and the United States. The groups considered are the core labour force (ages 25-54), youth (ages 15-19 and 20-24) and older people (age 55 and over). Our main conclusion is that an increase in the aggregate participation rate should be expected over the medium term, but it is unlikely to return to its 1989 peak level or to track the U.S. rate as closely. The greatest uncertainty surrounds the direction of the participation rate for adult men in general and of those aged 55 and over in particular.

Demographic and Compositional Effects

The participation rate fell by 2.7 percentage points from 1989 to 1997 in Canada compared with an increase of 0.5 percentage points in the United States. Although much of this difference is because of Canada's worse cyclical performance, some of it may be explained by demographic developments and shifts in the composition of the population of labour force age.

TABLE 1 The American and Canadian labour market

Per cent change

	United States			Canada		
	Population of working age	Labour force	Employment	Population of working age	Labour force	Employment
1976-79	5.6	9.2	11.4	6.2	10.4	10.1
1979-89	13.1	18.0	18.7	15.3	21.7	21.6
1989-97	9.0	11.4	10.4	13.0	8.5	6.5

Demographic Effects

Since 1976, the population of working age has grown at a faster pace in Canada than in the United States primarily because of our higher rate of immigration (Table 1). Until 1989, however, the labour force (and employment) grew faster in both countries because of an increase in the participation rates. In the 1990s population growth accelerated in Canada, exceeding the increase in the labour force, which had slowed markedly but less than employment. By contrast, population growth decelerated in the United States and even though labour force growth also slowed it continued to outstrip population growth. Even if employment and the labour force had posted the same increase as they had in the United States, the participation rate would still have fallen by about one percentage point, assuming the population growth remained as it was.

In order to have matched the performance of the U.S. participation rate for 1989 to 1997, Canada's labour force would have had to increase by almost 14 per cent, implying a similar growth in employment, assuming the previous relationship between the labour force and employment growth was maintained. While, faster population growth can be expected to give rise to faster economic growth and, therefore, higher employment and participation rates, the acceleration in the rate of new entrants to the labour market may have been more than the economy could immediately absorb, in an era of record downsizing in both the private and public sector.

Compositional Effects

At any point in time, the aggregate participation rate, which is a ratio of the labour force to the population of working age, is the current weighted average of the widely varying participation rates of the different age/sex groups. Each of these groups may be subject to different sociological and economic influences, which may change over time. For example, the decisions of college students to work may be influenced by the availability of grants, loans and subsidies to education. Many older people's decisions about permanent withdrawal from the labour market may be affected by the existence of public or private pension plans. The ages for peak participation in the labour force are 25 to 44 years (a rate of more than 80 per cent since the beginning of the 1980s). Rates for the 20-24 age group were fairly similar until 1989. Teenagers' rates are considerably lower than any of the groups aged 20-54. Rates drop dramatically after age 54 but particularly after 64, when they are less than 10 per cent.

Because there have been major swings in birth rates since the 1920s, the population shares of these various age groups have changed significantly since 1976. Such changes have the potential to affect the aggregate participation rate even if the specific age group participation rates were to remain unchanged. The major development has been the replacement of the aging baby boomers (those born from 1946 to 1965) by the baby bust generation over the past two decades. The first baby boomers passed age 44 in 1991 and were replaced in the 25-44 age group by the first of the baby bust generation (those born after 1965). But other cohorts are also having an impact. For example, people born in the low birth rate Depression years entered the 65 and over group in 1995. It is the combination of the shifts in movements of relatively small age groups that may have an effect on the aggregate participation rate but for simplicity we focus here on three broad groups.

The core group, which is aged 25 to 54, rose from about 50 per cent to 51 per cent of the work-

Chart 4 Participation rates and the effect of changes in the age composition of the Canadian population

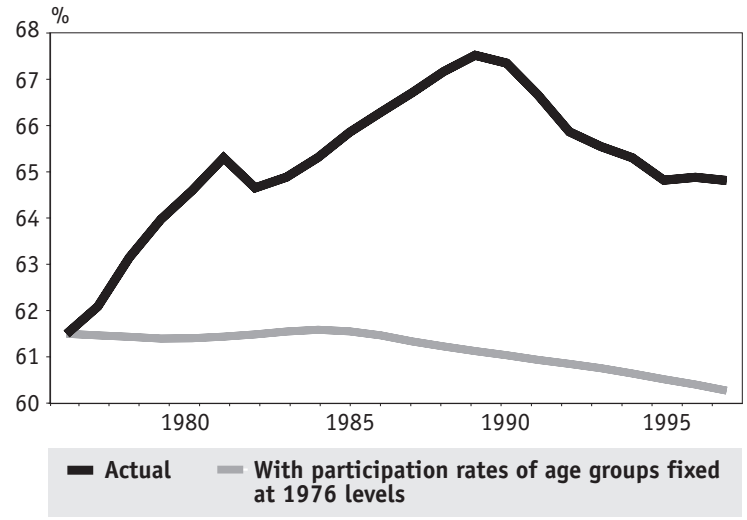
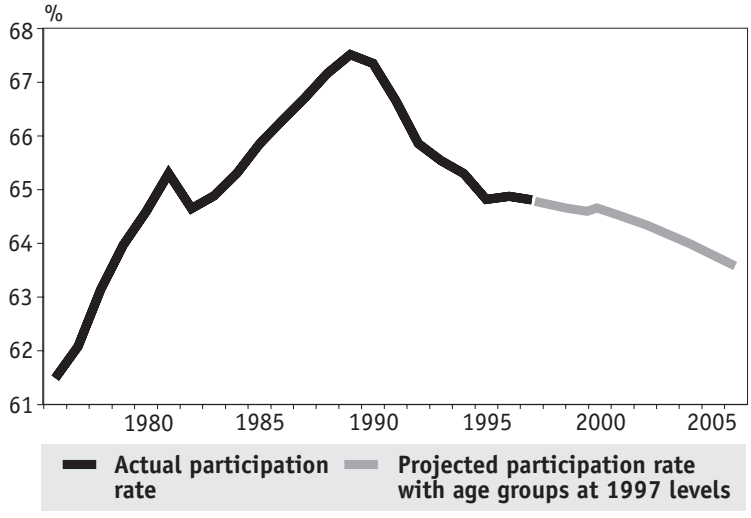


Chart 5 Projected Canadian participation rate



ing age population in the mid-1970s to about 58 per cent in 1996 in both Canada and the United States, with most of the growth having occurred in the 1980s.[5] Since the participation rate of this age group is higher than that of youth and of people aged 55 and over, it plays a major role in determining the level of the aggregate participation rate. However, the drop of about half a percentage point in its participation rate from 1989 to 1997 accounted for less than 10 per cent of the drop in the aggregate rate over that period.

In contrast, the youth share (ages 15-24 in Canada and 16-24 in the United States) fell dramatically in the 1980s as the baby boomers completed their passage through this age group. In Canada the share dropped from more than 26 per cent in the 1970s to 19 per cent by the end of the 1980s and to under 17 per cent by the mid-1990s. In spite of being only about a third of the size of the population aged 25-54 in 1989 and a decline of about 2.5 percentage points in its population weight in the 1990s, the drop in the youth participation rate in Canada after the 1990-91 recession accounted for almost 60 per cent of the fall in the aggregate participation rate from 1989 to 1997.[6]

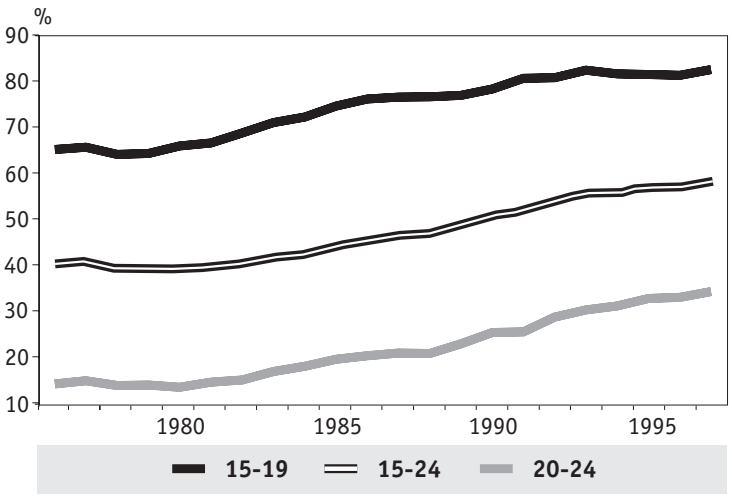
The participation rates for the 55 and over age group, are very low relative to younger age groups, particularly in the case of females. The rate of permanent departure from the labour force picks up after age 55 and accelerates rapidly after age 65. Currently in Canada the participation rates for men fall from 73 per cent in the 55 to 59 age group to only 16 per cent for ages 65 to 69. A similar pattern is observed for women, whose participation rates are considerably lower. The share in the population of working age of the 55 and over group has risen from 22 per cent in 1976 to about 25 per cent in the mid-1990s. Because of their longer life expectancy, the share of older women is significantly higher than that of older men.

An estimation of the compositional effects can be made by keeping the participation rates constant for a base year. Chart 4 illustrates the effect of weighting the 1976 participation rates of major age groups by each year's population shares. From 1976 to 1984, the effects of compositional changes in the labour force population on the aggregate participation rate were roughly neutral, but since then the effect has been increasingly negative. Compositional changes are estimated to have accounted for about one percentage point, or about one third, of the overall decline in the aggregate participation rate from 1989 to 1997.[7] Dugan and Robidoux (1999) make a similar estimate for the United States and find the effect of compositional changes was almost neutral from 1989 to 1996.[8] The move of the baby boomers into the 55-plus group in the next decade is projected to raise the share of this age group in the population of working age to almost 30 per cent by 2006 and its compositional effect on the aggregate participation rate will become much larger after 2000 (Chart 5).

Changes in the mix of students and non-students

The youth population comprises students and non-students with very different participation rates. Although many full-time students work or search for work during the school year, they are less likely than non-students to be participating in the labour force. Even at the peak of economic activity in the 1980s, the participation rate for students in Canada was only half that of non-students.[9] Thus, a rise in attendance rates will produce a lower overall youth participation rate, other things being equal.[10] In Canada the full-time school attendance rate rose to more than 58 per cent in 1997 from 50 per cent in 1989 (Chart 6), which, according to one estimate, accounted for about 50 per cent of the decline in the youth participation rate from 1989 to 1997.[11]

Chart 6 Full-time students as a proportion of population of same age in Canada



The rise from 1989 to 1997 in the full-time school attendance rate in Canada for teens was only about half the increase experienced by young adults. It therefore had a much smaller effect on the teens' than on the young adults' participation rate, accounting for only about 20 per cent of the decline in the participation rate of teens compared with 90 per cent of the decline in the rate of young adults (Jennings, 1998).

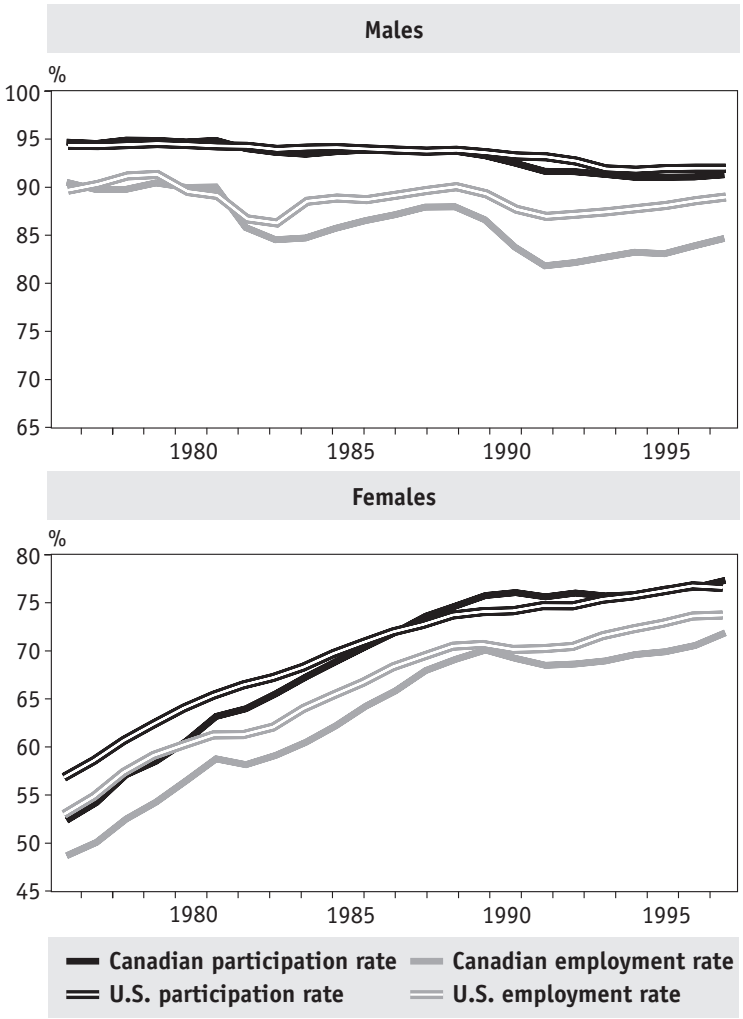
For both the 16-19 and the 20-24 age groups the rise in attendance rates was larger in Canada than in the United States in 1989-97 according to a measure that includes part-time students.[12] From being roughly equal in 1989, the teen rate rose seven percentage points for Canada compared with 4.9 percentage points for the United States. The attendance rate for those aged 20-24 was one percentage point higher in Canada than in the United States in 1989 and rose 10.9 percentage points compared with 7.2 percentage points in the United States. If most of the rise in the United States were structural, then using it as a benchmark, the extra growth in Canada may be interpreted as a cyclical response. These assumptions, however, imply that the rise in youth school attendance rates do not account for any of the difference between the falls in the participation rates of the two countries.

Faster growth in the attendance rates as the employment rate fell between 1989 and 1992 indicates that, particularly for teens, they do respond to cyclical developments. The incentive to stay in school is likely stronger when there are fewer low-skill job opportunities, and these opportunities tend to be sensitive to the business cycle. The 1990-91 recession had a disproportionate effect on teenagers encouraging many to stay in school. Data on school attendance in the United States are available from the late 1940s, whereas in Canada, they go back only to 1976. From an examination of the U.S. data cyclical effects appear to be small relative to longer-term trends.

The recent growth in U.S. male attendance rates was a continuation of an upward movement dating back to the beginning of the 1980s, after a fall related to the Vietnam War had petered out. By the mid-1990s, rates were in the region of the previous peaks and appear to be still holding. Female rates, on the other hand, have been rising very steadily in the United States for 50 years and have now virtually converged with their male counterparts. Strong gains were posted by all but 16- and 17 year olds. These developments suggest that the rise in the school attendance rate is largely structural. The Canadian experience has been similar to that of the United States since the early 1980s. Women's rates grew more strongly than men's. Teen rates have begun to flatten out in recent years but young adults' rates have continued to rise. It therefore seems reasonable to assume that some of the longer-term characteristics of the U.S. experience, especially for women, are present also in Canada and that a large share of the increase in the attendance rate in the 1990s was likely structural.

Further evidence of the structural nature of the increase in school attendance rates is the fact that

Chart 7 Participation and employment rates 25-54



they rose in the 1980s in both countries, even as employment rates increased, perhaps responding to factors such as the continuing shift in demand from low- to higher-skilled jobs.

The premium paid to workers with higher levels of education is one incentive to spend more years in school. Since, in Canada, there is little evidence these premiums have increased since the 1970s, they do not account for the rising trend in attendance rates (Bar-Or et. al., 1995, Beaudry and Green, 1997). The failure for these premiums to rise may be because the supply of educated youth has been growing faster than the demand for such workers. Nevertheless, the lower unemployment rate for those with higher levels of education[13] may be a sufficiently strong incentive for relatively more young people to choose to stay in school and thus improve their employment prospects.[14]

Interpreting the differences between Canadian and U.S. school attendance rate increases from 1989 to 1997 as the cyclical component of the Canadian increase implies that for teens the structural increase in the attendance rate accounted for about 1.75 percentage points, or 15 per cent, of the 12 percentage point fall in their participation rate. For young adults the structural component would account for 3.4 percentage points, or 60 per cent, of the drop of 5.7 percentage points in their participation rate. These two effects combined appear to account for about 0.4 percentage points of the decline in the aggregate participation rate.[15]

Possible Structural Influences on Participation Rates of Major Age/Gender Groups

The disaggregrated data for the three age groups considered here show that the similarity before 1990 between the aggregate Canadian and U.S. participation rate levels and trends extended to most sub-groups. Even beyond 1990 there were remarkable similarities in some groups though the aggregate rates were so different.

The core labour force: ages 25-54

For the core labour force group as a whole (aged 25-54), the steeply rising trend in the female participation rates in the 1970s and 1980s outweighed the declining trend in the rates for men. In the 1990s, however, the rate for women flattened out in Canada and slowed considerably in the United States, while the decline in the rate for men picked up (Chart 7). Because this group has a strong attachment to the labour force, its participation rate is relatively insensitive to changes in the business cycle.

Since the 1981-82 recession, Canadians have stayed in the labour force almost to the same degree that Americans have — both men and women — while employment rates have generally been much lower in Canada. This indicates that Canadian adults have a stronger attachment to the labour force. The similarity in participation rates in the 1990s is particularly remarkable, tak-

ing into account the more severe recession in Canada in 1990-91 and the subsequent weaker expansion. This stronger attachment may have been because of the higher probability that an unemployed worker in Canada will be receiving Unemployment Insurance (now called Employment Insurance). Apart from the incentive to remain active in the labour market in order to qualify for benefits, recipients of EI have to be searching for work and are, therefore, likely to report in the Labour Force Survey that they are seeking work when they are not employed.[16] Changes to EI since 1989 have helped to more than halve the probability that a non-working individual will receive benefits and to almost eliminate the difference between the two countries' probabilities. There may, however, be some inertia in the participation rate response to these changes in Canada but eventually the tighter eligibility rules, especially as they apply to seasonal workers, may bring the relationship between employment and participation rates in Canada closer to that of the United States. Another factor that tends to raise the participation rate in Canada relative to that of the United States is that, in Canada, just looking at job ads qualifies an individual for inclusion in the labour force. If the U.S. definition were used, the participation rate in Canada would be about 0.5 per cent lower.[17]

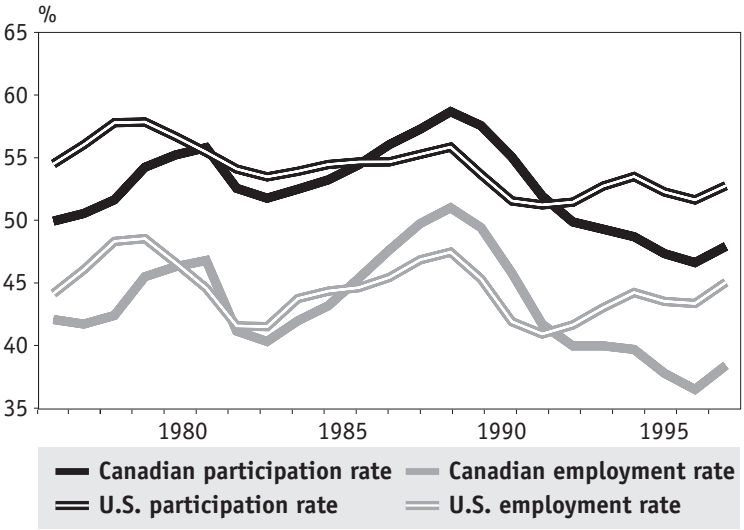
In the case of male participation rates, the continuation of the long-term downward trend after 1976 appears to be the result of a permanent negative reaction to recessions. Although not easily apparent from Chart 7, a closer examination of the data reveals that the shift to a lower level in the early 1980s was permanent in the United States, while there was a partial recovery in Canada. After 1989, the decline lasted until 1995 followed by a marginal increase in both countries. Although U.S. employment rates are now at about the same level as they were in 1984-87, the participation rate is two percentage points lower and 2.5 percentage points below its 1979 level, in spite of the sustained strong expansion. This inertia in the U.S. participation rate suggests structural factors at work, which may also be present in Canada.

Nevertheless, it is unclear why the male participation rate has been on a declining trend for so long in Canada and the United States as well as other industrial countries.[18] Accordingly, there is a great deal of uncertainty about the future direction and size of movement for this group.

One possible explanation for the downward trend in the male participation rate is rooted in the rising skill levels required for workers in many sectors. When men with limited skills are laid off from traditional, well-paid jobs in goods-producing industries, they may take a long time to adjust their wage rate expectations to the level their experience and skill level can command in an environment where technological change has made many skills obsolete. Many of these men, unable to find "suitable" jobs, drop out of the labour force. Those who can take advantage of early retirement options may opt for permanent withdrawal. Others may switch roles with spouses, frequently moving in and out of the labour force. In Canada, declines in the participation rate for workers with fewer than eight years of education have been greater than those for groups with higher levels of education. Although some of this difference can be attributed to the harsher impact of a weak economy on the least skilled, the U.S. experience suggests a longer-term effect may be operating. The rise since the early 1980s of school attendance rates of young men in both countries may eventually outweigh the negative effect of layoffs and early retirements and lead to a reversal of the long-term downward trend in the rate for adult men.

The rising trend in the participation rates of women in 1976-89, continued a trend that began in the early 1950s. Strong demand for occupations that women were able to fill interacted with various sociological and economic factors that were evident in both the United States and Canada, as well as many other industrial countries: changes in societal attitudes toward working women, particularly those with family responsibilities; the larger percentage of women with post-secondary education; and the more ambitious career aspirations of many women. As a result of these factors, each generation of women has spent more time in the labour force than the preceding one, pushing up the core participation rate. The marked slowdown in the rate of growth of the U.S. participation rate over the 1990s, in the face of continuing robust expansion, raises the question as to whether this ratcheting-up process is nearing a limit and that the flattening out of the Canadian female participation rate was partly the result of structural factors, which will restrain further growth in the future.[19]

Chart 8 Participation and employment rates, both sexes, in Canada and the United States



Note: Canadian data for 15-19 year olds; U.S. data for 16-19 year olds.

Further disaggregation of this group strengthens the case that, while this process is not yet over, additional ratcheting upward will be much smaller. In the United States, participation rates for women with children under 18 have been rising faster than those of other women, with the result there has been a considerable shrinking of the difference between the rates of these two groups.[20] The other source of growth in the rate for U.S. core-age women since the mid-1980s has been in the group aged 45-54 without children. The degree of convergence of the rates for these sub-groups, as well as the rates for men and women, has already been considerable. In addition, the proportion of the year that women have been spending in the workforce on average has now reached 11 months compared with 11.5 months for men.[21] These developments indicate there is less room for growth in the participation rate for women aged 25-54. Similar movements appear to have been taking place in Canada. In fact, the rate for women aged 25-44 is now higher in Canada than in the United States. However, the rate for the 45-54 age group in Canada, which rose significantly in the 1990s, is still below that for U.S. women of the same age and below that for Canadian women aged 25-44. There may, thus, be more room for the participation rate of Canadian women to rise than for women in the United States, despite the fact that the rates for Canadian and U.S. core-age women were virtually identical in 1997.

One explanation for the tendency for women's participation rates to increase while men's stagnate or decline may be that women are more flexible over the kind of jobs they will fill. For example, there is some evidence women's greater willingness to take low-paying jobs, for which they are overqualified, while they are juggling work and domestic duties.[22] The relatively greater rise in full-time school attendance rate for young women than for young men, may also be responsible for a stronger influence on the participation rate for women in the core group.

In Canada, changes to EI may eventually weaken labour force attachment with the result that a cyclical increase in the overall employment rate for those in the core group may not be accompanied by as much of a rise in the participation rate. By 2006 the participation rate of the core-age group appears to have room to move to about three percentage points above the 1996 level but only if male rates rise slightly (say by one percentage point). The U.S. Bureau of Labor Statistics assumes the male rate in the United States will decline over the next decade, and projects a 1.7 percentage point increase in the total core-age rate from 1996 to 2006 (Fullerton, 1997: Table 4).

Youth: Ages 24 and under

Participation rates are more cyclical for youths than for adults but, if a large part of the increase in school attendance rate is structural, the participation rates may not return to the peak level of the late 1980s any time soon. For the United States, that development would be a continuation of a pattern that was evident in the 1980s for teens and men aged 20-24.

Teens: 19 years and under

The labour market experiences of teens (15-19 in Canada, 16-19 in the United States) and young adults (20-24) are sufficiently different to warrant separate treatment here.[23]

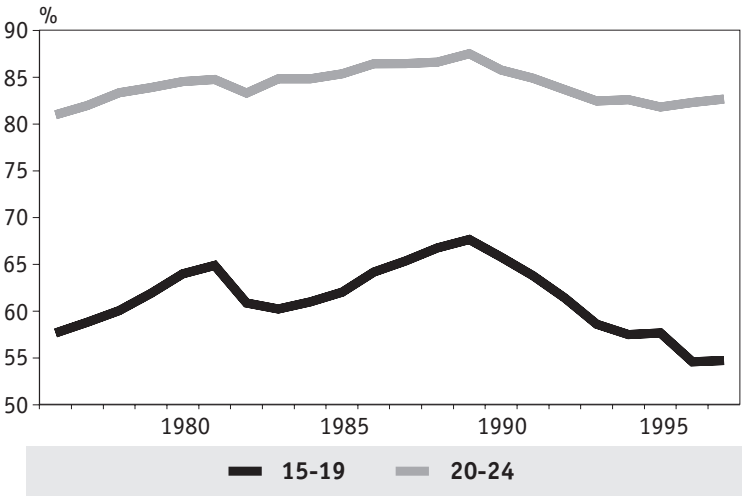
In both Canada and the United States, the attachment of teenagers to the labour force is relatively weak, driven largely by job opportunities. Their participation rates are, therefore, very cyclical, tracking their employment rate very closely for some time (Charts 8 and 9). This is not surprising since, during the school year, most teens are in school full-time and thus available for few hours of work each week.[25]

Although the participation rate for the teenaged group was lower in Canada than in the United States in the 1970s, it had caught up by the beginning of the 1980s and overtaken the U.S. rate by the end of the decade. The relatively stronger expansion in Canada was a significant factor in the latter occurrence. The drop in participation rates in the 1990-91 recession, though significant in both countries, was much more severe in Canada and, while the rates began to recover somewhat in the United States after 1992, they continued to fall in Canada. Nevertheless, the U.S. rates have not returned to their pre-recession levels, suggesting structural factors may be playing a role.

As the increase in full-time school attendance in Canada can account for only a small part of the decline in the participation rate, most of the decline stemmed from falling participation rates for students and non-students. The participation rate for teenage students in Canada fell about 12 percentage points between 1989 and 1997, reflecting a particularly difficult job market for these young people, one that was much more severe for both students and non-students than for older youths (Statistics Canada, 1997). The performance of teen participation rates in the summer months enforces this view (Chart 9). In addition to the weakness of the economy, Canadian students may also have been affected by the restructuring in sectors that traditionally provided the kind of part-time or summer jobs filled by teenagers, such as retail, which accounts for about 25 per cent of student employment.

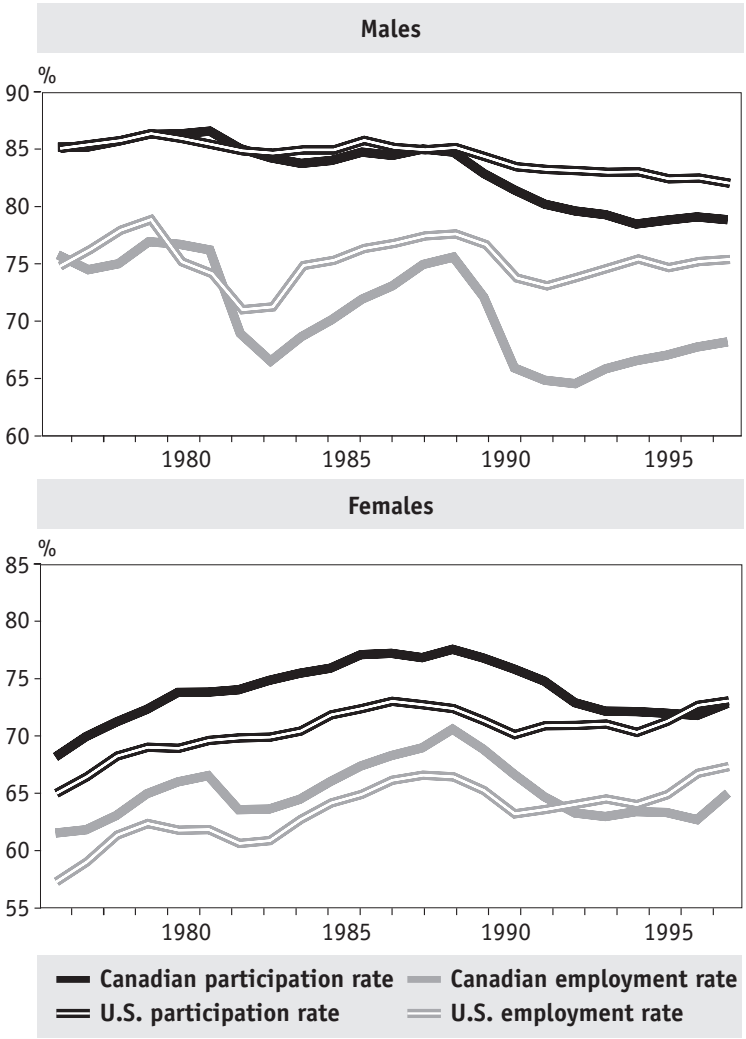
Canadian teenagers who are not in school have also had difficulty finding jobs in the 1990s.[25] Their participation rate fell by almost seven percentage points during the recession, and by 1997 it had recovered by only two percentage points. Apart from the cyclical effect, the shrinking percentage of jobs that now require more than a basic level of literacy may have negatively affected the search intensity of both United States and Canadian teens.[26] The increases in payroll taxes, including the extension of EI premiums to all hours worked, may also have discouraged job search among Canadian teens. The rise in the minimum wage in Canada relative to the average wage in the 1990s, in contrast to its decline from the mid-1970s until the mid-1980s, may have had a negative effect on the demand side of the labour market, which in turn dampened the supply side. The

Chart 9 Summer participation rates, Canada



Note: Data not seasonally adjusted.

Chart 10 Participation and employment rates, 20-24 age group



evidence on the impact of minimum wages is, however, mixed.[27]

As in the past, the business cycle and labour costs will heavily influence the demand side of the teen labour market. On the other hand, the structural changes that have taken place in some sectors in Canada, such as retail, and the increases in payroll taxes may permanently depress both the demand and supply in the teen labour market. While part of the rise in the school attendance rate was cyclical, the structural increase will still have a small permanent impact on the overall participation rate. A recapture of at least 75 per cent of the drop in the teen participation rate since 1989 should be possible as the economy moves to full capacity. The BLS, on the other hand, is projecting a decline of over 3 percentage points for the 16-19 age group by 2006 in the United States (Fullerton, 1997: Table 4).

Young adults: Ages 20 to 24

Although employment rates for young male and female adults in both countries are just as cyclical as those for teens, their participation rates have been considerably less cyclical, particularly before the 1990s (Chart 10). The looser relationship between employment and participation rates of young adults relative to teenagers is because of the much larger proportion of non-students in the young adult group. Non-students have a greater attachment to the labour force than do students.

The trends of participation rates for young adults have been broadly similar in the two countries since the mid-1970s. In the late 1980s, male participation rates weakened, while female rates were rising strongly. Male employment rates, on the other hand, were sufficiently weaker in Canada than in the United States after the early 1980s to raise questions about how long the Canadian participation rate could continue to track the U.S. rate. Female participation rates were significantly higher in Canada than in the United States until the 1990s, which was consistent with a higher employment rate.

The absolute decline in the male participation rate in Canada from 1989 to 1992 was much larger than in the United States, resulting in the first divergence in male rates in more than 10 years and a convergence in female rates. (As the U.S. female employment and participation rates have recovered since 1994, they have moved above the Canadian rates for the first time since the mid-1970s.) Since the rise in school attendance rates apparently accounted for much of the weakness in the U.S. participation rate and the decline in the Canadian rate, other structural factor may not have been important for this age group. In fact, an examination of the developments in the movements in the participation rates of students and non-students, suggests cyclical factors played the dominant role.

The job-seeking experience of Canadian students aged 20-24 was relatively good in the 1990s. Their employment rate remained close to its 1990 peak level, which may explain the small rise in their participation rate. Nevertheless, that rise in the student participation rate in the 1990s pales in comparison with what took place in the 1980s, when their participation rate rose along with their school attendance rate. The rise in the participation rate for students in the 1980s can be attributed to the upward trend of tuition fees and the downward trend in government support in the form of grants. The persistence of these trends in the 1990s should have spelled further increases in the participation rate for students. The flattening that occurred indicates a deterioration of job opportunities for older students in the 1990s compared with the 1980s, even though their job-search experience was more successful than that of teenagers and slightly better than that of the core labour force. The contrasting performance of the summer participation rate in the 1980s and 1990s for young adults is further evidence of that deterioration (Chart 9).

In contrast with the experience of Canadian students, the participation rate for young adults who are not in school fell in the 1990s. Most of this decline appears to be cyclical. The fact that part-time employment has become more common among these non-students suggests the decline was the result of a deterioration in labour market conditions for this group (Statistics Canada, 1997).[28] Although the participation rate has begun to recover recently, in 1997 it was still 1.6 percentage points below its 1989 peak.

The participation rates of the 20-24 age group followed employment rates more closely in the 1990-91 than in the 1980-81 recession, in both countries, particularly for women, Since about 1994, only the participation rate for U.S. men has been at odds with the employment rate performance. This development may be because of the higher percentage of students, with weaker at-

tachment to the labour force than non-students, in the population and, in Canada, the changes in EI eligibility may also be loosening the attachment of this age group to the labour force. The relationship between the Canadian participation and employment rates may, therefore, become even closer in the future.

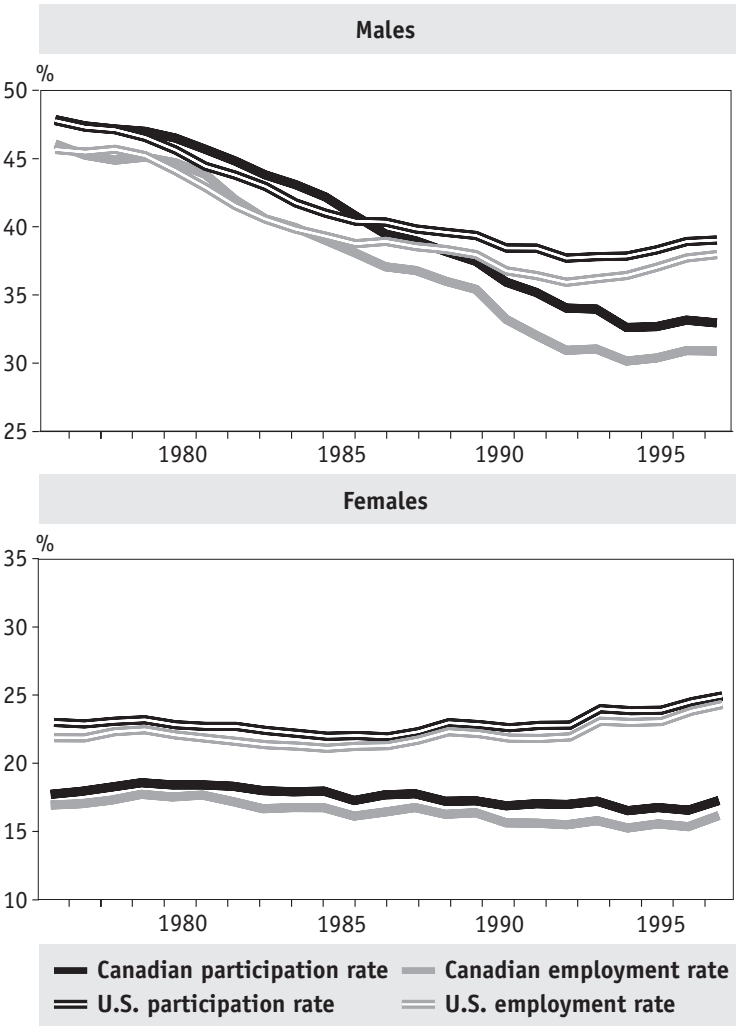
Primarily because of the higher school attendance rate in 1997 than in 1989, a large part of which appears to be permanent, an increase of no more than three to four percentage points from 1996 to 2006 appears likely. The maintenance of all the gains in the attendance rate would, by itself, preclude a return of the participation rate to the peak level reached in 1989. Although the participation rates for Canadian students and non-students can be expected to continue to make cyclical gains, the gap between the participation and the employment rates may shrink toward that of the United States, in response to changed EI rules. In contrast with this projection, the BLS is projecting a decline of 2.6 percentage points for this group by 2006 in the United States (Fullerton, 1997: Table 4).

Older workers: Ages 55 and over

The most striking characteristics of participation rates for workers aged 55 and over in both countries are the dramatic decline in the male rate from the mid-1970s to the mid-1990s and the close relationship between participation and employment rates, indicating a weak attachment to the labour force (Chart 11).[29] Both the employment and participation rates for men in the two countries ended their decline in the 1990s, and have even risen slightly in the United States. Participation rates for women, which are much lower in Canada than in the United States, exhibited a very weak downward trend until 1986. Since then, these rates have diverged even more as the U.S. rate ratcheted upward. The long-term nature of the downward trend in this older group's participation rates suggests structural factors have been more important than cyclical forces in their labour market decisions. It is even difficult to find a purely cyclical reason for the recent change in the trend in the male rates.

There is a great deal of variation in participation rate patterns among the various age groups that make up the aggregate 55 and over group. For example, the rate for youngest sub-group of women (aged 55-59) rose decisively in the 1980s.

Chart 11 Participation and employment rates, 55 and over



Since the same group has been exhibiting comparable behaviour in the United States, it appears the ratcheting-up phenomenon of women's participation rates may be affecting this age group and, may affect the 60-64 age group eventually.

In the United States, a new development appears to be taking place that may be a harbinger for Canada. The change in direction in the participation rate for U.S. men aged 55 and over was caused by an increase of more than two percentage points from 1986 to 1996 in the rate for the 65-75 age group.[30] Since the rise continued throughout the recession, when for most other U.S. male groups it declined, it appears to be structural. In Canada, the participation rate for males aged 65-69 stopped falling in the 1990s, suggesting it may follow the new trend for older American men.

To determine whether the change in the trend of the male participation rate is permanent or if the decline has merely been interrupted, it would be necessary to identify the dominating influences on the timing of permanent withdrawal from the work force. These factors would include the state of workers' health and sources of retirement income (from personal wealth, employer retirement plans and social security). The role of education in the retirement decision might be expected to be important, but at the present time, the evidence is inconclusive.

While the improvements in various measures of social security aimed at the elderly have no doubt enabled a growing proportion of older people to drop out of the labour force, the provision of public pensions does not always have that effect. People may "retire" but still opt to work, perhaps at reduced hours, if there is no earnings penalty. Unlike in the case of social security in the United States, there is no restriction or tax on work in order to receive the Canada or Quebec Pension Plans.[31] Changes in Canada, such as the introduction of cost-of- living indexation and an early retirement option, have made early retirement more attractive since the 1970s[32] but there is little evidence of any substantial effect on labour market decisions from early retirement options in public pension plans in Canada (Baker and Benjamin, 1997:16). It should be remembered that a large percentage of CPP/QPP beneficiaries do not qualify for the maximum pension ($744.79 a month for both CPP and QPP as of July 1, 1998) when they become eligible to claim benefits. Many people have not accumulated the maximum number of years and may, therefore, increase their average pension by working longer. Others may be able to replace years when earnings were low with years at, or close to, the maximum. While disincentives to remaining in the labour force are built into the CPP/QPP, they may affect only those whose incomes would be marginally higher than the penalty level. Higher-income individuals (who likely also have post-secondary education) may have greater motivation to remain in the work force because their opportunity cost of retiring is very large. One study of the relationship between social security and retirement in the United States found that the influence of social security provisions on retirement planning varied according to such factors as marital status and earnings. For example, there was a disincentive for workers with low earnings to continue work after age 61 but a large incentive for high-earnings workers to continue to work from 62 to 64 (Diamond and Gruber, 1997:24-25).

Rather than social security availability being a major incentive to withdraw from the labour force, especially before age 65, a combination of factors such as economic conditions, industrial restructuring and the availability of employer-provided pension plans, may be more influential. For example, for U.S. workers who were covered by both private-sector pension plans and social security, decisions to withdraw from the labour force were found to be influenced more by the employer pension plans (Wise, 1996:3). A Canadian survey of people not in the labour force provided evidence that older workers, who are subject to downsizing, may choose to leave the labour force rather than start a new career. The number of workers who made this decision because of layoffs, plant closures or voluntary early retirement options during the 1990-92 recession was about two thirds larger than the number that left for these reasons in 1987-89 (Siroonian, 1993 and Gower, 1997:11). This development suggests structural change may cause the cyclical effect to be greater than otherwise.

Evidence for the role of education in the retirement decision is both scant and mixed. An analysis of Canadian LFS data for 1991-95 found those with a postsecondary diploma or degree retired earlier than those with eight years of schooling or less (Gower, 1997). Evidence for the United States, however, suggests people with more schooling are more likely to continue working past age 55. In fact, in the United States the participation rate for those who have completed four years or more of college has begun to rise in recent years (Besl and Kale, 1996). It is possible the Canadian findings are a temporary phenomenon, reflecting the generous early retirement options that, in the 1990s, have been a feature of many restructuring efforts in sectors where employees' levels of education tend to be high, e.g. education and public administration. Later retirement among those with the least schooling may be because of inadequate pension entitlements or personal wealth. Many of these people would not even be eligible for the maximum CPP/QPP pension. Canada may, therefore, see a similar turnaround in the participation rate for higher edu-

cated people aged 55 and older as Besl and Kale predict for the United States.

Government policy and social and economic developments appear to be causing the change of direction in the participation rate of the 55-plus group in the United States and may have a similar impact in Canada in the future. These include less-generous retirement support by private and public sectors and a higher percentage of older women who need to be financially independent, after three decades of increased incidence of marriage breakdown (Besl and Kale, 1996). Other likely influences on the decision by Americans about when to leave the workforce mentioned by Besl and Kale are legislation eliminating mandatory retirement and outlawing age discrimination, fiscal constraints on the growth in Social Security benefits and the operation of medicare, which is projected to run out of funds before 2002, and regulations implemented over time to raise the normal retirement age for full Social Security benefits from 65 to 67. All these considerations lead Besl and Kale to expect higher labour force participation rates among older adults in the next century. Labour force projections that assume that participation rates for those aged 55 and older will remain at the current low levels may be overly pessimistic and may underestimate the size of the future labour force.

Finally, the rising trend in the ratio of the self-employed to total employment may have a significantly positive effect on the participation rate, since these people tend to retire later than salaried employees (Gower, 1997).[33] The acceleration in the growth of this ratio in the mid-1990s may, however, be temporary to the extent that self-employment was a second-best solution for some of those who took early retirement as part of the massive reduction in employment in the public sector.

A plausible outcome for the 55-plus age group in Canada would be a relatively strong increase — as much as four to five percentage points — between 1996 and 2006. This compares with the BLS projection for the United States of a rise of 6.5 percentage points for this age group over the same period (Fullerton, 1997).

Conclusion

This article has attempted to develop a synthesis of various pieces of information about past structural influences on the participation rates of Canada and the United States with a view to hypothesizing how much potential underlying strength there is over the next few years.

Compositional and structural factors appear to have played a significant role in the decline in the participation rate in Canada over the 1990s and in the different performance between the two countries. Rough estimates of the effect of the shifts in weights of demographic groups in the working age population and between students and non-students appear to account for one to 1.5 percentage points of the 2.69 percentage point decline from 1989 to 1997, or 37 per cent to 56 per cent. This is not a minor effect and strongly suggests it was unreasonable to expect the participation rate to have regained the peak level of 67.5 per cent during this time. Compositional effects also appear to account for about 30 per cent of the difference between in the change in the two countries' participation rates over the period.

In addition, structural factors such as the convergence of female participation rates to male rates and a continued trend in early retirements among 55 and over males have all helped to put downward pressure on the aggregate participation rates.

Over the next decade, Canada, as well as the United States and many other members of the Organization for Economic Co-operation & Development, will experience a rising population share of older people, who have on average the lowest participation rates of the major groups. This change in composition would result in a decline in the aggregate participation rate without offsetting increases in the participation rates of age- pecific groups (Chart 5). There is unlikely to be a much larger increase in the school attendance rate, as in the case of teens it appears to be approaching a saturation point. However, because a large proportion of the increase appears to have been structural, the impact will be permanent.

In the case of the largest group — core-age workers — the participation rate appears to have room to increase moderately. As workers enter the core-age group with higher levels of education than those leaving it, there may be a better match

Table 2 Participation rate projection

	1996	1998	Forecast 2006
Canada 15-19	47.3	48.1	57.0
U.S. 16-19	52.3	52.8	51.8
Canada 20-24	75.5	76.0	79.5
U.S. 20-24	76.8	77.4	74.3
Canada males 25-54	91.0	91.3	92.3
U.S. males 25-54.	91.8	91.8	90.8
Canada females 25-54	74.7	77.3	81.0
U.S. females 25-54	76.1	76.5	79.3
Canada males 55+	32.7	32.9	37.5
U.S. males 55+	38.3	39.05	43.8
Canada females 55+	16.8	17.3	21.1
U.S. females 55+	23.9	25.0	29.9
Aggregate			
Canada	64.9	65.1	66.6
U.S.	66.8	67.1	67.6

with the skill requirements of employers. This development may end the decline in the rates for men and may help to further narrow the gap between the rates for men and women, albeit at a slower pace than in the 1970s and 1980s. There is, however, a possibility that participation rates for women will rise to a higher level in Canada than in the United States. The participation rate for teens is likely to make some large gains in the face of continued economic expansion, but the small weight of this group will also keep the impact on the aggregate rate relatively small. In the case of young adults, the room for cyclical gains is quite large but, again, their weight in the population is relatively small. The participation rate for older workers could well increase further, although the greatest uncertainty surrounds this group's participation rates.

Structural and demographic factors will likely prevent the aggregate participation rate from returning to its 1989 peak before 2006, but the factors exerting upward pressure on the participation rate are likely to outweigh those that are pulling it down.

Another feature of the aggregate participation rate that appears likely to emerge is a greater propensity for the participation rate to react to a change in the employment rate, closer to the U.S. experience. This results partly from the rising weight in the population of groups whose participation rates tend to vary closely with the corresponding employment rate, e.g. students and those aged 55 and over. In addition, the decline in the proportion of the unemployed who qualify for EI may produce a reduction in the labour force attachment of some groups, such as seasonal workers, and an increased responsiveness to changes in the employment rate.

Taking into account all the developments and factors that seem to be influencing the outcome for each Canadian group examined, plausible projections have been made for eight age/sex groups. The rates are then weighted by their projected population shares to estimate what the aggregate Canadian participation rate might be in 2006. These projections are summarized in Table 2 with those made by the BLS in its most recent biennial employment outlook (Fullerton, 1997). These estimates suggest the aggregate participation rate could rise to more than 66.5 per cent by 2006, compared with 64.9 per cent in 1996. That would still be a percentage point below the U.S. projected rate although the projected rise for Canada between 1996 and 2006 is about double the U.S. rise. Considerable uncertainty, however, surrounds many of the assumptions underlying this projection.

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Notes

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1. The growth of population aged 15 and over, which is a function of birth and death rates and net immigration, interacts with changes in the participation rate to determine the growth of the labour force.

2. Dugan and Robidoux (1999) take a similar approach. In contrast with an earlier article (Ip, King and Verdries,1998), this article has an explicit Canada-U.S. comparison, puts more weight on compositional factors, and less on cyclical factors. The use of annual averages and data for all of 1998, produces somewhat different calculations and estimations.

3. Archambault and Grignon (1999) were unable to use educational cost variables because of data limitations.

4. Except where noted, sources of data are Statistics Canada and the U.S. Bureau of Labor Statistics.

5. Note that population shares are not perfectly comparable between Canada and the United States because of the inclusion of 15-year-olds in the Canadian figures. The United States population is defined to include people aged 16 years and older.

6. These calculations do not take into account the effect of the changes in age composition of the aggregate rate.

7. The calculation varies somewhat with the number of age/sex groups used. This estimation uses 12 groups and 1989 participation rates. Dugan and Robidoux (1999) used 16 groups for 1989 to 1996 to estimate a contribution of -0.75 or about 28 per cent of the total drop. Beaudry and Lemieux (1999) took account of the age composition effect but only for female participation rates on which they find only a small effect on "recent changes". In addition the estimation period does not include 1995 to 1997.

8. Their explanation is the earlier aging of the U.S. population.

9. In 1997 the participation rate for non-students was 78 per cent, while for students it was 35 per cent.

10. Although for the United States the measure is an enrolment rate, the term "attendance" is used throughout for simplicity.

11. Jennings (1998) attributes a further 38 per cent of the decline in the youth participation rate from 1989 to 1997 to the fall in full-time student participation rates and 11 per cent to the fall in non-student participation rates.

12. Teens 16-19 have been used for comparison purposes with the United States.

    Data for Canada are for attendance at school but for the United States the measure is enrolment in school. Thus, there could be a small upward bias in the U.S. measure relative to the Canadian rate.

    U.S. school enrolment statistics are based on replies to the Current Population Survey interviewer's inquiry whether the person was enrolled in regular school. Such schools include elementary and high schools, colleges, universities, and professional schools but exclude those that are not in the regular school system, such as trade schools, business colleges and schools for the mentally handicapped, which do not advance students to regular school degrees. Attendance may be on full- or part-time (U.S. Department of Commerce, 1995).

    For Canada, school attendance statistics are based on replies to the LFS interviewer's inquiry about whether the person was attending any educational establishment (primary, secondary, community college, junior college, CEGEP, university or others) either full- or part-time and taking credit courses toward a degree, diploma or certificate.

    We thank Deborah Sunter of Statistics Canada, Labour Force Survey Division for providing data for the 16-19 and 20-24 age groups for both countries for 1989 and 1997.

13. The unemployment rate in the U.S. for those with less than a high school diploma was 8.1 per cent in 1997 compared with 2 per cent for those with a college degree.

14. The OECD (1997) found that even though the supply of workers with low education levels generally fell between the mid-1980s and the mid-1990s, their labour-market situation worsened in most countries.

15. The indicators used for these estimates are not entirely consistent, relying on full- and part time attendance rates in the Canadian/U.S. differences and on Jennings estimates, which use full-time rates. Thus, they should be interpreted as simply an indication of the possible effect of the fall in attendance rates.

16. See Card and Riddell (1996) for a discussion of the role of EI and labour force attachment. The broader definition of job-seeking in Canada than in the United States also increases the probability that someone who is not working, will be included in the labour force.

17. This estimate uses information from Macredie (1996),

18. Fullerton (1997) notes, in passing, the paucity of research on the long-term decrease in participation rates of core-aged men.

19. Beaudry and Lemieux (1999) found the flattening of the female participation rate in the 1990s is primarily a structural phenomenon.

20. Hayghe (1997) notes that, in the United States, the participation rates for most groups of women in the 25-54 age group rose in the 1970s and 1980s, but that growth was greatest for mothers of children under age 18.

21. The average time per year spent in the labour force by women had been nine months in 1960. See Motley, 1996.

22. In a recent survey, Statistics Canada found women were more likely than men to feel overqualified for their jobs. In 1994, 24 per cent of women with a degree or college diploma were likely to have a clerical or service job compared with 8 per cent of men. "One possible explanation is that more women than men may accept jobs with lower-level requirements in order to balance family demands and earning an income." Kelly, Howatson-Leo and Clark (1997). Also, a much larger proportion of women than men work part-time.

23. Since 1976 the size of these two population groups has been roughly equal in Canada but, because the teen participation rate is much lower, their share of the labour force is less than 6 per cent compared with 10 per cent for the older group.

24. In Canada, 95 per cent of 15- to 16-year-olds are attending school, compared to 97 per cent in the United States; for 17- to 19-year-olds the figures are about 70 per cent in Canada and 71 per cent in the United States. Statistics Canada (1997) and Census Bureau (1995).

25. A Statistics Canada review of youths and the labour market notes the school to work transition has become more difficult for this group in the 1990s. The employment rate for non-student youths (15-24) has fallen from 73.2 per cent in 1992 to 69.2 per cent in 1996. Statistics Canada (1997)

26. An international literacy survey done in 1994, and in which Canada participated, found Canadians in the labour force who were at the lowest level of literacy had a significantly higher level of unemployment than those who were at the highest level of literacy. The differences were similar on three scales, prose, document and quantitative (Statistics Canada, HDRC and National Literacy Secretariat, 1996).

27. Archambault and Grignon (1999) found the minimum wage relative to the industrial wage had a significant negative impact on youth participation rates, particularly of students. Other studies in the U.S. in the 1990s have found a rise in the minimum wage appeared to increase employment. See Card, David and Alan B. Kreuger (1994).

28. In addition, the percentage of youth (15-24) who worked part-time because that was all they could find rose dramatically from 1990 to 1995 (Gordon Betcherman and Norm Leckie, 1997).

29. The fact that since 1976 people aged 65 and over have been ineligible to participate in the EI/UI program may be one reason why participation rates have such a close relationship with employment rates.

30. Fullerton (1997:29) observes the participation rate for this group had been trending down continuously since 1890.

31. In order to qualify for the QPP or CPP between the ages of 60 and 65, the applicant must have "substantially" stopped working, but there is no subsequent restriction on earnings or hours of work for pension recipients. There has been no restriction on applicants between 65 and 70 since 1975.

32. The phase-in period for the CPP/QPP ended in 1976. Indexation was introduced in Canada in the 1970s and the early retirement option (age 60-64) was introduced to the QPP in 1984 and to the CPP in 1987. In the United States, an early retirement option (ages 62-65) was introduced in 1956 for women and in 1961 for men.

33. The large proportion of self-employed in Japan helps to explain the high participation rate for older Japanese (Takashi Oshio and Naohiro Yashiro, 1997).

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Demographic Shifts and Labour Force Participation Rates in Canada

*Bob Dugan and Benoît Robidoux**

"Demographics explain about two-thirds of everything."
— David K. Foot, Boom, Bust & Echo, 1996

The labour force participation rate underwent an unprecedented fall during the last recession and the subsequent slow recovery, declining three percentage points from peak to trough. In all likelihood, this decline reflects a combination of cyclical and structural factors.

The extent to which this fall is structural has major policy implications. In the short term, it will have an impact on the estimated output gap and, hence, the appropriate conduct of monetary and fiscal policies. A lower structural participation rate will also mean the economy has less room to grow over the short to medium term before running against its sustainable, non-inflationary level of output, and the unemployment rate will fall more quickly in response to stronger employment growth.

Longer-term, a continued decline in the participation rate because of structural factors will exert downward pressures on potential output, the employment ratio and gross domestic product per capita. It is relatively well known that the ageing of the baby-boom generation over the next decades will tend to significantly depress source population growth and, hence, potential output growth, while increasing dependency ratios. At issue here is the strong possibility these downward pressures on growth will be compounded by a falling participation rate.

The key is to know how much of the downturn is purely cyclical and how much is structural. To highlight this issue, we use a simple, accounting framework that combines plausible trend participation rates for 16 demographic groups with source population data to estimate an aggregate structural participation rate for the Canadian economy. This not only enables us to assess the current structural participation rate, but also its prospects over the next four decades.

Our study updates the work of MacGregor and Mang (1996) and highlights the impact demographic shifts had on the aggregate participation rate in the 1990s and will continue to have in coming decades. In contrast to the conventional wisdom that the ageing of the population will start to dampen the aggregate participation rate only when baby-boomers start to retire in a few decades, our results show the ageing of the population has already started to exert downward pressures on the aggregate participation rate. This results from a trend toward increased life expectancy, which translates into a trend increase in the proportion of the working-aged population aged 65 and over. Although this trend was masked by the entry of baby boomers into the labour market in the 1970s and early 1980s, since the mid-1980s the underlying downward pressures associated with an older society have again dominated the overall participation trend. As a result, baby boomers' retirement will not start but rather intensify a downward trend in aggregate participation.

An Accounting Approach

MacGregor and Mang (1996) suggest a simple accounting framework to calculate the trend participation rate at the aggregate level. The approach is based on the idea that changes in the aggregate participation rate reflect changes in the participation rate of individual age-sex cohorts as well as changes in the importance of each of these cohorts in the source population. More formally, we have:

$$(1) \quad PR_t = \sum_{i=1}^{j} w_{i,t}\, PR_{i,t}$$

$$(2) \quad w_{i,t} = SP_{i,t} / SP_t$$

where PR_t is the aggregate participation rate in year t, PR_{it} is the participation rate of cohort i in year t, and w_{it} is the share of cohort i in total source population, SP_t, in year t. The trend aggregate participation rate (PRT_t) in year t is defined as:

$$(3) \quad PRT_t = \sum_{i=1}^{j} w_{i,t}\, PRT_{i,t}$$

where PRT_{it} is the trend participation rate of cohort i in year t.

This paper uses the framework described by (3) to estimate the aggregate trend participation rate since the mid-1970s, the starting period for the current Labour Force Survey, as well as to assess its prospects over the next four decades. Source population series are taken from actual population data and Statistics Canada's moderate growth projection (Scenario 2).[1] We identify 16 demographic groups ($i = 1, 2, \ldots 16$) in the analysis — 10-year gender-specific cohorts, except for youths and older people where five-year cohorts are used. It is important for these groups to use five-year cohorts because significant differences in their participation rates provide a richer estimate of the demographic effect.[2]

Trend participation rates for the 16 demographic groups correspond to plausible assumptions based on the results of econometric studies and a comparison with U.S. participation rates of similar demographic groups.[3] Only a few econometric studies have analysed the participation rate behaviour for detailed Canadian age-sex cohorts. Archambault and Grignon (1999) and Rose (1994) have analysed youth participation rates, Beaudry and Lemieux (1999) have examined female participation rates, while Fortin and Fortin (1997, 1999) have studied a broader range of demographic groups.[4] Moreover, the results of some of these studies are difficult to interpret because they use the employment-to-population ratio as a measure of business cycles, which should in principle capture not only cyclical effects but also structural changes.

As suggested by Rubin and Lester (1997), Ip et al. (1999) and Haritos (1998), the U.S. experience also provides useful information on benchmark trend participation rates for various demographic groups in Canada. In contrast to previous decades, business cycles in Canada and the United States have diverged in the 1990s. As a result, labour market indicators have also diverged; particularly the participation rate, which has risen to a record level in the United States while it has trended down in Canada. With the U.S. economy now at or above potential, U.S. participation rates are likely free of important cyclical factors, revealing underlying changes in structural participation rates of individual age-sex cohorts. This suggests the actual U.S. participation rates for detailed demographic groups can be used to gauge the structural participation rates for comparable demographic groups in Canada.

One advantage of the framework used here is its ability to capture the effects of continuing demographic changes on the aggregate participation rate. In our framework, structural changes in the aggregate participation rate reflect either changes in individual trend participation rates or a change in the composition of the source population for given individual participation rates — the demographic composition effect. It is convenient to define this effect with the following:

$$(4) \quad \overline{PR}_t = \sum_{i=1}^{j} w_{i,t}\, PR_{i,89}$$

which is the aggregate participation that would have been observed at time t if all individual participation rates would have remained at their 1989 levels. The annual average demographic composition effect between year t and $t+k$ is then simply defined as:

$$(5) \quad dce_{t,t+k} = (\overline{PR}_{t+k} - \overline{PR}_t)/k$$

A negative (positive) demographic composition effect indicates source population has moved, on average, from age cohorts with higher (lower) than average participation rates to age cohorts with lower (higher) than average participation rates over a given period. Obviously, a negative demographic composition effect would reduce the aggregate structural participation rate, while a positive demographic composition effect would increase it.

Table 1 Average annual demographic composition effect, Canada, 1921-2040
(Percentage points)

Period	Effect	Period	Effect	Period	Effect
1921-1930	-0.104	1960-1970	-0.105	2000-2010	-0.210
1930-1940	-0.122	1970-1980	-0.008	2010-2020	-0.335
1940-1950	-0.095	1980-1990*	-0.032	2020-2030	-0.229
1950-1960	-0.048	1990-2000	-0.119	2030-2040	-0.086

* Between 1980 and 1985 the average annual demographic effect was positive at 0.016 percentage point, while it was negative between 1985 and 1990 at –0.079 percentage point.

Table 2 Age composition of working-aged population, Canada, selected years 1921-2041

Year	Share of Population aged (per cent):						
	15-24	25-54	55-64	65-69	70+	Males 70+	Females 70+
1921	26.3	57.3	9.0	3.0	4.3	2.2	2.1
1931	27.5	55.0	9.3	3.3	4.9	2.4	2.4
1941	25.9	53.8	11.0	3.7	5.5	2.8	2.8
1951	22.0	55.8	11.0	4.4	6.7	3.3	3.4
1961	21.7	56.0	10.7	4.0	7.5	3.6	3.9
1971	26.4	50.9	11.3	4.0	7.3	3.2	4.2
1981	25.2	51.2	11.3	4.4	7.9	3.2	4.7
1991	18.1	56.6	10.9	4.9	9.5	3.8	5.7
2001	16.5	56.4	11.5	4.5	11.2	4.5	6.7
2011	15.7	52.3	15.1	5.3	11.7	4.8	6.9
2021	14.0	48.0	16.7	6.8	14.5	6.2	8.3
2031	13.5	46.3	14.4	7.4	18.4	7.9	10.5
2041	13.4	45.4	14.4	6.5	20.3	8.6	11.7

What We Know More About: The Demographic Composition Effect

Before moving to look at participation rates for individual age-sex cohorts, we first want to highlight continuing demographic changes in the Canadian economy and their impact on the aggregate participation rate (Table 1). The demographic composition effect has displayed two distinct phases since the early 1970s.[5] In 1970-85, the effect of the demographic evolution on the participation rate has been roughly neutral on average. However, since the mid-1980s it has had a negative impact, removing about 1.25 percentage points from the participation rate. From the aggregate participation rate's peak level in 1989, the demographic composition effect has already removed almost one percentage point from it by 1997. Moreover, it will continue to be negative for many decades, removing an additional 8.5 percentage points from the structural participation rate by 2030. In the next four decades or so, the annual demographic effect will intensify to peak at about -0.35 of a percentage point a year in 2015, compared with -0.14 of a percentage point in 1997, before falling gradually to about -0.04 of a percentage point a year in 2040.

A detailed decomposition of the demographic composition effect for 1989-96 will be found in Table A1. It shows that the lower contribution to the aggregate participation rate from younger cohorts has been only partially offset by higher contributions from older cohorts. Most important, the share in source population of people aged 70 and over increased by 1.4 percentage points but had a negligible effect on the aggregate participation rate given their low participation rates.

The negative demographic composition effect is not a new phenomenon. Indeed, Table 1 shows that 1970-85 is the anomaly. Aside from this period, the demographic composition effect has exerted downward pressure on the aggregate participation rate since the 1920s. This downward trend in the demographic composition effect reflects continuous increases in the share of older people in the source population, particularly women aged 70 and over, which, in turn, mirror the increase in life expectancy experienced since the 1920s (Table 2). The pause observed in the 1970s and early 1980s reflects the temporary offsetting effect of baby boomers who were entering into the workforce (see Chart A17).

What We Know Less About: The Structural Levels of Individual Participation Rates

To complete our analysis, the trend or structural participation rates for the 16 demographic groups are specified. Actual participation rates of the 16 age-sex groups in Canada and the United States in 1976-97 are plotted (Charts A1-A16).

The first observation that can be made from these charts is that youth participation rates appear to be sensitive to aggregate cyclical downturns, while adult participation rates appear to be mainly driven by structural factors. However, the participation rate of adult males aged 25-34 is one notable exception. This group seems to be more sensitive to business cycles than other adult cohorts, particularly in the 1990s. Most empirical analysis has confirmed that participation rates for youths are sensitive to business cycles or employment opportunities, but have had trouble identifying a robust cyclical effect for adult cohorts.[6] The exception is Fortin and Fortin (1997) who have concluded that, with the exception of prime-aged males, adult participation rates are as much or even more sensitive to business cycles than youth participation rates.

This last conclusion is difficult to reconcile with the graphical evidence. The source of the opposing results seems to be the variable they used to capture business cycles or job opportunities in these empirical studies: the ratio of employment to source population. The employment-to-population ratio is not a measure of the imbalances between the demand and the supply of labour but the endogenous result of the interaction between them. To capture the business cycle, a measure of the level of the employment consistent with the underlying potential supply of labour in the economy — "the natural rate of employment" — is needed.

This measurement of business cycles or job opportunities is particularly troublesome when applied to a specific demographic group in which

the participation rate of that group is regressed, *inter alia*, on its *own* employment-to-population ratio, as in Fortin and Fortin's 1997 work. Clearly, the two variables will be strongly correlated since they are linked by the following identity: $E/SP = (1-UR)(L/SP)$ where E is employment, SP is source population, UR is the unemployment rate, and L is labour force. This does not mean the participation rate of that demographic group is sensitive to business cycles or job opportunities. Indeed, it is easy to imagine an example in which employment-to-population ratio and participation rates are strongly correlated because they both trend up or down, driven only by structural factors. In that context, the approach used by Fortin and Fortin will wrongly suggest that the participation of that cohort is very sensitive to job opportunities or to the business cycle. As a result, their study is uninformative of the decomposition between cyclical and structural forces behind changes in participation rates and is thus not used in this study to benchmark trend participation rates.

In a more recent study, Fortin and Fortin (1999) acknowledge the endogeneity of the employment-to-population ratio to the participation decision. As an alternative measure of job opportunity they use the ratio of the help-wanted index to the working-age population. Their new results support the graphical evidence that youth participation rates are sensitive to aggregate cyclical downturns, while adult participation rates are mainly determined by structural factors.

Youth Participation Rate

The decline in the youth participation rate in the 1990s has been particularly severe. Since 1989, it has fallen by almost eight percentage points, compared with a 1.4-percentage-point decline for adults over the same period. As noted above, this is partly because youths tend to be more sensitive than adults to business cycles in their decision to participate in the labour force. In the 1990s the decline has been shared by students and non-students, but has been more pronounced for youths aged 15-19, who are more sensitive to cyclical economic downturns.

Recent econometric analyses suggest about half this decline in youth participation reflects cyclical factors that will be reversed as job prospects improve, while the balance is likely to be structural (Rose, 1994).[7] One key factor that has reduced youth participation in the 1990s is the increase in school enrolment.[8] The proportion of those aged 15-24 attending full-time school has increased by more than 10 percentage points since 1989, reaching 58.2 per cent in 1997. Youths attending school participate less in the labour market than those not in school. Therefore, an increase in school enrolment rates reduces the overall youth participation rate. Moreover, the results of Archambault and Grignon (1999) suggest most of the increase in school enrolment observed in the 1990s is structural, rather than a temporary response to weak labour market conditions. Their results show also that a less generous Unemployment Insurance system and higher relative minimum wages have reduced structural participation rates of both students and non-students.[9] Therefore, in line with recent empirical evidence, the current analysis assumes half the decline in youth participation rates reflects cyclical factors, while the other half reflects structural factors.

Prime-aged Adults

The participation rate of prime-aged men (those aged 25-54) has declined in the 1990s, continuing the downward trend observed in the 1980s. The drop was more pronounced than in the United States for men aged 25 -34, but similar to that in the United States for those aged 35-54. This suggests most of the fall in the participation rate of prime-aged men was structural, although some cyclical effects should have played a role for those aged 25-34.

Looking ahead, there is a great deal of uncertainty surrounding the evolution of the participation rate of these cohorts, since it is unclear if the downward trend is completed. The current analysis assumes the trend participation rate for those aged 35-54 is near the actual participation rate level and will remain there until the end of the projection period. In contrast, the trend participation rate for males aged 25-34 is about one percentage point higher than the actual rate, but lower than the U.S. rate for the same age group.

The participation rate of prime-aged women (25-54) stopped rising at the end of the 1980s and the outlook for their participation is uncertain. On the one hand, their participation has shown little, if any, sensitivity to the business cycle. On the other, participation rates for prime-aged women in the United States have recently started to rise again. However, this is in the context of a tight la-

bour market, rising real wages, a reduction in welfare generosity, and from lower participation rates than in Canada for women aged 25-44. Our working assumptions for prime-aged women is for a gradual increase of trend participation rates to 80 per cent over the projection period.[10] Compared with actual participation levels, this represents a modest increase for women aged 25-45 but a significant increase for those aged 45-54 (7.6 percentage points). The latter would represent a "cohort effect" as younger generations of women with demonstrated strong attachment to the labour market replace older generations who never had such a strong attachment.

Older People

As for prime-aged adults, the recent evolution of participation rates for older people (55 and over) are different for men and women. The participation rate of older men has declined in the 1990s, continuing the downward trend observed in the two previous decades. The fall in participation rates of older males is, indeed, part of a long-standing trend that began in the 1950s. In contrast, in the past two decades, participation rates of older women have increased for those aged 55-64, while they have declined slightly for those aged 65 and over.

The introduction of public pension plans in the mid-1960s and the increased share of the population covered by private pension plans have without a doubt played a key role in reducing the labour market participation of older men. The increased presence of pension plans may also have played some role in keeping the participation rates of women over age 65 from rising despite the long-standing increase in the participation of women aged 25-65. Moreover, as shown by Italiano (1996), defined-benefit private and public pension plans are structured to make early retirement attractive by providing some net wealth gains for those who retire before age 65. In all likelihood, this trend toward early retirement has been compounded in the 1990s by more early retirement packages, especially in the public sector, and difficult economic conditions.

There is also a considerable difference between Canadian and U.S. participation rates for older people. The rates for older cohorts, both males and females, are much higher in the United States than in Canada. The difference is particularly striking for men and women aged 65-69 and for women aged 55-64 where the difference peaks at 13 percentage points. One notable exception is the participation rate for men aged 55-64 that has only recently started to fall below that of their U.S. counterparts. Between the mid-1970s and the end of the 1980s, Canadian rates were above U.S. rates.

Table 3 Years of school completed, 1996, Canada and the United States
(Per cent)

	Elementary	High school education	Some post-secondary	University degree
Prime-aged 25-54 cohort				
Canada	6.0	35.7	39.8	18.5
U.S.	4.6	41.2	27.5	26.8
Older 55+ cohort				
Canada	32.0	36.5	23.1	8.5
U.S.	15.8	49.4	18.3	16.5

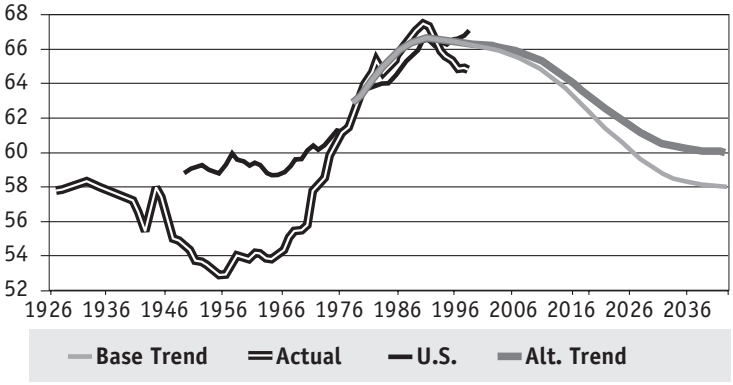
Table 4 Participation rate of Canadians aged 55 and over by education level, 1997
(Per cent)

Elementary	High school education	Some post-secondary	University degree	Average
13.0	23.4	31.8	44.2	24.2

The higher participation of older people in the United States seems to be explained by differences in the social safety net and educational attainment. First, as noted by Haritos (1998), it may be traceable to the less pervasive social safety net in the United States. For example, the lack of universal heath care coverage in the United States and its high cost may force older people to work longer.[11] While Americans are eligible for Medicare at age 65, it is less comprehensive than Canadian medical insurance, covering less than 50 per cent of medical expenditures. Gruber and Madiran (1995) concluded that introducing universal health-insurance coverage in the United States could lead to a large increase in the early retirement rate.

Second, older Canadians tend to be less educated than their U.S. counterparts. A higher pro-

Chart 1 Aggregate participation rates



portion of Americans aged 55 and over have completed university or have high school education, whereas in Canada there is a higher proportion of people with an elementary or incomplete post-secondary education (Table 3). Since participation rates are positively related to education (Table 4), the fact older people are less educated in Canada than in the United States may account for some of the participation gap between the two countries.

To assess the impact of education on the participation rate differential between older Canadians and Americans, we have calculated a participation rate series combining the educational attainment distribution of older Americans and the education-specific participation rates of Canadians aged 55 and over. The resulting series is plotted with actual participation rates of older Canadians and Americans in Chart A18. Although the education-adjusted Canadian participation rate still lies below the U.S. participation rate in recent years, it is equal or above the U.S. rate for 1976-87, suggesting educational attainment is an important source of the difference.

One would expect a narrowing of the participation rate gap between older Canadians and Americans as younger and more educated Canadians age. As shown in Table 3, prime-aged Canadians are almost as educated as their U.S. counterparts. The proportion of those aged 25-54 with only elementary education is similar in both countries, while a lower proportion with a university degree in Canada than in the United States is partly offset by a higher proportion of Canadians with some post-secondary education. In the longer term, education prospects may even be better. The proportion of young Canadians attending school has increased from 45.4 per cent in 1984 to 60 per cent in 1996, while in the United States the enrolment rate increased from 43.1 per cent to 53.6 per cent.[12] Moreover, the fact younger generations are more educated than previous generations suggests the narrowing of the older cohort's participation gap between Canadians and Americans may be accompanied by an increase in participation rates of older people in both countries.

The fact Canada is gradually becoming a more educated society suggests very long-term prospects for participation rates of older cohorts are brighter than one would conclude by looking only at recent trends. However, we are reluctant to apply this "optimism" to our participation rate projection for many reasons. First, although the higher educational attainment of Canadians aged 25-54 may affect positively the participation of older cohorts in coming decades, higher school enrolment rates among youths will not affect the participation rates of the cohort aged 55 and over for three to four decades. Second, the trend toward higher educational attainment has been going on for some time in Canada. The level of educational attainment of older Canadians, and indeed for all Canadians, has been increasing for several decades, while their participation rates have been trending down. As noted above, other factors have played an important role in that decline — private and public pensions, social safety net, and higher net wealth — and it is not clear the effects of these factors have come to an end.

This is why we have not assumed any major increases in the trend participation rates of older people over the projection period in the baseline projection. A noticeable exception is the participation rate of women aged 55-64, which is assumed to continue its upward trend as younger women with higher lifetime participation rates enter that cohort. The trend participation rates of other older cohorts are assumed to remain roughly at their actual levels. To assess the impact of this hypothesis on our results, an alternative scenario, in which the participation rates of older Canadians — apart from women aged 55-64 — increase gradually to close all their actual gaps with comparable U.S. rates by 2040 is also provided (see Charts A11 to A16 for the profile of these alternative participation rates for older cohorts).

Aggregate Trend Participation Rate

The total-economy trend participation rate calculated from the individual participation rates and source population data is plotted in Chart 1. In 1997, the estimated series suggests a trend participation rate of 66.2 per cent, 1.4 percentage points higher than the observed participation rate of 64.8 per cent.[13] This suggests that about half the decline in the aggregate participation rate since the last recession is structural while the other half is cyclical. Our current estimate of the structural level of the participation rate is higher than the estimate of MacGregor and Mang (1996) and Fortin and Fortin (1999), similar to the estimate suggested by the aggregate equation of Fortin and Fortin (1997), and lower than that of Rubin and Lester (1997).[14]

More important, looking ahead, the trend participation rate will continue to fall gradually as a result of downward pressures from demographic changes. By 2015, it is estimated it will be at about 63 per cent, down more than three percentage points from the current trend level, and a rate similar to that observed in the late 1970s. The participation rate stabilizes only by the late 2030s at about 58 per cent, down more than eight percentage points from the current trend level, and a rate similar to that experienced in the early 1970s but also in the 1920s and 1930s.

An alternative scenario, in which the participation rates of older Canadians — apart from women aged 55-64 — increase gradually to close all their actual gaps with comparable U.S. rates by 2040 is also presented in Chart 1. Assuming older Canadians will increase their participation in the labour market in the coming decades reduces somewhat the extent of the fall in the aggregate participation rate but does not change the overall conclusion of the analysis. By 2040, the participation rate in the alternative scenario is 60 per cent, compared with 58 per cent in the base case scenario.

U.S. Experience

In contrast to the Canadian economy, the United States experienced a slight increase in its aggregate participation rate in the 1990s, from 66.5 per cent in 1990 to 67.1 per cent in 1997. This suggests that, in contrast to Canada, the United States has not experienced any decline in its trend participation rate. Applying the same methodology used for Canadian data to that of the United States suggests the divergence in the two countries' structural participation rates reflects, in large part, divergence in their recent demographic evolutions.

Table 5 Average annual demographic composition effect, Canada and the United States, 1950-2010
(Percentage points)[1]

Period	Canada	United States
1950-1960	-0.048	-0.204
1960-1970	-0.105	-0.135
1970-1980	-0.008	-0.001
1980-1990	-0.032	0.073
1990-2000	-0.119	-0.022
1990-1997	-0.116	-0.010
1997-2000	-0.127	-0.048
2000-2010	-0.210	-0.151

1 The demographic composition effect for the United States was calculated by holding the participation rates for the 14 individual age-sex groups constant at their 1989 values, and aggregating them using civilian population weights. For each cohort, the civilian population was obtained as the ratio of the labour force to the participation rate. Because of data availability, the two older cohorts—65 to 69 and 70 and over—were combined together, reducing the number of cohorts to 14.

A comparison of the demographic composition effect in Canada and the United States between 1960 and 2010 is presented in Table 5. In Canada, the demographic composition effect tended to subtract from the aggregate participation rate since the 1950s and will continue to do so in coming years. However, the magnitude of the demographic composition effect differs in the two countries, depending on the period considered. In the 1950s and 1960s changes in the age composition of the population were exerting more downward pressures on the aggregate participation rate in the United States than in Canada. However, since the 1970s, demographics have exerted more drag on the participation rate in Canada than in the United States. Indeed, in the 1980s, changes in the age composition of the population added 0.7 percentage points to the U.S. rate, while they removed 0.3 percentage points from the Canadian equivalent.

In the 1990s, the demographic composition effect continued to show up more strongly in Canada than the United States, removing almost one percentage point from the Canadian participation rate between 1990 and 1997, compared with less than 0.1 of a percentage point from the United States. As in Canada, the composition of the U.S. source population shifted from those aged under 34 to those aged 35 and over during the 1990s. However, in contrast to Canada, this change in age-sex composition of the source population exerted almost no downward pressures on the aggregate participation rate. This is because Canada experienced a much larger increase in the proportion of the source population aged 65 and over than the United States in the 1990s. The proportion of the source population in this age group increased by 1.3 percentage points in Canada in 1989-96, but only by 0.2 of a percentage point in the United States (Table A2).

The divergence in the timing of the demographic composition effect between the United States and Canada reflects the fact the United States became an older society faster than Canada. In 1950-70 in the United States, the proportion of the population aged 65 and over increased from 10.8 per cent to 13.9 per cent, while Canada saw an increase from 10.9 per cent to 11.4 per cent. In the 1970s the share of older people in the population began to increase more rapidly in Canada, allowing an almost complete catch-up to the U.S. level by the end of the 1990s. In 1970-97, the proportion of the population aged 65 and over rose from 11.4 per cent to 15.3 per cent in Canada, while it increased only from 13.9 per cent to 15.8 per cent in the United States.

The United States became an older society faster in part because the Canadian baby boom started later, lasted longer and was more intense than the U.S. baby boom (Foot, 1996). Immigration policy has also played a role in skewing the age pyramid in favour of youth in Canada, relative to the United States. In Canada, a point system is used to evaluate the applications of immigrants. This is designed to favour the applications of highly skilled and highly educated immigrants, but it also places a premium on youth (points are deducted for applicants over age 35). In contrast, in the United States, family reunification is the main objective of immigration policy. Immigration of immediate family members, such as parents, is not subject to any numerical restrictions. Immigrants entering the country under this provision account for a significant share of total immigration in the United States and the average age of immigrants is higher than in Canada (Borjas, 1993).

Looking ahead, the demographic composition effect will also intensify in the United States but will remain less of a drag on the aggregate participation rate than in Canada. This reflects the fact Canada is expected to become an older society than the United States, with its share of those aged 65 and over increasing to 16.7 per cent by 2010, compared with 16.1 per cent in the United States

Conclusion

Clearly, the respective roles of cyclical and structural factors underlying the evolution of participation rates is the subject of considerable uncertainty, but we hope we have highlighted the issue by using a simple population accounting framework. We have focused on demographic changes that are the most certain component of any participation rate projection. In that respect, the conventional wisdom is that the ageing of the population will start to dampen the aggregate participation rate only around 2010 when the leading edge of the baby boom generation will start to retire. In contrast, our results indicate the retirement of baby boomers will not start but rather intensify a downward trend in aggregate participation related to longer life expectancy.

As a result, our calculations suggest the structural participation rate has been trending down since 1989 and will continue to do so in coming decades. Although our estimated rate depends on the assumptions underlying individual trend participation rates and the population projection, the overall downward profile obtained in this paper is robust with respect to any set of plausible assumptions.

The fact Canadians are less likely to participate in the labour market with the passage of time has direct implications for the design of current and future policies. This is because most feasible policies, such as those related to education, social programs and pension systems, will affect labour force participation only with long lags. Considering pension systems for example, it is probably not just a question of reducing economic incentives to early retirement but also moving toward a more flexible labour market in which gradual retirement is possible rather than "forcing" workers

into the choice of working full time or not working at all. Additional economic research should be devoted to understanding the determinants of labour market participation of various demographic groups and particularly older people aged 55 and over, who will account for 40 per cent of the population in 30 years.

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Notes

* The views expressed within this paper are those of the authors and should not be attributed to the Department of Finance.

1. The medium growth population projection, which covers 1993-2041, encompasses the following assumptions. First, the fertility rate remains constant at 1.7 children per woman over the entire forecast horizon. Second, life expectancy at birth increases from 74.6 years and 80.9 years in 1991 to 78.5 years and 84 years in 2016 for males and females, respectively. After 2016, life expectancy is assumed to remain constant at their 2016 levels. Third, the annual number of immigrants remains constant at its 1993 level of 250,000 over the entire projection period.

2. The results obtained by Fortin and Fortin (1999), which decompose the the source population in only six cohorts, show the estimated demographic effect associated to changes in the composition of the source population is very sensitive to the aggregation level used in the analysis.

3. Econometric studies and U.S. data are only used to benchmark individual trend participation rates after 1990. Between 1976 and 1989, the trend participation rates are obtained from an HP filter.

4. In these studies, the participation rate is regressed on both structural and cyclical variables. The estimated relationship is then used to purge cyclical effects from the actual participation rate and obtain an estimation of the structural or trend participation rate. One notable exception is Beaudry and Lemieux (1999) which perform a cohort analysis.

5. In calculating the demographic composition effect for 1921-2040 different population weights were used in different sub-periods because of data availability. First, for 1921-75, population data from CANSIM were used. Second, for 1976-97 labour force source population data from the Labour Force Survey were used. Because population data were used to calculate the composition effect before 1976, the series calculated between 1921 and 1975 was scaled by the ratio of the demographic composition effect calculated with population weights to the one calculated with source population weights in 1976. Finally, for the projection, source population for each age-sex cohort was estimated by scaling each cohort's population projected by Statistics Canada by its source population-to-population ratio in 1997.

6. As noted in the previous section, this issue has been analysed in only a few studies, however.

7. The empirical results obtained by Fortin and Fortin (1999) suggest structural factors played a somewhat larger role.

8. See Jennings (1997) for a descriptive analysis of this issue.

9. The expected impact of higher relative minimum wages on youth participation rates is uncertain since it affects both the supply and demand of young workers.

10. This assumption is consistent with the results presented in Beaudry and Lemieux (1999).

11. The same argument may apply to higher private education costs in the United States than in Canada.

12. For Canada the school enrolment rate is for those aged 15-24 and includes those attending school full-time as well as part-time. For United States the school enrolment rate is for those aged 16-24.

13. In line with our estimated trend participation rate, solid employment performance since mid-1998 has triggered an increase in the actual participation rate, which has reached 66.0 per cent in April 1999.

14. Rubin and Lester (1997) obtain this result by assuming that the "structural" employment-to-population ratio has not changed since 1989. It is interesting to note that this implies a natural rate of unemployment of about 5.5 per cent.

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Appendix

Chart A1 Participation Rate, Males 15 to 19

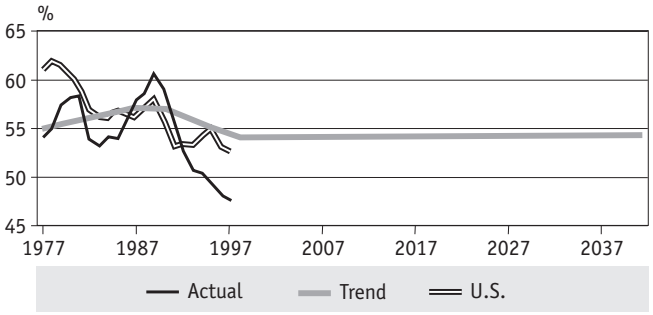


Chart A2 Participation Rate, Females 15 to 19

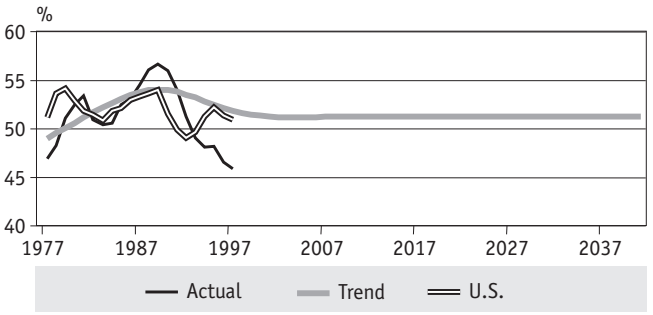


Chart A3 Participation Rate, Males 20 to 24

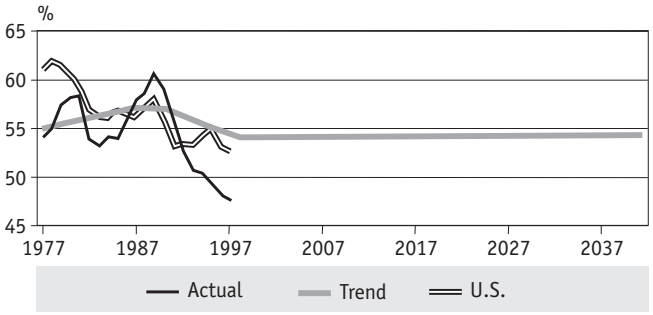


Chart A4 Participation Rate, Females 20 to 24

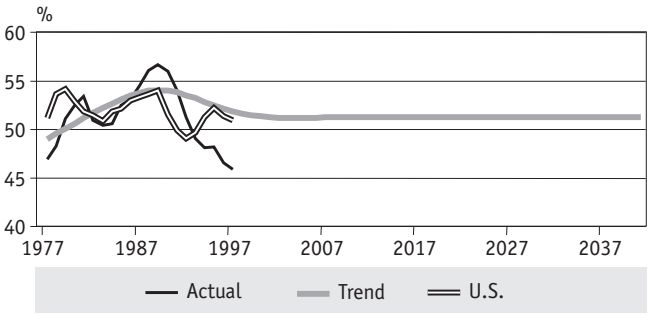


Chart A5 Participation Rate, Males 25 to 34

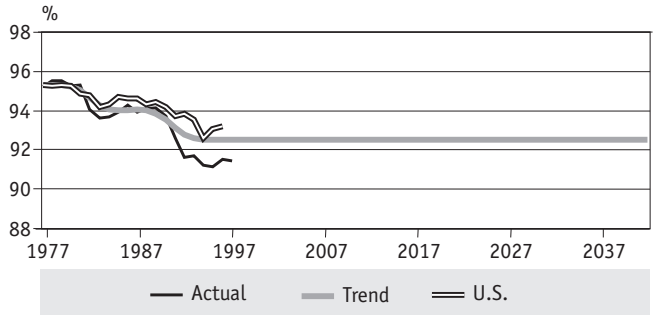


Chart A6 Participation Rate, Females 25 to 34

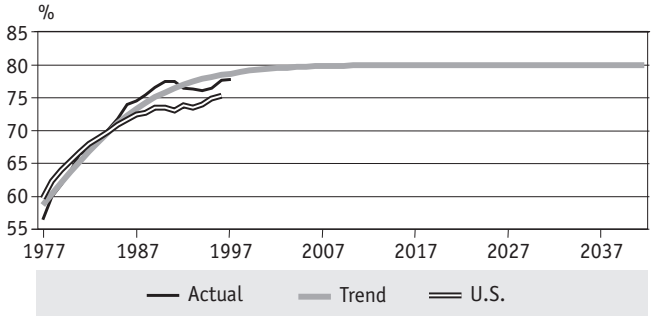


Chart A7 Participation Rate, Males 35 to 44

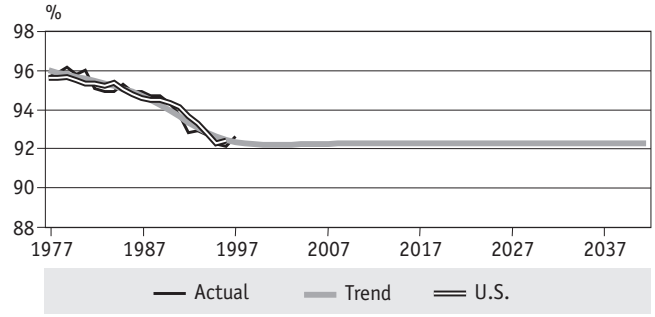


Chart A8 Participation Rate, Females 35 to 44

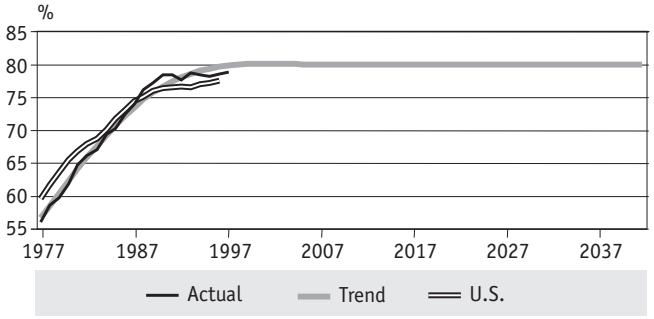


Chart A9 Participation Rate, Males 45 to 54

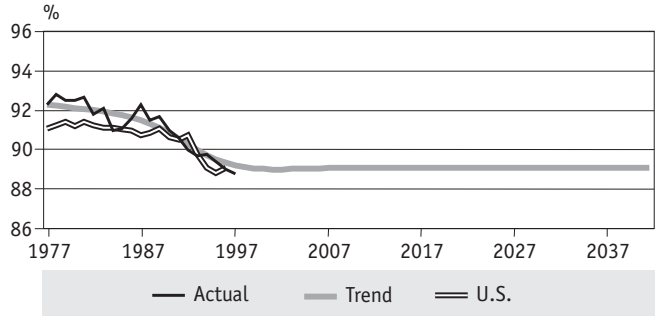


Chart A10 Participation Rate, Females 45 to 54

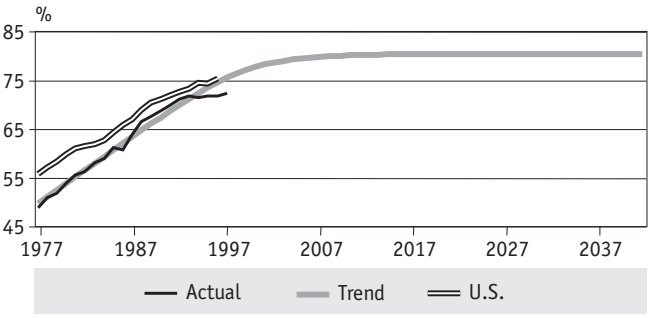


Chart A11 Participation Rate, Males 55 to 64

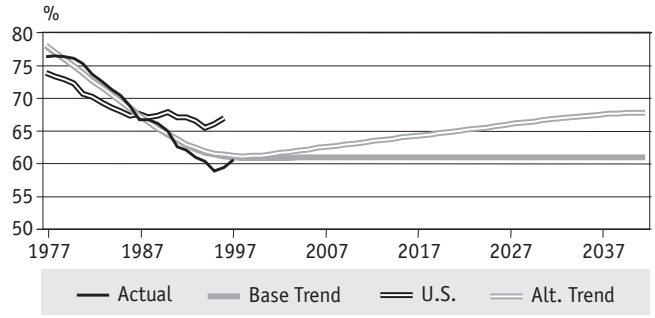


Chart A12 Participation Rate, Females 55 to 64

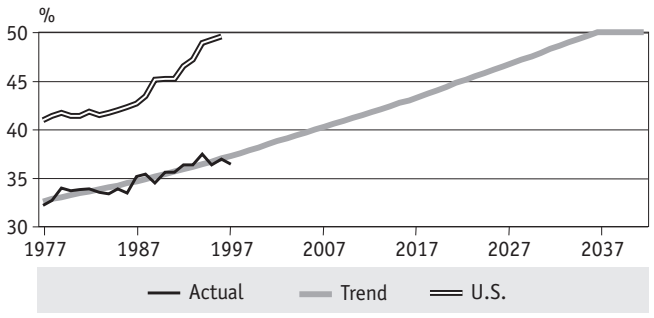


Chart A13 Participation Rate, Males 65 to 69

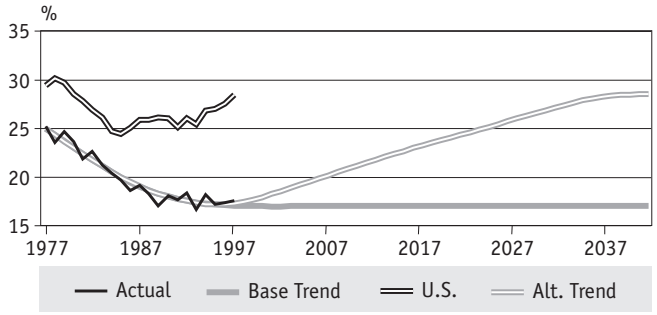


Chart A14 Participation Rate, Females 65 to 69

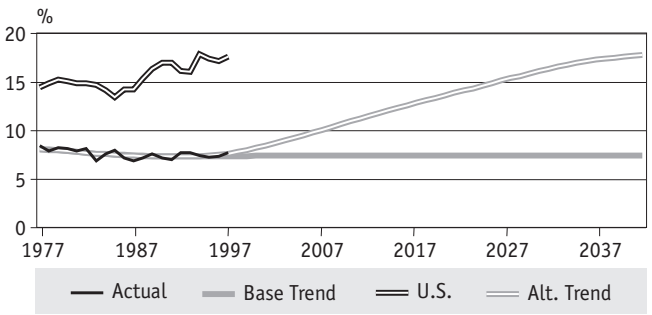


Chart A15 Participation Rate, Males 70 & Over

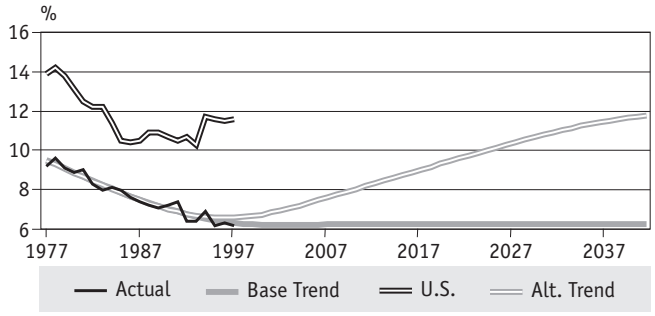


Chart A16 Participation Rate, Females 70 & Over

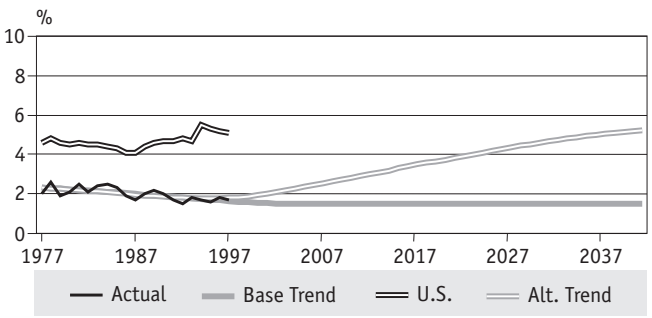


Chart A17 Synthetic Participation Rates Individual Participation Rates Fixed at 1989 Values

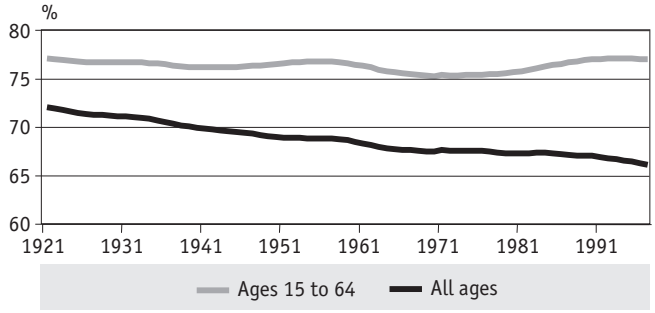


Chart A18 Participation Rate, 55 & Over, Canada & United States Correcting For Educational Attainment

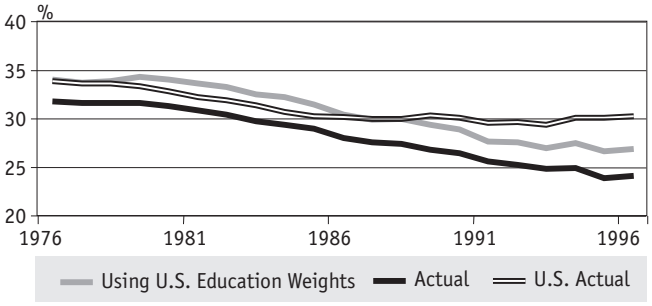


Table A1 Detailed demographic composition effect, Canada, 1989-96

	1989 Participation rate (1)	1989 Source population weights (2)	1989 Contribution to aggregate participation rate (1)*(2)	1996 Source population weights (3)	1996 Contribution to aggregate participation rate with 1989 cohort rates (3)*(1)	1989-1996 Changes in weights (4)=(3)-(2)	Contribution to the Change in Aggregate Participation Rate with fixed 1989 cohort rates (5)=(4)*(1)	Cumulative Contribution (5)
Men 15-19	60.6	4.59	2.78	4.30	2.61	-0.29	-0.18	-0.18
Women 15-19	56.7	4.42	2.51	4.10	2.32	-0.32	-0.18	-0.36
Men 20-24	84.9	5.11	4.34	4.30	3.65	-0.80	-0.68	-1.04
Women 20-24	77.6	5.01	3.89	4.22	3.27	-0.80	-0.62	-1.66
Men 25-34	94.1	11.82	11.12	10.19	9.58	-1.63	-1.54	-3.19
Women 25-34	76.5	11.73	8.98	10.14	7.76	-1.59	-1.22	-4.41
Men 35-44	94.7	9.78	9.26	10.60	10.04	0.82	0.78	-3.63
Women 35-44	77.2	8.78	7.55	10.65	8.22	0.87	0.67	-2.96
Men 45-54	91.7	6.59	6.05	8.10	7.43	1.51	1.38	-1.57
Women 45-54	67.6	6.55	4.43	8.09	5.47	1.54	1.04	-0.53
Men 55-64	66.2	5.53	3.66	5.31	3.52	-0.22	-0.15	-0.68
Women 55-64	34.4	5.79	1.99	5.45	1.88	-0.34	-0.12	-0.80
Men 65-69	17.0	2.22	0.38	2.26	0.38	0.03	0.01	-0.79
Women 65-69	7.6	2.67	0.20	2.50	0.19	-0.17	-0.01	-0.80
Men 70+	7.1	3.46	0.25	4.04	0.29	0.57	0.04	-0.76
Women70+	2.2	4.94	0.11	5.76	0.13	0.82	0.02	**-0.75**
Total	67.48	100.00	**67.48**	100.00	**66.73**	0.00	**-0.75**	—

Table A2 Detailed demographic composition effect, United States, 1989-96

	1989 Participation rate (1)	1989 Source population weights (2)	1989 Contribution to aggregate participation rate (1)*(2)	1996 Source population weights (3)	1996 Contribution to aggregate participation rate with 1989 cohort rates (3)*(1)	1989-1996 Changes in weights (4)=(3)-(2)	Contribution to the Change in Aggregate Participation Rate with fixed 1989 cohort rates (5)=(4)*(1)	Cumulative Contribution (5)
Men 15-19	57.8	3.83	2.21	3.79	2.19	-0.05	-0.03	-0.03
Women 15-19	54.0	3.80	2.05	3.66	1.97	-0.14	-0.08	-0.10
Men 20-24	85.2	4.69	4.00	4.29	3.66	-0.40	-0.34	-0.44
Women 20-24	72.4	4.98	3.61	4.39	3.18	-0.59	-0.43	-0.87
Men 25-34	94.5	11.31	10.68	9.86	9.31	-1.45	-1.37	-2.24
Women 25-34	73.5	11.68	8.58	10.21	7.50	-1.47	-1.08	-3.32
Men 35-44	94.5	9.43	8.92	10.58	10.00	1.14	1.08	-2.24
Women 35-44	76.0	9.87	7.50	10.90	8.28	1.03	0.78	-1.45
Men 45-54	91.1	6.43	5.86	7.81	7.12	1.38	1.26	-0.19
Women 45-54	70.5	6.85	4.82	8.22	5.80	1.38	0.97	0.78
Men 55-64	67.2	5.42	3.64	4.98	3.35	-0.43	-0.29	0.49
Women 55-64	45.1	6.07	2.74	5.48	2.47	-0.59	-0.27	0.22
Men 65+	16.6	6.51	1.08	6.65	1.11	0.14	0.02	0.24
Women 65+	8.3	9.14	0.76	9.18	0.77	0.04	0.00	0.25
Total	66.45	100.00	**66.45**	100.00	**66.70**	0.00	**0.25**	—

Evolution of the Female Labour Force Participation Rate in Canada, 1976-1994: a Cohort Analysis

*Paul Beaudry and Thomas Lemieux**

One striking feature of the Canadian labour market during the 1970s and 1980s was the sustained growth in the numbers of working women. For women aged 25-64 the participation rate in the labour force increased from less than 50 per cent in the mid 1970s to 70 per cent in the late 1980s (panel a of Chart 1). An equally striking development is the recent stagnation in the female participation rate, which has remained around 70 per cent throughout the 1990s. While the participation rate of men of the same age group has declined during this latter period, Chart 1a shows that the 1990s represented a much less dramatic departure from previous trends — indicated by a dotted line in the charts — for men than for women.[1]

Why has female participation in the labour force stagnated? Is it a temporary phenomenon tied to the poor growth performance of the economy during the 1990s, or does it represent a permanent change in the behaviour of women? For example, it could indicate that the process of integration of women into the work force is almost complete. A cohort analysis is performed using data from the Survey of Consumer Finances (1976 to 1994) to examine this issue.

Our methodology involves isolating the effect of three separate factors on the participation rate of women — we follow cohorts of women over time, that is, we track the participation rate of representative groups of women who entered the work force at a given point in time (e.g. those who were 25 years old in 1976). We then "decompose" a cohort's participation rate into three effects. The first is a macroeconomic effect that by definition is common across cohorts. Recession and structural phenomena such as the generosity of the employment insurance system are some of the factors that may cause a macroeconomic effect. The sec-

Chart 1 Participation and employment rates: Men and women age 25 to 64

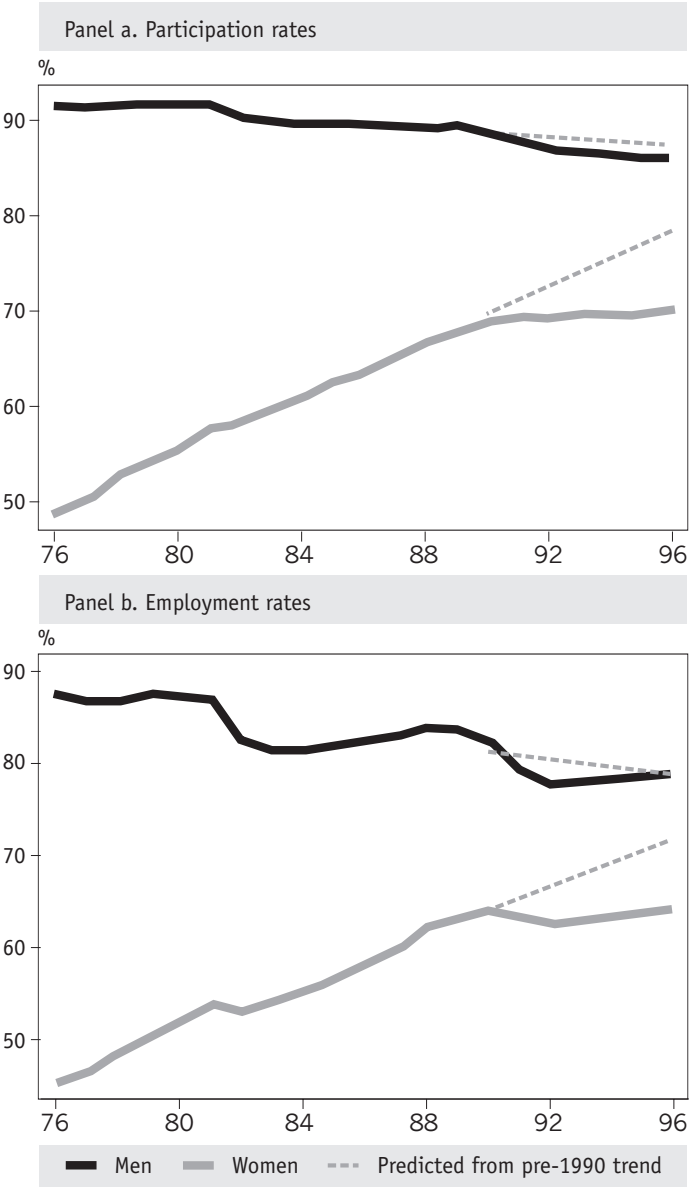


Table 1 Age structure and education level for women 25-64, 1976-94

Year	Age distribution in per cent				Per cent with high school or less	Number of obs.
	25-34	35-44	45-54	55-64		
	(1)	(2)	(3)	(4)	(5)	(6)
1976	40.9	24.0	19.8	15.3	73.6	12269
1978	39.1	24.9	20.5	15.5	75.0	17372
1980	39.9	26.1	19.1	14.9	74.7	18212
1982	39.5	26.2	19.1	15.3	73.5	18881
1983	39.2	27.5	18.9	14.4	72.7	19775
1985	38.7	29.3	17.7	14.3	71.0	19664
1987	37.9	29.9	18.0	14.3	70.4	17949
1989	37.1	31.0	18.3	13.6	68.3	21117
1991	34.9	32.3	19.3	13.6	59.7	26033
1993	31.4	32.8	21.6	14.2	56.2	22592
1994	32.8	32.7	21.2	13.3	54.3	22420
Average	37.0	29.2	19.4	14.3	67.2	216284

ond factor is the age or life cycle effect, which shows how the cohort's participation rate changes as its members age. The third is the cohort specific effect, which shows differences between cohorts for a given age and macroeconomic effect. For example, if the cohort that entered the labour force in 1976 has a participation rate 10 per cent higher than that of the cohort that entered the labour force in 1966 at the same age and under similar macroeconomic conditions, the 1976 cohort is said to exhibit a 10 per cent cohort effect relative to the 1966 cohort.

Our results indicate that cohort effects are likely the dominant factor in explaining the recent stagnation in female labour force participation rates. The same result was obtained when the labour force participation rate was replaced by the employment rate. Cohort effects help explain both the large increase in participation and employment rates during the 1970s and 1980s, as well as their stagnation in the 1990s. The 1989-94 recession merely amplified the stagnation phenomenon; it also explains the observed decline in the participation rate for some demographic groups. These results show, however, that stagnation would have occurred, albeit later in the 1990s, even if more favourable macroeconomic conditions had prevailed.

Data and Descriptive Statistics

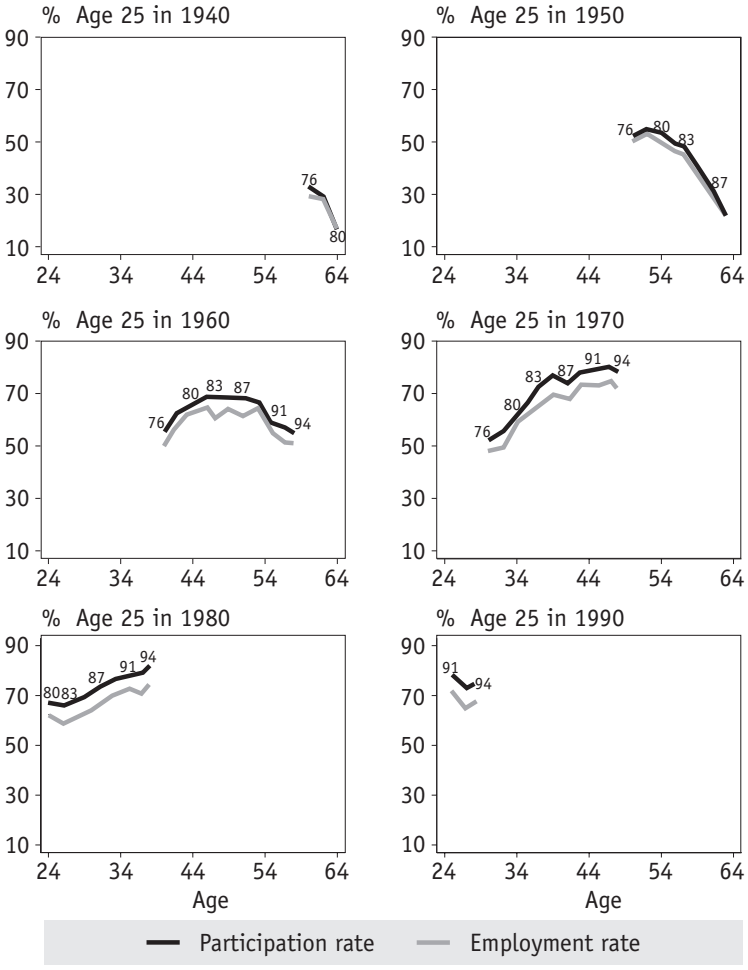
Our date were obtained from the Survey of Consumer Finances (SCF) for 1976, 1978, 1980, 1982, 1983, 1985, 1987, 1989, 1991, 1993 and 1994 (survey years).[2] They were chosen because: from 1976-82 the survey was taken only every other year; since then it has been taken every year, except 1984; and 1994 was the last year available when we began this study. The years represented (about every other year) provide a fairly coherent sample across time. One important advantage of the SCF over other existing data sets is that the age of respondents is available in the public use samples provided by Statistics Canada.[3]

Individuals were grouped into two-year cohorts according to their date of permanent entry into the labour force. This was defined, somewhat arbitrarily, as the even-numbered year in which the woman was 25 or 26 years old (e.g. a women

born in 1941 is in the "entering" cohort for 1966). Thus for each even year, all women aged 25-64 are divided into 20 cohorts (25-26, 27-28, ..., 63-64).[4] In total, 29 cohorts entered the labour force between 1936 and 1992.

Note that Statistics Canada's public use files of the SCF from before 1982 provide data only for heads of households and spouses; we therefore confined our analysis to this sub-sample for the entire 1976-94 period.[5] Labour force activity (employment, unemployment or non-participation) is determined based on individual responses to the usual Labour Force Survey questions (for April in the SCF). Chart 2 shows the evolution of the labour force participation rate, represented by a solid line, and the employment rate, represented by a dotted line, for the cohorts that entered the labour force in 1940, 1950, 1960, 1970, 1980 and 1990. These six cohorts are a relatively representative sample of the full 29 cohorts that are not shown to simplify the chart. Those entering the labour force first (e.g. the 1940 cohort) appear only in their last years in the labour market, while those that entered last (e.g. the 1990 cohort) appear only in their earlier years. The chart shows that the evolution of the labour force participation and employment rates is similar for all cohorts. Both these rates tend to increase from the age of 25 to 45-50 years, then decrease rapidly until age 65. Participation and employment rates are obviously higher for those cohorts that entered the labour force most recently.

Chart 2 Female participation rate and employment rate by cohort



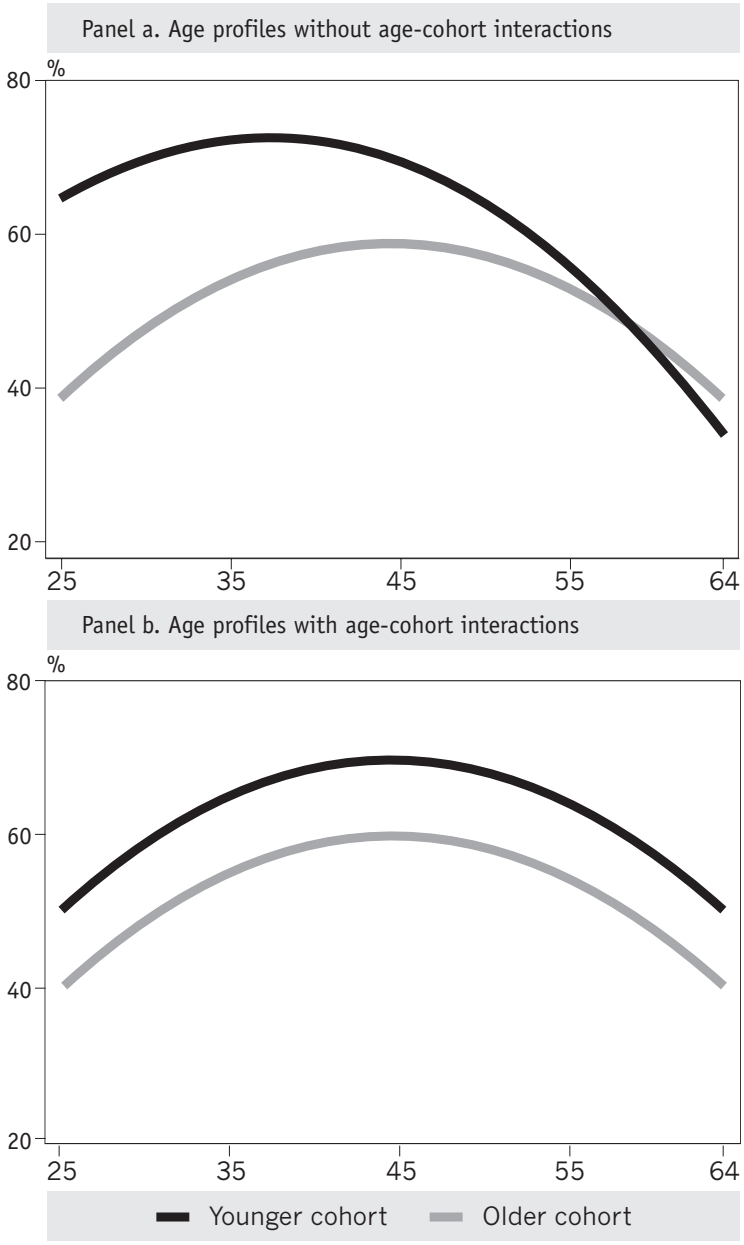
Other descriptive statistics are shown in Table 1, which illustrates age composition and education levels (percentage of women with a high school education or less) for each year studied. The table shows quite a young population in 1976-94. About 65 per cent of women in the 25-64 age group during these years were 44 or younger. The impact of the baby boom/baby bust on the population's age composition is also clearly visible. This helps explain the increase in the proportion of women aged 35-44 since the beginning of the 1980s; the first wave of boomers born in 1946 reached the age of 35 in 1981. The same phenomenon occurred at the beginning of the 1990s as the first of the boomers reached 45. It is now the baby bust generation, those women born after 1965, who make up the 25-34 segment.

The statistics in Table 1 also show a steady increase in level of education: the percentage of women with a high school education or less dropped from 73.6 per cent in 1976 to 54.3 per cent in 1994. This trend, however, is slightly exaggerated by the revamping of the questions on education in the LFS in 1990.[6]

Cohort Analysis: Econometric Model

Our cohort analysis uses an econometric model to examine the separate roles played by the macroeconomic, cohort and age effects on labour force participation and employment rates. The dependent variable used in the regressions is the participation (or employment) rate p_{jt} for cohort j at time t expressed in "log-odds" form $\ln(p_{jt}/(1-p_{jt}))$.[7] For example, $p_{74,84}$ represents the labour force participation rate for the cohort that entered the labour force in 1974 ($j = 74$) during the year 1984 ($t = 84$). This functional form is used to account for the special nature of variable p_{jt}, whose

Chart 3 Participation rate and age profiles



value is always between 0 and 1. It ensures the predicted value will always be between 0 and 1, which would not be the case if a standard linear specification were used instead.[8]

In most of the estimated models, only one macroeconomic variable is used, the unemployment rate among men aged 25-44. Although certain long-term trends in this rate may be determined by structural factors, it is clear its short-term fluctuations mainly reflect the evolution of the economic climate. Other variables such as the output gap may be used in as well as the unemployment rate, but we prefer to concentrate on the latter, because of its simplicity; however, the results must be interpreted with caution.[9] The scope of the macroeconomic effect will, however, be broadened by adding other variables in our discussion on robustness analysis later in this article.

The model is completed by adding a flexible specification for age, or life cycle, effects (fourth degree polynomial) and for cohort effects (third degree polynomial). This yields the equation:

$$(1)\quad \ln\left(p_{jt}/(1-p_{jt})\right) = \alpha + \delta ur_t + \beta_1 j + \beta_2 j^2 + \beta_3 j^3 + \gamma_1 a_{jt} + \gamma_2 a_{jt}^2 + \gamma_3 a_{jt}^3 + \gamma_4 a_{jt}^4$$

where δur_t represents the unemployment rate among men 25-44, j represents the cohort, and a_{jt} represents the age of women from cohort j in year t.

One characteristic of equation (1) is that the age profile for each cohort, i.e. the evolution of the labour force participation rate over the life cycle, is similar for each cohort; they differ only in terms of the intercept. In other words, the model allows a vertical displacement of the life cycle profile from one cohort to another while forcing the shape of the profile, and thus the slope, to be identical for each cohort. A more general model is produced by introducing age-cohort interaction terms to allow the age effect to vary from one cohort to another. This was done with the following model, which incorporates an age-cohort ($a_{jt}j$) and an age-cohort squared interaction term:[10]

$$(2)\quad \ln\left(p_{jt}/(1-p_{jt})\right) = \alpha + \delta ur_t + \beta_1 j + \beta_2 j^2 + \gamma_1 a_{jt} + \gamma_2 a_{jt}^2 + \gamma_3 a_{jt}^3 + \gamma_4 a_{jt}^4 + \theta_1 a_{jt} j + \theta_2 a_{jt} j^2.$$

If second or higher order polynomial terms are omitted, equation (2) shows that the effect of age on $\ln(p_{jt}/(1-p_{jt}))$ is equal to $\gamma_1 + \theta_1 j$. If θ_1 is positive, the age effect will be greater for those cohorts that most recently entered the labour force (highest j) than for the others, and vice versa. Coefficient θ_1 thus allows the life cycle profile to vary from one cohort to another.

Chart 3 illustrates the advantages of equation (2) over equation (1), which does not include the age-cohort interaction term. Without such interaction terms, the intercept is the only difference between different cohorts' age profiles (panel a). The same increase in participation at career outset and the same decrease in participation at career end is shown for every cohort. The age profile is clearly more flexible in panel b where interaction

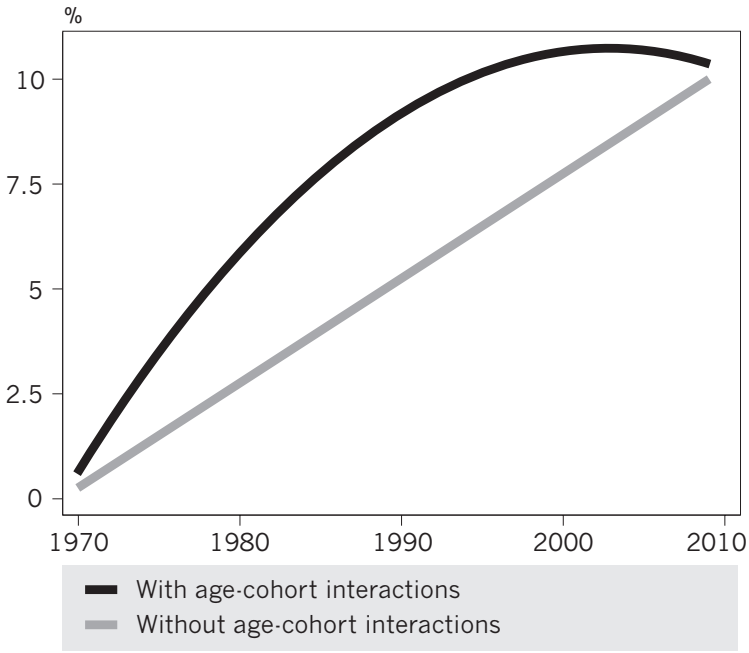
Table 2 Detailed results of regressions
(standard deviation in brackets)

	Employment rate			Participation rate		
	1976-1994	1976-1994	1976-1989	1976-1994	1976-1994	1976-1989
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.792	-3.102	-2.912	0.997	-3.398	-2.746
	(0.143)	(0.291)	(0.344)	(0.158)	(0.245)	(0.177)
Unemployment rate.	-0.019	-0.029	-0.031	-0.004	-0.016	-0.014
	(0.011)	(0.004)	(0.003)	(0.011)	(0.003)	(0.002)
Cohort effect: a						
co	-1.830	3.804	3.506	-2.227	4.162	3.267
	(0.154)	(0.383)	(0.465)	(0.151)	(0.319)	(0.215)
co^2	1.609	-0.792	-0.681	1.892	-0.851	-0.561
	(0.131)	(0.118)	(0.150)	(0.102)	(0.100)	(0.062)
co^3	-0.289	—-	—-	-0.336	—-	—-
	(0.025)			(0.019)		
Age effect:						
Age/10	0.389	2.706	2.780	0.405	3.004	2.749
	(0.053)	(0.175)	(0.216)	(0.051)	(0.124)	(0.126)
(Age/10)^2	-0.445	-1.742	-0.676	-0.471	-0.760	-0.701
	(0.024)	(0.101)	(0.027)	(0.021)	(0.032)	(0.019)
(Age/10)^3	-0.130	-0.151	-0.161	-0.139	-0.162	-0.167
	(0.007)	(0.007)	(0.009)	(0.006)	(0.006)	(0.009)
(Age/10)^4	0.031	0.032	0.024	0.032	0.034	0.027
	(0.006)	(0.006)	(0.004)	(0.005)	(0.005)	(0.005)
Interactions:						
Age/10	—-	-1.742	-1.902	—-	-1.963	-1.886
*co		(0.101)	(0.140)		(0.067)	(0.091)
(Age/10)	—-	0.226	0.298	—-	0.258	0.305
*co^2		(0.021)	(0.021)		(0.016)	(0.021)
P-value of						
pred. test:	0.001	0.096	—-	0.000	0.036	—-
R squared:	0.941	0.954	0.951	0.953	0.964	0.962
Number of observations	224	224	164	224	224	164

a co=(year of entry into the labour force — 1932)/20

b p-value of a (Chow) test that the 1990-94 data is correctly predicted by the model estimated from the 1976-89 data.

Chart 4 Effect of the entry of new cohorts on the participation rate



terms are introduced. Here, the "newer" cohort has both a higher ordinate value at the origin and a shallower slope. This results in a higher and more stable age profile at career outset than in the previous cohorts (the "older" cohorts). This profile is also more similar to that for men, whose participation rates are fairly high and stable until the age of about 50. The situation shown in panel b is therefore more consistent with the idea of a convergence between men's and women's labour force participation rates, or increasing participation of women in the labour force, than that shown in panel a.

In panel b, the cohort effect is concentrated at career outset, participation rates before the age of 40 for the newer cohort being much higher than those for the older cohort, while the rates are reasonably comparable after age 50. The impact of the entry of the newer cohort on the aggregate labour participation rate would thus be felt most strongly during the first 10 or 20 years after its arrival, while in panel a its influence is shown as continuing throughout the life cycle. In other words, the entry of newer cohorts in panel b should result in a rapid increase in the aggregate participation rate, followed by a period of stagnation. Panel a, on the other hand, implies a constant increase in the aggregate participation rate.

Chart 4 shows the impact of the arrival of newer cohorts in the two cases discussed above, with those cohorts entering the labour force after 1970 considered "newer" and those entering before 1970 considered "older."[11] The chart clearly indicates that only the presence of an age-cohort interaction effect can explain the stagnation phenomenon.

Though the case presented in Charts 3 and 4 is only an illustrative example, it provides insights into the importance of the age-cohort interaction in explaining stagnation of participation rates in the 1990s. The specification we actually estimate (equation 2) is a flexible version of the dichotomous case considered in the two charts. It allows for smooth changes in age profiles across cohorts.[12]

An often-mentioned problem with cohort analyses is the impossibility of separately identifying cohort effects, year effects (macroeconomic effects), and age effects because of the linear dependence between them. In fact, since $a_{jt} = 25 + t - j$, the three variables (a_{jt}, j and t) are perfectly collinear. Our work assumes that variable δur_t captures any systematic macroeconomic effect and that there is no other temporal trend in this effect. If there were a time trend in the female participation rate, for example, because of the feminist movement, we would be attributing this trend to cohort effects. Note, however, that as long as the time trend is linear, it cannot account in itself for the stagnation in participation rates (a break in trend) in the 1990s. So although there may be some issues regarding the interpretation of our results, we do not think our analysis of the sources of the stagnation in female participation rates will be affected by these issues.

These considerations aside, econometric models (such as (1) and (2)) can never explain all the variations in the data (R squared is less than 1). As a rule, a residual macroeconomic effect is obtained, representing the macroeconomic variation in the data that cannot be explained by other variables in the model. If during a period, say the 1990s, we were to find a large residual we would interpret this as indicating that participation in this period has experienced a macroeconomic effect not captured by its standard co-movement with the unemployment rate.

Results

Equation (1) and (2) were estimated using weighted least squares, with cohort size j at time t

used as the weights. The results are shown in Table 2 for employment rates (columns 1-3) and participation rates (columns 4-6). For model (1), note that all the coefficients are significant, except for the rate of unemployment among men 25-44 (columns 1 and 4). That effect becomes significant, however, when age-cohort interaction terms from model (2) are introduced (columns 2 and 5). Also note that interaction term coefficients are highly significant, and that R-squared for model (2) is higher than for model (1).

We also present the results of the regressions when the sample is limited to the 1976-89 period (columns 3 and 6). The purpose of this exercise is to assess whether the levelling off of participation and employment rates in the 1990s was predictable from the behaviour of these rates before 1990. The results indicate that the estimated parameters for 1976-89 are relatively similar to those for the period as a whole. In fact, the p-value of the Chow-test statistic reported at the bottom of column 2 indicates we cannot reject the null hypothesis that the estimated employment rate models are the same for 1976-94 (column 2) and 1976-89 (column 3).[13] The estimated models for 1976-94 and 1976-89 are only marginally different (p-value of 0.036 in column 5) in the case of the participation rate. We shall return to the question of the stagnation of the participation and employment rates.

To facilitate presentation of the results, it is simpler to use a graphical approach than to examine the numbers presented in Table 2 in detail. For each rate (participation and employment) and each model (1 and 2), Chart 5 presents four panels. Panel a shows the cohort effect at age 44, i.e. the variations in the participation and employment rates attributable to the cohort effect at a precise point in the life cycle. Panel b shows the age effect throughout the life cycle for a typical cohort (the one that entered the labour force in 1964). Panel c presents a similar result for the six representative cohorts of Chart 2 (entering the labour force in 1940, 1950, 1960, 1970, 1980 and 1990) to illustrate cohort differences over the entire age profile. It should be noted, however, that panel b shows a predicted age profile for the entire life cycle, while panel c shows the profile only for the ages at which the cohort in question is observed in the data (1976-94). Finally, panel d indicates the degree to which the estimated model for

Chart 5 Participation rate model without age-cohort interactions

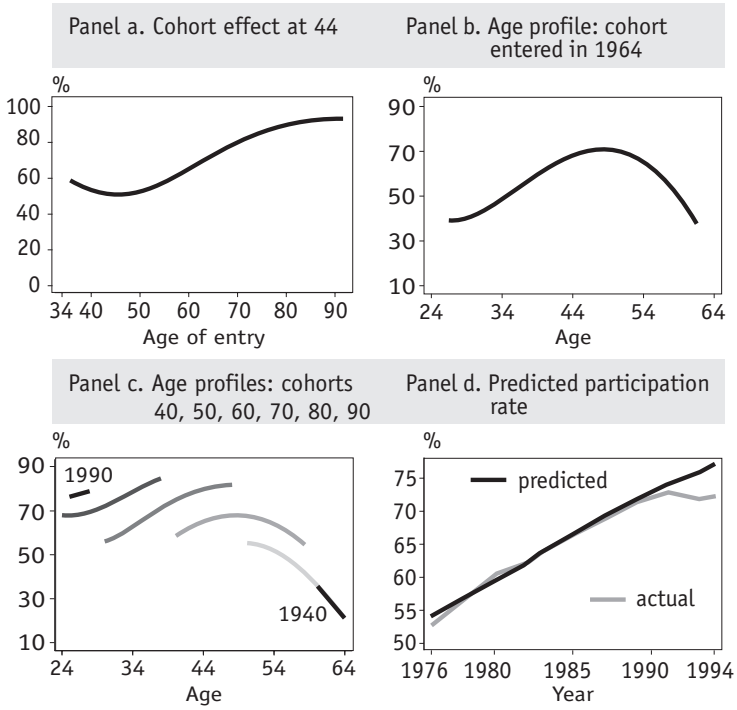


Chart 6 Participation rate model with age-cohort interactions

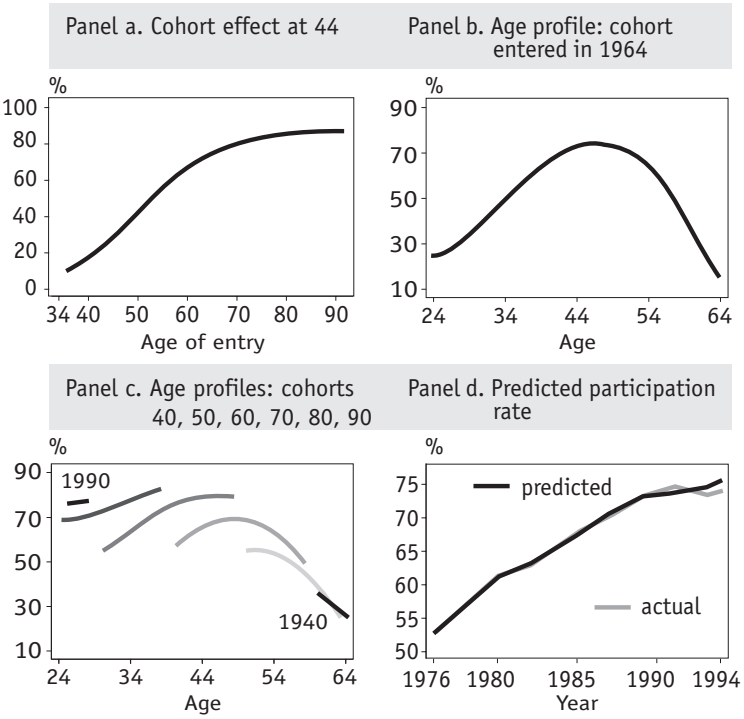


Chart 7 Employment rate model without age-cohort interactions

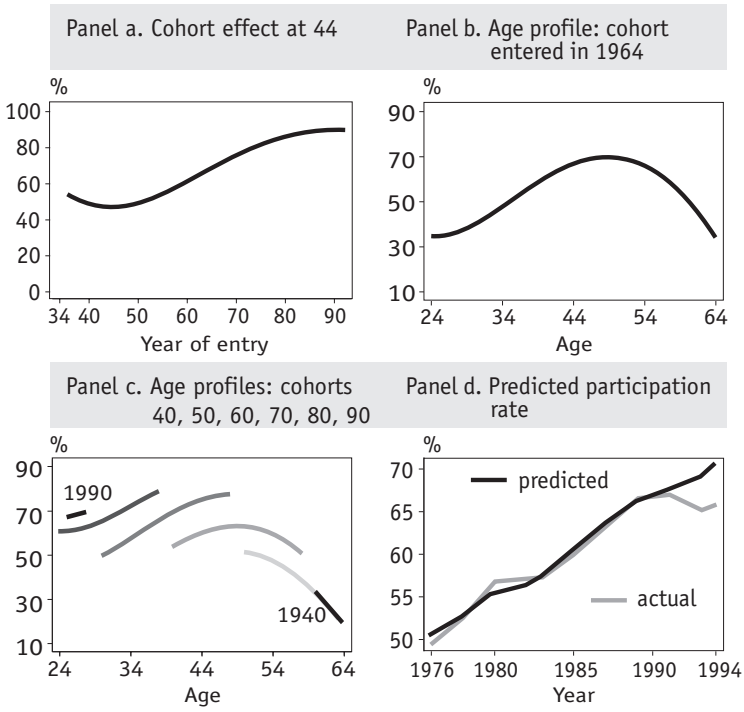
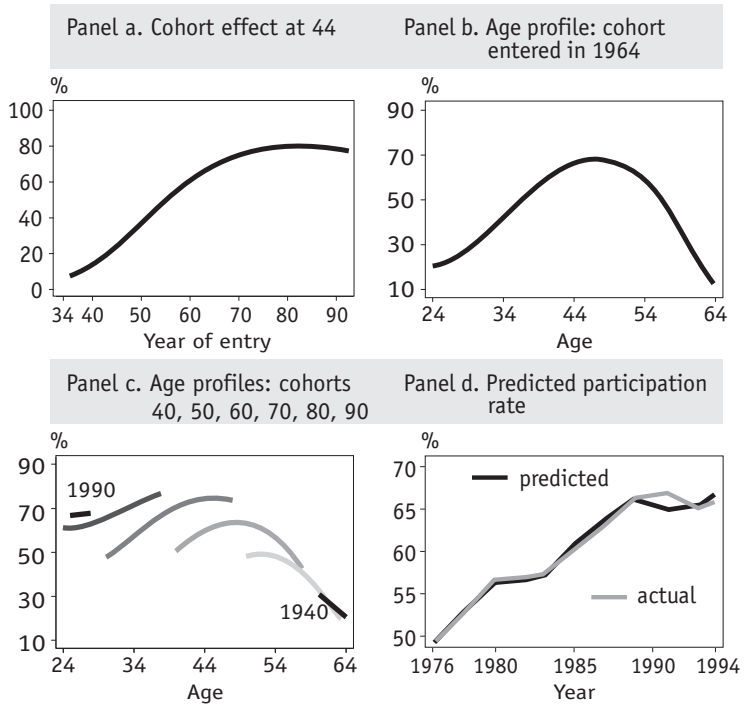


Chart 8 Employment rate model with age-cohort interactions



1976-89 can be used to predict participation and employment rates for the entire 1976-94 period.

Rather than discussing each of the graphs in detail, we will confine ourselves to noting a few highlights:

- All the estimated models indicate a levelling off in cohort effects (panel a of Charts 5-8); the participation and employment rates for the 1992 cohort are comparable to the ones for the cohorts that entered the labour force in the 1980s (or at least, the cohorts will all be comparable once they have reached age 44).
- The participation and employment rates peak around age 50 (panel b of Charts 5-8).
- The younger cohorts have flatter age profiles (shallower slopes) early in their careers. This pattern is particularly pronounced for model 2, which includes age-cohort interaction (panels c of Chart 6 and 8).[14]
- The model without interactions (model 1) provides no explanation whatsoever of the stagnant participation rate (panel d in Chart 5) and falling employment rate (panel d in Chart 7) observed in the 1990s. On the other hand, these phenomena can be predicted more accurately from the model with interactions (model 2) estimated for 1976-89 (panel d in Charts 6 and 8).

This last finding is the most interesting. The charts suggest model 2 does a much better job predicting post-1990 patterns from pre-1990 data than model 1. The prediction tests reported at the bottom of Table 2 is a formal way of evaluating this hypothesis. The p-value for the specifications corresponding to model 1 (columns 1 and 4) are well below the critical value of 0.05, which suggests that the models fit to the 1976-89 period do not predict accurately the post-1990 data. By contrast, the specifications corresponding to model 2 predict more accurately the post-1990 data, especially for the employment rate model (p-value of 0.096). Though the p-value is higher in column 5 (model 2) than in column 4 (model 1), we nevertheless reject the null hypothesis of an accurate prediction for the participation rate.

The reason why the prediction test fails for the participation rate can be seen in panel d of Chart 6. This shows that the model predicts some growth in the participation rate in the early 1990s while the actual data show a clear stagnation.[15] Relative to the pre-1990 period for which the fit of

the model is almost perfect (predicted and actual values look almost identical), the discrepancy between the predicted and actual values in the 1990s seems sizable.

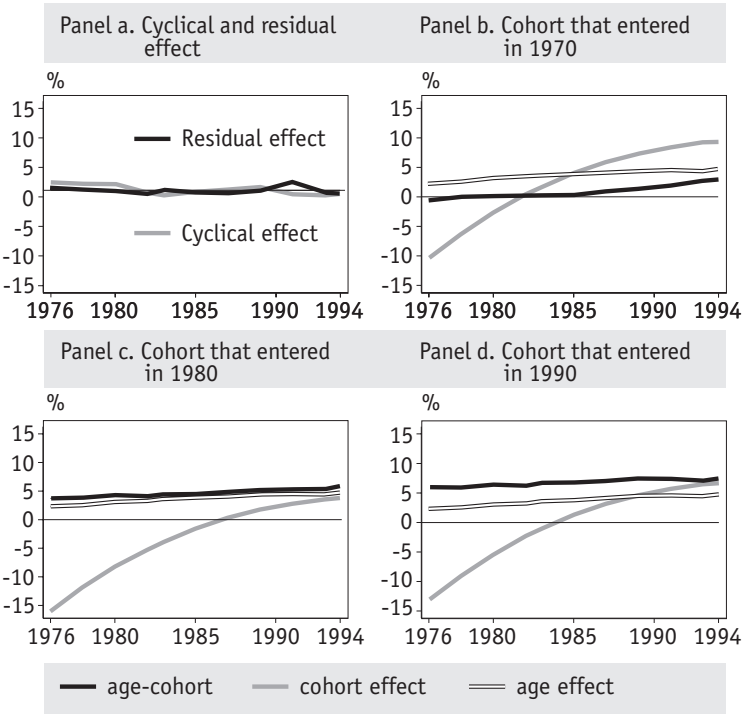
All in all, however, model 2 provides a much more accurate prediction of what happened in the 1990s than model 1. Looking at the average for 1991, 1992, and 1994 (three years of observation for the 1990s), model 1 overpredicts the employment and participation rates by three percentage points and 3.2 percentage points, respectively. By contrast, model 2 underpredicts the employment rate by 0.4 percentage points and overpredicts the participation rate by 0.5 percentage points.[16]

Our results seem to indicate that, in addition to unfavourable macroeconomic conditions, the levelling off of cohort effects also contributed to the trend observed in the 1990s. This hypothesis will be examined in detail in our discussion of decomposition. Note also that the stable cohort effects for cohorts entering after 1970 yields some support for the assumption there is no time trend in participation rates (Section 2a). If there were a positive time trend in participation rates, the cohort effects for cohorts entering after 1970 would have to follow a negative trend (youngest cohorts less active than those that entered in 1970), which is a surprising result.[17]

In our more formal analysis of the role of different factors in the recent evolution of aggregate participation and employment rates for women aged 25-64, we break down this evolution into four components: the macroeconomic effect related to the unemployment rate among men aged 25-44 (the economic cycle), the residual macroeconomic effect, the age effect and cohort effects. In terms of equation (2), it is relatively easy to identify the first two factors, which correspond to the term δur_t and to the residuals of this equation.[18]

More precisely, we first calculate the participation (or employment) rate for each year, taking the weighted average of p_{jt} values for each t. The observed rate (p_{jt}) is then replaced by the predicted rate $_{jt}$ from the estimated model.[19] The average of the $_{jt}$ values for each t therefore represents the aggregate rate predicted by the model. The difference between the observed aggregate rate and the predicted rate represents the residual macroeconomic effect.

Chart 9 Decomposition of the participation rate



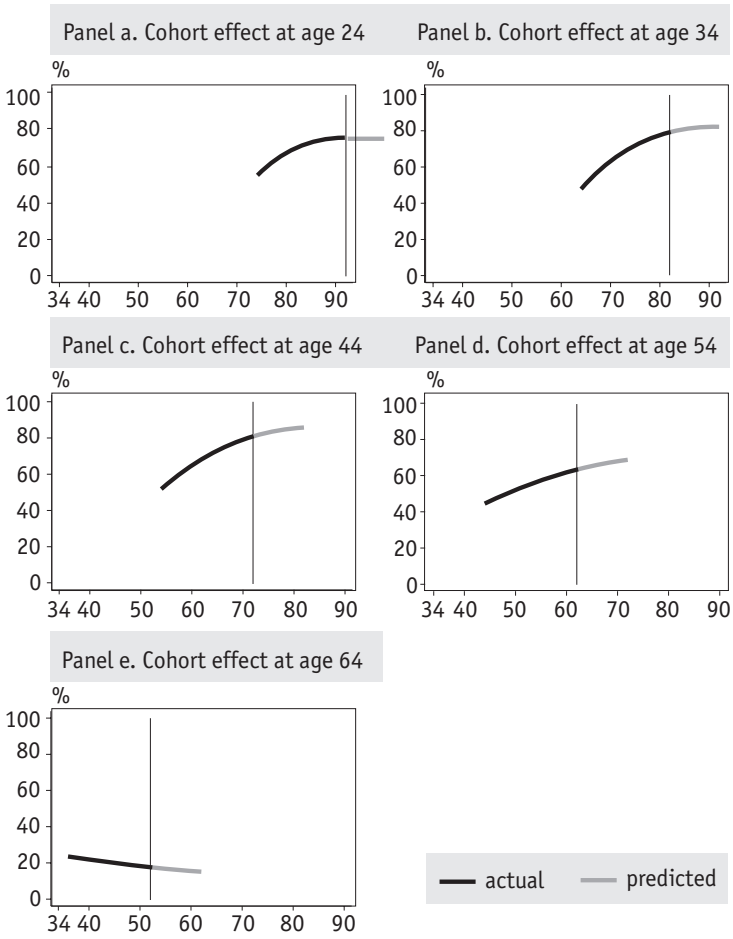
We then recalculate the prediction by replacing the observed unemployment rate by the average of the unemployment rates over the entire sample (8.2 per cent). The difference between this new prediction and the preceding prediction represents the macroeconomic effect related to the male unemployment rate, which we also call the cyclical effect.

The cyclical and residual effects obtained in this manner are presented in panel a of Chart 9 for the participation rate. Note that the charts showing the decomposition results for the employment rate are qualitatively similar to those for the participation rate and are not reported here.[20] We nevertheless discuss the main results both for the participation and the employment rate in the text.

During the 1990s, the cyclical effect is about -1 per cent for the participation rate and -2 per cent for the employment rate. In other words, the female participation rate would have been 1 per cent higher in the first part of the 1990s if the male unemployment rate had held steady at 8.2 per cent.

Age and cohort effects are somewhat more complicated to understand because of the interaction terms in equation (2). It should be noted, first of all, the age effect comes into play only to the

Chart 10 Predicted and actual cohort effects participation rate



extent that the population's age composition changes over time. For example, the arrival of the baby boomers in the labour force in the early 1970s considerably rejuvenated the 25-64 population as a whole. As these young women had below-average participation rates, it should have been expected this change in composition would have had a negative effect on the aggregate participation rate and vice versa.

It might therefore be supposed that to identify the age effect, it is enough to recalculate the predicted rate using a uniform age composition (5 per cent of the population aged 25-64 in each two-year age group) instead of the observed age composition. The problem with this procedure is that it depends on the cohorts present in the labour force in each year, since the age profile is dependent on the cohorts through the interaction terms. This procedure therefore serves to isolate the age effect plus the crossed age-cohort effect.

The same problem arises when we want to isolate the role of cohorts. For example, we can try to recalculate the predicted rates by replacing the cohort effect expressed as $\beta_1 j + \beta_2 j^2 + \theta_1 a_{jt} j + \theta_2 a_{jt} j^2$ by the cohort effect obtained if the cohort is set at an arbitrary level such as $j = 70$ ($\beta_1 70 + \beta_2 70^2 + \theta_1 a_{jt} 70 + \theta_2 a_{jt} 70^2$). This gives us the cohort effect plus the crossed age-cohort effect, in the same way as in the case of age. Once we have all this information, however, it is possible to separate the overall effect of age and cohorts into three components: a "pure" age effect that indicates how participation rates would evolve over time if all cohorts exhibited the same participation profile; a "pure" cohort effect that indicates how the participation rate for a population with a uniform age distribution would evolve over time as older cohorts get replaced by younger ones; a joint age-cohort that residual interactions between age and cohort effects.[21]

These different effects are illustrated in panels b-d of Chart 9. Let us take the example of panel b: here, we use the cohort that entered the labour force in 1970 as a reference cohort for the decomposition. The cohort effect thus indicates the difference between the observed rates and the rates that would have prevailed had all the cohorts followed the same age profile as cohort 17, other factors being kept constant. This cohort effect is therefore the "pure" effect mentioned earlier. The panel also shows the "pure" age effect (for a given cohort and other factors) as well as the combined age and age-cohort effect (the age effect for the observed cohorts in each year).

While it can be rather difficult to grasp all the details of these decompositions, the results speak for themselves: it is really the cohort effect that dominates the evolution of the participation and employment rates in 1976-94. The results are similar, regardless of which cohort is used as a reference for the decompositions (1970, 1980 or 1990). We find that cohort effects account for an increase of about 20 percentage points in participation and employment rates over the period. At the same time, the charts clearly show this phenomenon seems to be coming to an end. By comparison, age effects play a relatively small role in recent changes.

To sum up, our results indicate that the stagnation of female participation and employment rates is primarily a structural phenomenon related to

the stabilization of the cohort effects, which were responsible for the remarkable increase in these rates in the 1970s and 1980s. The unfavourable macroeconomic situation amplified this phenomenon but was not the root cause. The relative performance of the participation and employment rates during the recessions of 1981-83 and 1989-94 clearly illustrates this phenomenon: in 1981-83, the downward pressure on the rates from the macroeconomic effect was offset by the cohort effects, pushing the rates up by one percentage point a year, whereas in 1989-94, because of the stabilization of cohort effects, macroeconomic effects comparable to those of 1981-83 resulted in lower participation and employment rates.

To clarify the role of cohort effects, we illustrate their magnitude at age 24, 34, 44, 54 and 64 in Chart 10. Take for example panel c, which shows the cohort effect at age 44 by year of entry into the labour force. The vertical line indicates the cohort aged 44 in 1994. The curve to the left of the line describes the evolution of cohort effects in 1976-94. The curve to the right shows the predicted evolution for the coming years.

Robustness Analysis

Education

The results indicate a general slowing trend for most of the ages under consideration, attributable to cohort effects. This is particularly true for the younger groups (ages 24 and 34), which explains why the levelling off and declining trend is more pronounced for the 25-44 age bracket than for the 45-64 bracket (Beaudry and Lemieux, 1998).

In our robustness analysis, we re-estimated the models separately for women who have pursued post-secondary studies and those who have only a high school diploma or less. The highlights of the results are:[22]

- The decline in the participation and employment rates in the 1990s is more pronounced among poorly educated women than for the entire female population. The growth in employment and participation in 1976-89 is also weaker within each education group than for the population as a whole. A significant portion of the rise in the rates for the population as a whole therefore seems to be attributable to the increase in average education levels.
- Similarly, the cohort effects exhibit a decline for the most recent cohorts in most cases. This suggests the average quality of cohorts is declining, since a high education level is a less selective characteristic than it was in the past.
- The younger cohorts have high and flat age profiles for women who pursued post-secondary studies. These profiles are similar to the ones for men with the same education levels.

Employment insurance

We have also re-estimated the regressions presented in Table 2 when the employment insurance subsidy rate is also used as a macroeconomic variable.[23] The results are not very conclusive, since the effect on the employment rate is negative when we also control for the unemployment rate among men aged 25-44.[24] The decline in the subsidy rate during the 1980s should therefore have increased the employment rate instead of lowering it. The effect on the participation rate is not significant. This being said, including the subsidy rate as a macroeconomic variable has little impact on the model's other coefficients. Our conclusions about the role of cohort effects versus macroeconomic effects during the 1990s therefore remain unchanged.

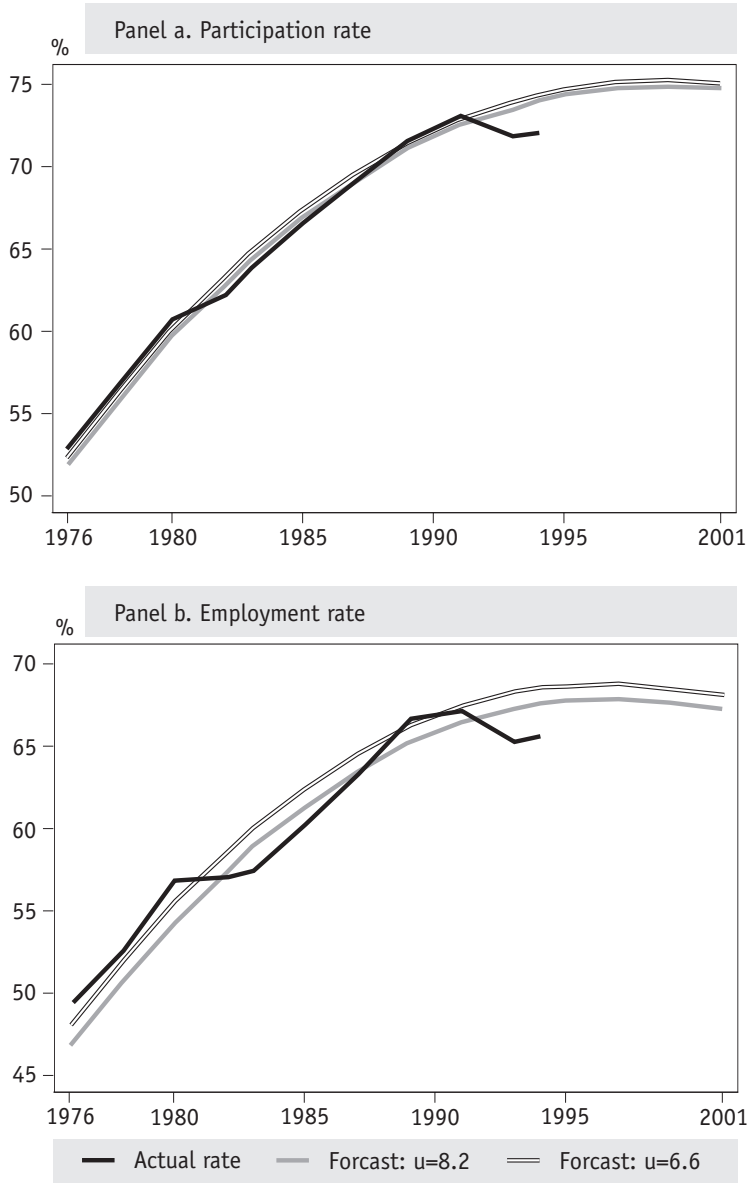
Alternative measures of the cycle

In another attempt to examine the robustness of our results, we have re-estimated our main models with an alternative cyclical variable, the after-tax real wage of women, instead of the unemployment rate of men aged 25-44.[25] This variable did not perform as well as a measure of the cycle as the unemployment rate of men in the same age group. For example, the estimated effect of the after-tax real wage of women was typically not statistically significant when the unemployment rate of men was included. The other parameters of the models were similar to those reported in Table 2.[26]

Predictions

Finally, we will now attempt to predict the future evolution of the participation and employment rates under two different macroeconomic scenarios: a 8.2 per cent unemployment rate for men aged 25-44 (the average for 1976-89) and a 6.6 per cent unemployment rate for the same group (the 1989 level). To do so, we must make some assumptions about the cohorts entering the labour force after 1994. We first assume their age profile will be similar to those of the last cohort

Chart 11 Participation and employment rate forecast for females 25-64



observed (which entered the labour force in 1992). This is a natural assumption since our empirical results indicate the cohort effects have been relatively stable for those cohorts entering the labour force in the 1980s and early 1990s (see panel a of Chart 6).[27] Since the age distribution is relatively uniform for cohorts entering the labour force throughout the 1990s, we also assume these new cohorts have the same size as the cohort that entered the labour force in 1992.[28]

The results of the simulations are presented in Charts 11. The conclusions are the same in both cases: large increases in the participation and employment rates are clearly a thing of the past; in the future, these rates can be expected to hold relatively stable. However, there is still room for a two-three percentage point increase in the rates if the macroeconomic situation continues to improve. It is illusory, though, to think that the rates could rise five-10 percentage points during the next period of expansion as they did in 1983-89. The cohort effects that prevailed then no longer exist.

Conclusion

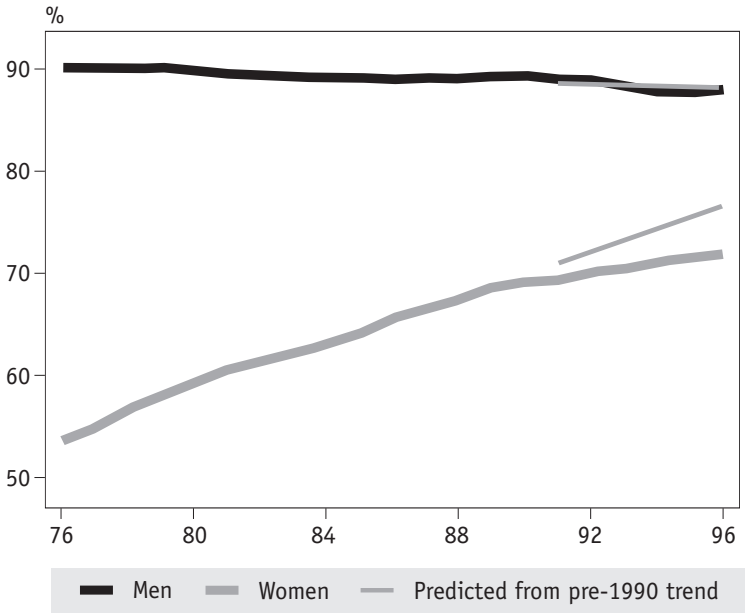
This study's main finding is that the levelling off of female participation and employment rates is primarily a structural phenomenon related to the stabilization of the cohort effects, which accounted for the remarkable increase in these rates in the 1970s and 1980s. The unfavourable macroeconomic situation has amplified this phenomenon but is not the root cause. The relative performance of the participation and employment rates in the 1981-83 and 1989-94 recessions clearly illustrates this phenomenon. In 1981-83, the downward pressure on the rates from the macroeconomic effect was offset by the cohort effects, pushing the rates up by one percentage point a year, whereas in 1989-94, because of the stabilization of cohort effects, macroeconomic effects comparable to those of 1981-83 resulted in lower participation and employment rates.

This result is strongly dependent on the amount of flexibility used to capture cohort effects. It is essential the age profile as a whole, and particularly its slope, be allowed to vary from one cohort to another. This makes it possible to accurately trace both the rise and the flattening of the employment and participation profiles by age. These phenomena are consistent with a convergence in the behaviour of men and women in the labour market: men exhibit high and flat (at least until age 55) employment and participation profiles. The profiles of recent female cohorts are therefore closer to those of men than to those of older female cohorts.

Finally, the recent evolution of participation rates in the United States seems to corroborate our findings: Chart 12 shows that, despite more favourable macroeconomic conditions in the United States than in Canada, the U.S. female participation rate grew much slower in the 1990s than in the 1970s and 1980s. By contrast, the par-

ticipation rate of U.S. men in the 1990s followed closely the pre-1990 trends. The fact there was a sharp break from previous trends in both countries suggests the poor performance of the Canadian economy in the 1990s was not the main factor behind the stagnation in female participation rates. This reinforces our conclusion on the importance of cohorts effects, rather than cyclical factors, as the main explanation for this phenomenon.

Chart 12 Participation rates in the United States
Men and women age 25 to 64



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Notes

1. The dotted line represents the values of the participation rate (from 1990 to 1996) predicted by a linear trend model fit to the 1976 to 1989 period.

2. SCF data are also available for 1972 to 1975. We are not using them, however, due to a problem of non-comparability of the questions on participation and employment, which were revamped as part of major changes to the Labour Force Survey in 1976.

3. The public use samples of the Labour Force survey have bigger sample sizes and are available for every year since 1976. Unfortunately, this data set in unsuitable for a detailed cohort analysis because respondents are pooled into 5-year age groups.

4. For odd-numbered years (1983 to 1993), the women included are between 25 and 65 years old.

5. Beaudry and Green (1996) point out that this restriction has little impact on individuals aged 25 and older, who are almost all heads of households or wives.

6. Before 1990, LFS questions on education did not specifically mention trade certificates. Since that time, those who have finished high school and also hold a trade certificate have been placed in the "post-secondary" category. This explains the break in the series between 1989 and 1991. Note also that changes to the LFS questionnaire make it difficult to use a more detailed classification than "high school or less" versus "post-secondary".

7. The "log-odds" specification is in fact only an application of the "logit" model to grouped data (grouped by cohort).

8. Consider $q = \ln(p/(1-p))$. This results in $p = \exp(q)/(1+\exp(q))$ where $0 \leq p \leq 1$, since $\exp(q) > = 0$. Thus, no matter what the value of q predicted by a regression such as equation 1, the predicted value of p will therefore always be between 0 and 1.

9. In theory, the output gap should be more representative of the economic climate than unemployment among men aged 25 to 44. In fact, the validity of the output gap depends on the accuracy of a number of difficult-to-verify hypotheses on the structure of the macroeconomic model used to obtain this measurement.

10. This particular functional form was arrived at using specification tests. As a rule, we add terms of a higher and higher power until the terms added are no longer significant. The same procedure was used for equation (1).

11. We also assume that age composition is uniform (one fortieth of the population at each age).

12. The specification proposed in equation 2 fits the data much better than a specification more directly in the spirit of the illustrative example (an "older" and a "newer" cohort with completely separate age profiles). The problem with the illustrative example is that it implies a sharp discontinuity across cohorts which is inconsistent with the observed data. Equation 2 also implies some restrictions since only the linear term of the age profile is allowed to vary across cohorts. We chose that latter specification because allowing for more general interaction terms did not affect our main conclusions.

13. This version of the Chow test compares the estimated models for a prediction sample (1976 to 1989) and for the full sample (1976 to 1994). It can either be interpreted as a model stability test (are the estimated models the same for the two sample periods?) or as a prediction test (does the model estimated for the prediction sample predicts accurately for other years?).

14. Note that the slope of the age profile in the participation rate (or employment rate) and age age space may change even without interaction terms due to the log-odds specification.

15. The actual data shows a small increase in the participation rate from 1989 to 1991, followed by a small decrease from 1991 to 1993. However, these variations are not statistically significant. It is thus accurate to describe the period from 1989 on as one of stagnation in the participation rate. The stagnation in the participation rate can be seen more clearly in Chart 1a which is based on the larger and, therefore, more accurate samples of the Labour Force Survey.

16. An alternative set of "prediction tests" consists of verifying whether these average prediction errors are significantly different from zero. These tests yield the same inference as the Chow tests reported in Table 2, namely that only model 2 for the employment rate predicts accurately the post-1990 data.

17. To see this point, consider the simple linear participation model $p = \alpha + \beta j + \gamma a$, where the time trend has been set arbitrarily to zero. Since $t = j + a\text{-}25$, if there is a true time trend δ, an equivalent specification can be rewritten as $p = \alpha + \beta j + \gamma a + \delta t\text{-}\delta t = \alpha + \beta j + \gamma a + \delta t\text{-}\delta(j + a\text{-}25) = (\alpha + 25\delta) + (\beta\text{-}\delta)j + (\gamma\text{-}\delta)a + \delta t$. In other words, the cohort effect becomes $(\beta\text{-}\delta)$ instead of β. If β is equal to zero (stable cohort effects as for the post-1970 cohorts), this means that, controlling for age and temporal effects, participation rates are lower for younger (high j) than older (low j) cohorts, which is unappealing on a priori grounds.

18. The residual macro-economic effect is the average of the residuals for each year.

19. The predicted rate (p) is derived from the predicted log-odd (l) by the following equation: $p = \exp(l)/(1 + \exp(l))$.

20. All these results are presented in a longer version of the paper (Beaudry and Lemieux, 1998).

21. Technical details available upon request.

22. See Beaudry and Lemieux (1998) for detailed results.

23. The subsidy rate is the product of the replacement rate and the maximum number of weeks of eligibility for a worker who worked the minimum number of weeks required for eligibility, divided by the minimum number of weeks required for eligibility (qualification period). Since the weeks of eligibility and the length of the qualification period depend on the local unemployment rate, we use a national weighted average of the subsidy rates in each UI economic regions. The detailed regression results are reported in Beaudry and Lemieux (1998).

24. EI may have a different effect on the participation rate of different groups of women. For example, married women may react differently to changes in the EI subsidy rate than single women. The estimated effect in Table 3 may be thought as an average affect of the subsidy rate for the different subgroups of the population. Since the overall effects were not very encouraging, we have not explored how the results differed by subgroups.

25. This wage variable used is the logarithm of after-tax annual earnings of full-year full-time female workers.

26. The results from these regressions are available on request.

27. Since an entering cohort represents only a small fraction of the population, our results would not change very much if cohort effects were to increase again for the newer cohorts.

28. Tabulations from the SCF indicate that the 1992 cohort (women who turned 25 and 26 in 1992) represents 0.85 percent of the female adult population (15 and more). The four newer cohorts used in the simulations (age 17-18, 19-20, 21-22, and 23-34 in 1992) represent on average 0.83 percent of the female adult population, which is very similar to the 1992 cohort.

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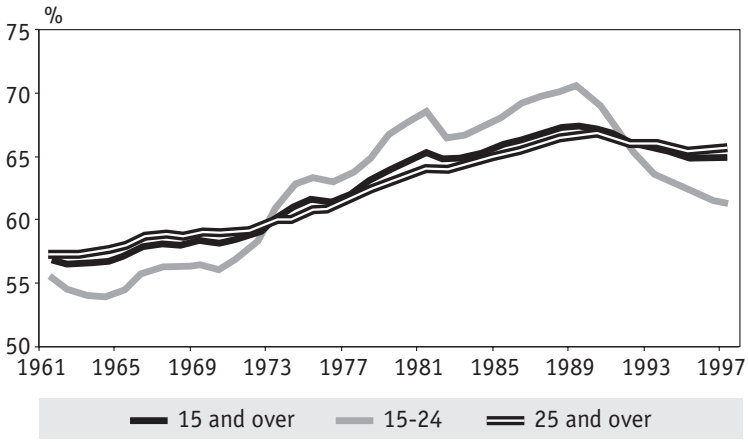
Decline in Youth Participation in Canada in the 1990s: Structural or Cyclical?

*Richard Archambault and Louis Grignon**

Canadian participation rates increased from the 1960s to the end of the 1980s (Chart 1). However, since the early 1990s, there have been sizeable declines. Between 1989 and 1997, the aggregate participation rate dropped by 2.7 percentage points, while the rate for the 15-24 age group decreased by 9.4 percentage points.[1] At the same time, the proportion of young people attending school full-time increased by 10.5 percentage points. For 15- to 24-year-olds, the decline in the participation rate continued throughout the 1990s, while the aggregate participation rate and that for those aged 25 and over have remained stable since 1995.

Chart 1 Participation Rate by Age Group, Canada 1961-1997



The major decline in youth participation rates in the 1990s and the concomitant increase in school enrolment raise some important questions. Are both phenomena essentially cyclical in nature and likely to reverse themselves completely or significantly in the coming years if the economy continues to improve? Or do they reflect a greater commitment by young people to education which will lead to future generations of better educated and more productive workers? What impact has changes to Unemployment Insurance, social assistance and minimum wages had on the school-to-work transition of young people?

In identifying the causes of the decline in the youth participation rate and the increase in school enrolment since the early 1990s we hope to understand better their policy implications and predict their future evolution. This study decomposes the youth participation rate into three distinct rates (participation rates for full-time students, participation rate for non-students and full-time school enrolment rate) and four demographic groups (men, women, the 15-19 age group and the 20-24 age group). This breakdown makes it possible to take into account differences in behaviour between students and non-students concerning their participation in the labour force and outside it. It will also help to explain changes in the school enrolment rate as a distinct phenomenon rather than as merely a determinant of the participation rates.

Interpreting the Data: a Descriptive Analysis

The youth participation rate tends to fall during recessions and to recover during economic expansion. After the 1981-82 recession the youth participation rate fell to a low point, then began to rise. However, after the 1990-92 recession, the rate continued to decline, falling to 57.5 per cent in 1997, from 66.9 per cent in 1989.

There were significant differences in the decline by age group and sex (Chart 3). The participation rates of males and females aged 15 to 19 decreased by 12.4 and 10.3 percentage points respectively over the 1989-97 period. In the 20-24 age group, the rates dropped by 5.7 percentage points for men and 6.7 points for women. Since the end of the last recession, only males aged 20-24 have experienced a slight increase, beginning in 1995. A convergence of male and female par-

Chart 2 Participation Rate, Ages 15-24

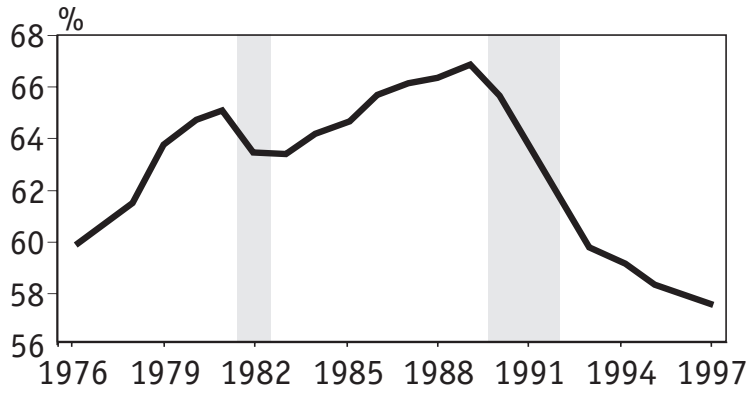


Chart 3 Participation Rate, Four Age Groups

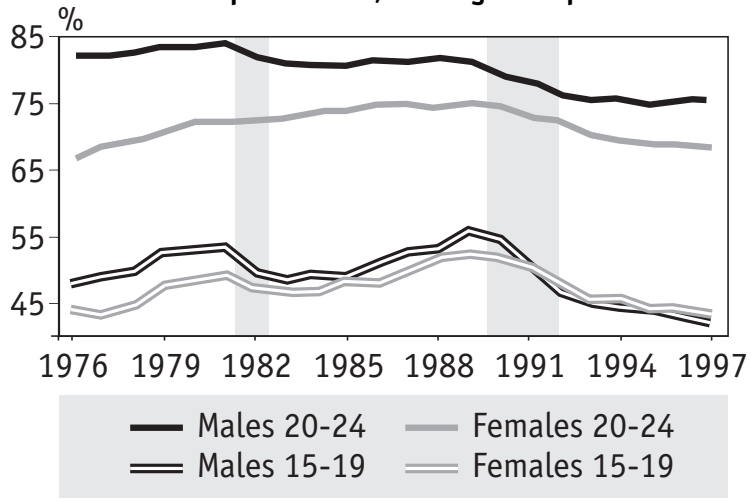
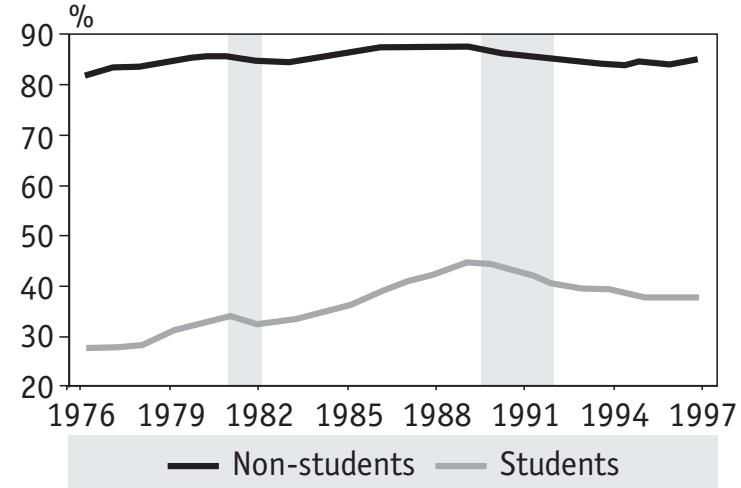


Chart 4 Student/Non-Student Participation Rates, Ages 15-24 yrs



ticipation rates can also be observed. In the 15-19 age group, the rates for both sexes have been almost the same since 1991. However, among 20- to 24-year-olds, the difference between male and female participation rates, which was 15.5 percentage points in 1976, narrowed to four percentage points by the early 1990s, then widened to 7.2 percentage points in 1997.

Participation rates for the 15- 24 age group can be separated out for full-time students and non-students (including part-time students) (Chart 4). These groups have very different participation rates. Over the period as a whole, the rate for non-students was on average 50 percentage points higher than that for students. However, between 1976 and 1989, the student participation rate increased more than the non-student rate. From 1989 to 1997, the student participation rate dropped by 6.7 percentage points, while the non-student participation rate fell by only 2.2 percentage points. Since the end of the last recession, and particularly since 1994, the non-student participation rate has begun to increase gradually. On the other hand, the student participation rate has stabilized at about 38 per cent since 1995. Stronger cyclical sensitivity can be observed in the participation rate of students than in that of non-students, as shown in the shaded areas.

The two groups most affected by the declining participation rate in the 1990s were male and female students aged 15-19 (Chart 5). From 1989 to 1997, the participation rate of male students in this age group declined by 11.4 percentage points, while that of their female counterparts fell by 8.9 percentage points. In contrast, for students aged 20-24, participation rates were higher in 1997 than in 1989. Males and females in this group registered increases of 1.4 and 2.1 percentage points respectively over the period. It should be noted that in both the 15-19 and 20-24 age groups, female student participation rates were appreciably higher than those of their male counterparts.

Between 1989 and 1997, the participation rate of non-students (Chart 6) declined less than that of students. The declines in non-student participation rates for males and females aged 15-19 were 4.4 and 5.4 percentage points respectively, while the rates for men and women aged 20-24 fell by 1.1 and 2.5 percentage points, respectively.

The decrease in youth participation rates was accompanied by a strong increase in the school

enrolment rate. School enrolment among 15- to 24-year-olds increased by 10.5 percentage points (Chart 7), following a rise of 6.9 percentage points in 1976-89. Economic downturns seem to be marked by a more rapid increase in the school enrolment rate, as shown in the shaded areas in Chart 2.6.

Increases in the school enrolment rate differed from one demographic group to another (Chart 8). School enrolment for 15- to 19-year-olds was similar for men and women. However, a more rapid increase in school enrolment can be observed among women aged 20-24 than among males of the same age. From 1989 to 1997, women and men aged 20-24 exhibited the greatest rise in school enrolment, with increases of 14.4 and 10 percentage points, respectively. For the 15-19 age group, this period was marked by more modest increases (5.7 and 6.1 percentage points for men and women, respectively).

The 9.4 percentage point drop in the youth participation rate between 1989 and 1997 is the result of both decreases of 6.7 and 2.2 percentage points for students and non-students, respectively, and an increase of 10.2 percentage points in the school enrolment rate. A rise in school enrolment gives more weight to the student participation rate within the aggregate participation rate. When the participation rates of students and non-students remain constant, an increase in school enrolment translates into a decline in the aggregate participation rate. From 1976 to 1997, the participation rate of students was nearly 50 percentage points lower, on average, than that of non-students. Since school enrolment has increased by 17.4 percentage points since 1976, the effect on the youth participation rate has been considerable.

Jennings (1998) analysed aggregate participation rates to determine what proportions of the decrease among 15- to 24-year-olds could be attributed to changes in school enrolment, and student and non-student participation. His results indicate that 44 per cent of the drop in the aggregate rate between 1989 and 1996, is accounted for by the increase in school enrolment, while decreases in the student and non-student participation rates accounted for 38 per cent and 18 per cent of the drop respectively.

Chart 9 shows the historical relationship between the school enrolment rate and the participation rate. It suggests that there was no stable relationship between the two rates from 1976 to 1997. Rather, there were three distinct episodes. The first covered the period from 1976 to 1981 and was characterised by a rise in the participation rate, along with a slight drop in the school enrolment rate. The second, between 1983 and 1989, was characterised by a simultaneous increase in both rates. The third, since 1989, featured a negative relationship between the participation rate and school enrolment, i.e. an increase in school enrolment accompanied by a decrease in the aggregate participation rate.

Chart 5 Student Participation Rate, Four Age Groups

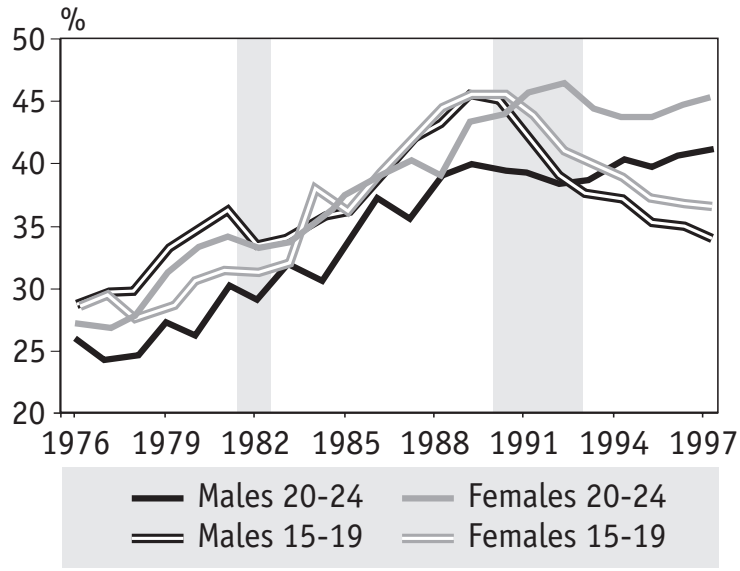


Chart 6 Non-Student Participation Rate, Four Age Groups

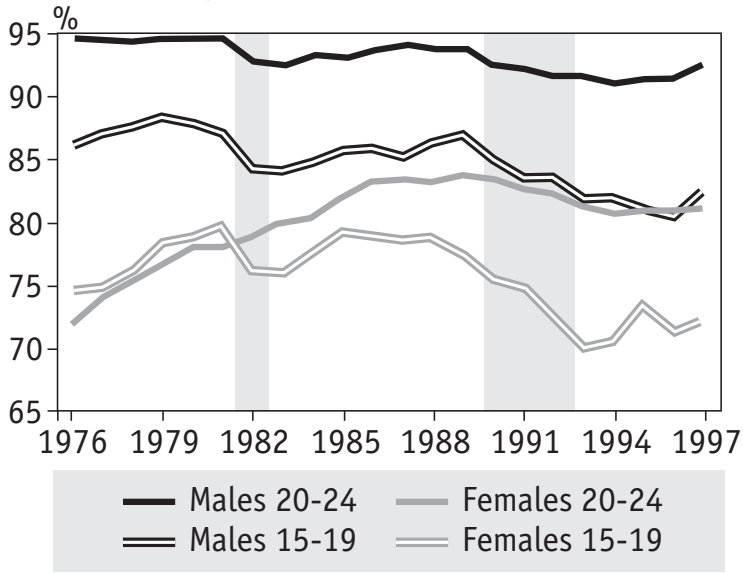


Chart 7 School Enrolment Rate, 15-24-Year-Olds

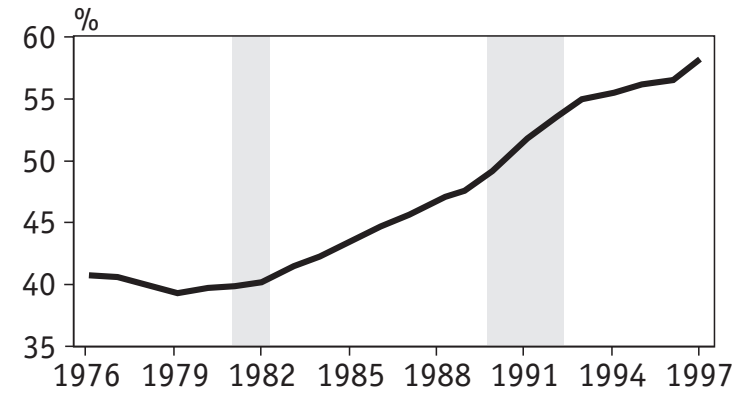


Chart 8 School Enrolment Rate, Four Age Groups

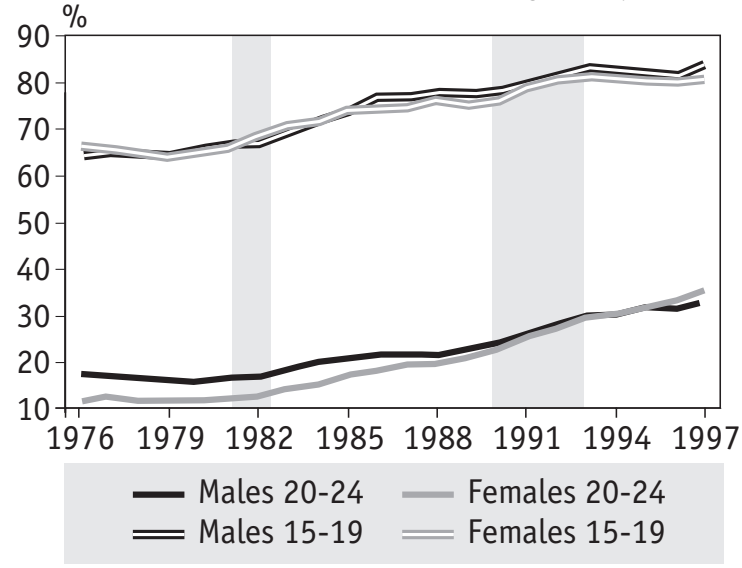
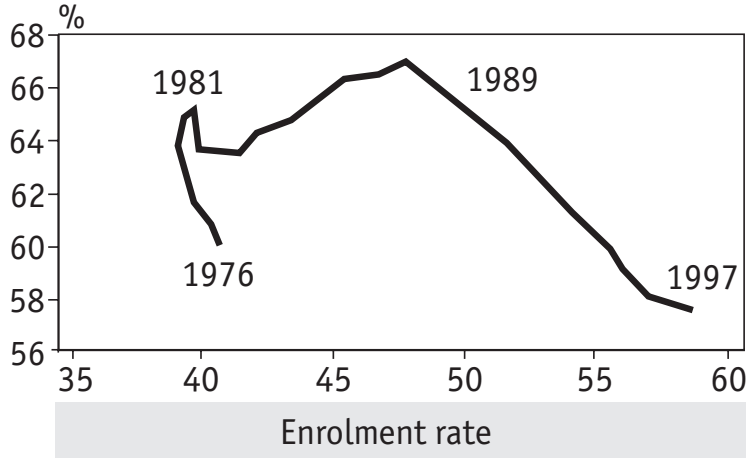


Chart 9 Relationship Between Participation and School Enrolment Rates, 15-24-Year-Olds



The increase in school enrolment was accompanied by a decline in the proportion of young people who were neither in school nor in the labour force (Chart 10). Between 1976 and 1997, this proportion decreased by 4.6 percentage points, a 45 per cent drop from its 1976 level. In 1997, only 5.7 per cent of young people aged 15 to 24 were neither in the labour force (working or looking for work) nor pursuing studies. The proportion of young people who were neither in school nor working fell by 5.8 percentage points over the same period, a 34 per cent drop from 1976. In 1997, 11.1 per cent of young people were neither working nor attending school.

A comparison of the demographic groups (Charts 11 and 12) shows that women aged 20-24 registered much higher rates of non-participation and non-enrolment in school than the other three groups. The number of women in this group with young children probably accounts for this result. Non-participation and non-enrolment fell for all categories of young people, with the exception of men aged 20-24, whose rate increased slightly between 1976 and 1997.

Analysis of Youth Participation Rates

The Model

In analysing youth participation rates, we break down the participation rate of young men and women aged 15-24 into three components — the student participation rate, non-student participation rate and school enrolment rate. The school enrolment rate is the full-time student population as a proportion of the youth population. Mathematically, the participation rate (PR) is expressed as the sum of the student participation rate (SPR) and the non-student participation rate (NSPR), weighted by the school enrolment rate (SER); thus, PR = SER*SPR + (1-SER)*NSPR. This decomposition makes it possible to take into account behavioural differences between students and non-students, and to treat the SER as a phenomenon to be explained rather than a determinant of the participation rates.

All rates are estimated for 15- to 24-year-olds using two approaches. The first, an aggregate approach, analyses the 15-24 age group, while the second, a disaggregated approach, analyses four age groups, men and women aged 15-19 and 20-

24. The model's equations are presented in Appendix 1. The analysis by demographic group makes it possible to identify behavioural differences among groups. For comparison purposes, we also estimate an aggregate participation rate equation for the 15-24 age group and for each demographic group separately. Each equation to be estimated contains the same explanatory variables.

The explanatory variables are as follows: one cyclical variable, deviations from the trend ($E - \overline{E}$) in the employment rate for 25- to 54-year-olds,[2] and five structural variables. The structural variables are the average real wage (w), the relative minimum wage (rmw), an employment insurance variable (ei), a social assistance variable (sa), and the rate of return to education (rreduc).

In theory, the cycle has an indeterminate effect on SPRs, NSPRs and SERs. When economic activity declines and job prospects deteriorate, two types of effects are observed: a "discouraged worker effect," which leads workers to withdraw from the labour force, and an "added worker effect," which leads other workers to enter the labour market to boost family income when a member of the household has lost his or her job.

Average real wages and relative minimum wages also have a priori indeterminate signs. The effect these variables may have on participation and school enrolment rates will depend on the income and substitution effects.[3]

Studies by Card and Riddell (1992, 1996) conclude that an increase in the generosity of unemployment insurance has a positive effect on the participation rate. Moreover, this effect is greater among weakly attached workers (i.e. the 15-24 age group) than among workers who are strongly attached to the labour market (i.e. the 25-54 age group). This conclusion is also consistent with that of Ferrall (1994). The more generous the UI program, the more likely young people are to enter the labour force. Accordingly, the unemployment insurance program could be expected to have a negative impact on the decision of whether or not to attend school full time.

We expect social assistance might have a negative effect on participation rates and an uncertain effect on school enrolment rates. Unlike the unemployment insurance program, which requires that claimants work a minimum number of weeks to qualify for benefits, social assistance programs require no previous work experience in order to qualify. Moreover, for every $1 a beneficiary earns in the labour market, $1 is generally deducted from social assistance benefits.[4] Thus, for a social assistance beneficiary to give up his or her benefits and enter the labour force, the income from work must at least equal the benefit plus a premium reflecting the fixed costs associated with having a job. The effect of social assistance on school enrolment rates is uncertain because the rules differ from one province to another (National Council on Welfare, 1997-98). For example, full-time students in post-secondary educational institutions are eligible for social assistance in

Chart 10 Percentage of Young People Neither in School nor Employed, 15-24-Year-Olds

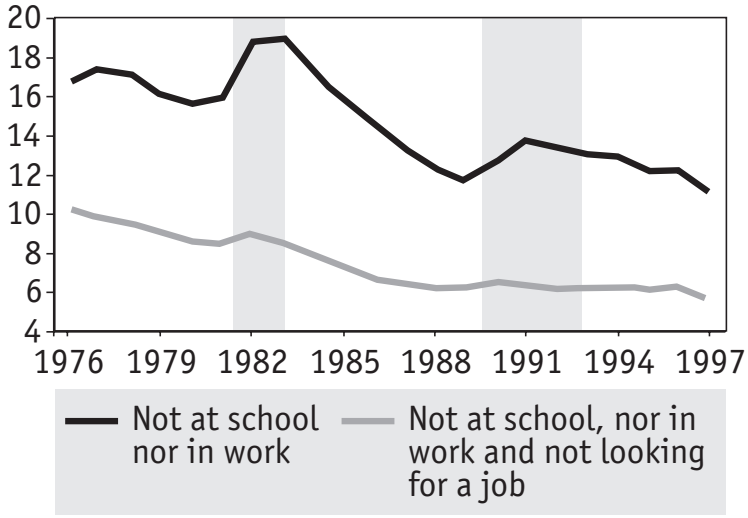


Chart 11 Percentage of Young People Neither in School nor in the Labour Force

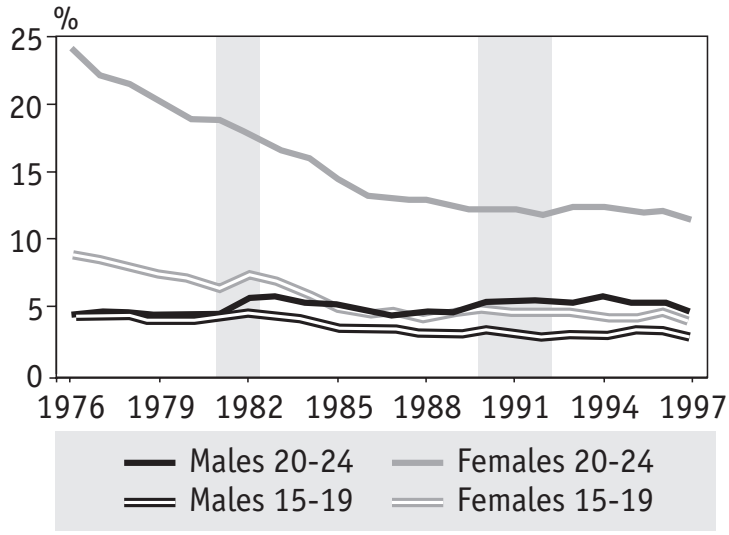
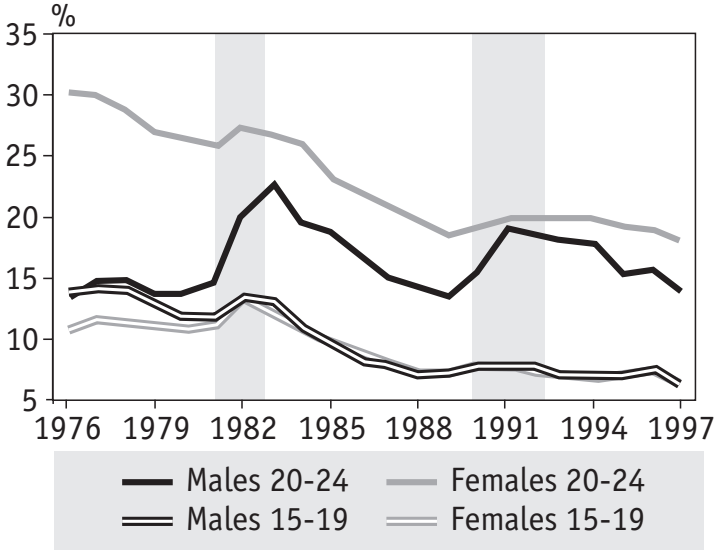


Chart 12 Percentage of Young People Neither in School nor Employed



some provinces only if they meet specific criteria. On the other hand, in other provinces, a student cannot apply for social assistance before leaving school.

We have also investigated the possibility of using the rate of return to education as an additional variable to characterize the decision of whether or not to be a full-time student. Unfortunately, data for this variable are of poor quality and available only from the mid-1980s, which has the effect of reducing the estimation period. We therefore rejected this variable.

Econometric Approach

The participation and enrolment rate equations are estimated using a SUR estimation procedure, on five regional equations[5] (Atlantic, Quebec, Ontario, Prairies and British Columbia). This method provides 95 observations.[6] Since our objective is to explain the drop in participation rates nationally, we impose an equality constraint on the regional coefficients.[7] In other words, we force the determinants to have the same impact on participation and school enrolment rates in each region.

The model is estimated in first difference in order to take into account the presence of unit roots in most of the series used. Our results are interpreted as percentage point change on the endogenous variables. In addition, we use a quadratic form in treating the relative minimum wage variable so as to take into account the fact the higher the minimum wage, the larger the number of individuals will be covered by it.

Results of the Analysis

Estimation Results

By and large, regression results are satisfactory (See Table A1 -A5 in the appendix for the regression for the 15-24 age group. See Archambault and Grignon, 1999, for regression results for 5-year age groups). They show the importance of economic conditions and the modest effect of public policy programs on the decisions to participate in the labour market and go to school.

The cyclical variable is significant and positive in all the estimated participation rate equations, indicating the prevalence of the discouraged worker phenomenon. The strongest effects were observed in the equations for students, particularly in the 15-19 age group. The effect of the cycle on school enrolment rates is negative, as we expected, and of less magnitude than the effect on participation rates. One percentage point increase in the employment rate of the 25-54 age group has an effect of between 0.7 and 0.9 of a percentage point on the overall 15-24 participation rate, 1.2 to 1.5 of a percentage point on the student participation rate, 0.3 of a percentage point on the non-student participation rate and –0.5 to –0.8 of a percentage point on the school enrolment rate.

The unemployment insurance variable is significant and of the anticipated sign in four of the 20 estimated equations. In each of the school enrolment equations, this variable has a positive sign, contrary to what one might expect. The unemployment insurance variable was excluded in the estimation of school enrolment rates.[8] The social assistance variable is significantly different from zero and of the anticipated sign in 75 per cent of the estimated equations. The average real wage is also significant in 75 per cent of the estimated equations.[9] The relative minimum wage has significant effects in 30 per cent of the estimated equations.

Regression diagnostics are satisfactory in most of the 20 estimated equations, with no serious problems. Most of the Durbin Watson statistics are close to 2 while the value of others is between the lower and upper limits of the Durbin table, i.e. in the grey area where the presence of autocorrelation in the error term can be neither accepted

nor rejected. However, certain equations seem to have suffered from multicollinearity. In certain estimates, withdrawing a variable has a major impact on the estimation of the other parameters. A longer estimation period would no doubt help rectify this problem.[10]

Simulation Results

Dynamic simulations of each component of the 20 estimated equations for 1990-96 were performed to assess the cumulative impact of each of the explanatory variables on changes in the participation and school enrolment rates.[11] The results of the aggregated and disaggregated approaches for the 15-24 age group are presented in Table 1.[12] The simulation results for the four age groups are found in Table A5 and A6 of the appendix.

The simulations do a fairly good job reproducing the observed declines in the student participation rate, with simulated drops of 5.0 and 4.5 percentage points for the aggregated and disaggregated approaches respectively, compared with an observed drop of 6.5 percentage points. Our simulations reproduce 77 per cent (aggregated) and 70 per cent (disaggregated) of the drop in the student participation rate between 1990 and 1996 and 61 per cent and 121 per cent of the decrease in the non-student rate. On the other hand, the simulation of school enrolment rates reproduce respectively 134 per cent and 100 per cent of the observed increase. The preceding results could explain 94 per cent and 85 per cent, respectively, of the observed changes in the participation rate calculated for 15- to 24-year-olds using the aggregated or disaggregated approach, compared with 96 per cent and 86 per cent of the estimated participation rate for this age group in 1990-96. Thus, it seems that the aggregated approach is better at reproducing the decline in the youth participation rate than the disaggregated approach. However, the disaggregated approach enable us to identify behavioural differences among the four demographic groups.

The cyclical variable explains between 48 and 33 per cent of the drop of the overall participation rate in the 15-24 age group between 1990 and 1996. The cycle explains between 67 per cent and 54 per cent of the decline in the student participation rate, between 35 per cent and 39 per cent of the decline in the non-student participation rate and between 19 per cent and 33 per cent of the increase in the school enrolment rate. The cycle appears to make a greater contribution to the decrease in the participation rate in the 15-19 age group than in the 20-24 age group (Table A-6 in the appendix). Among women aged 15-19, slightly more than 49 per cent of the decrease appears to be due to cyclical fluctuations, as opposed to only 19 per cent in the 20-24 age group. Among men aged 15-19, the economic cycle's contribution to the decrease in the aggregate participation rate is 41 per cent, as opposed to 40 per cent among men aged 20-24.

Among the structural variables, increases in the relative minimum wage explain between 9 and 3 per cent of the decline in the participation rate for the 15-24 age group. The effect of the minimum wage is greater among students than among non-students, contributing 12 per cent and 1 per cent according to the disaggregated approach. However, according to the aggregated approach, the effect of the relative minimum wage is nil for both groups although there is an important effect on the school enrollment rate. Using both approaches, the changes made to unemployment insurance during the 1990s have a modest effect on the participation rate among 15-24 year-olds. These changes explain only 2-3 per cent of the decline in the participation rate in the 15-24 age group during the 1990s, or about 0.2 percentage point. The contribution of social assistance and average real wages to the youth participation rate is negligible, regardless of the approach used.

Conclusion

To our knowledge, this study is the first to model jointly the decisions on whether to attend school or to participate in the labour force. Unlike other studies, it treats the decision to attend school as a phenomenon to be explained rather than a determinant of participation rates. Although hampered by data limitations, our approach enables us to distinguish significant and distinct cyclical effects on participation rates and the school enrolment rate. It therefore enables us to better measure cyclical and structural effects on participation and school enrolment among young Canadians.

This study performs a multivariate analysis by applying a SUR econometric estimation procedure to the data on participation and school enrolment rates among men and women aged 15-19

Table 1 Results of simulations for the 15-24 age group (1990-96)

	Cycle	EI	SA	W	RMW	Trend	Total	Residual	Observed
Contribution in percentage points									
Aggregated approach, both sexes, 15-24 age group									
Students	-4.36	-0.33	-0.41	0.20	0.00	-0.06	-4.98	-1.49	-6.47
Non-students	-0.83	0.00	-0.05	-0.22	0.00	-0.32	-1.43	-0.91	-2.33
School enrolment	2.39	0.00	-0.11	-0.14	0.69	6.62	9.45	-2.18	7.28
Calculated[1]	-3.74	-0.17	-0.19	0.05	-0.29	-2.95	-7.28	-0.44	-7.72
Estimated [2]	-2.76	0.00	0.00	0.00	-0.70	-3.94	-7.09	-0.63	-7.72
Disaggregated approach, weighted sum of the four demographic groups									
Students	-3.47	-0.29	0.08	-0.06	-0.80	0.03	-4.51	-1.96	-6.47
Non-students	-0.90	0.00	0.08	0.03	-0.03	-1.99	-2.81	0.48	-2.33
School enrolment	1.41	0.00	0.03	-0.09	-0.03	6.00	7.32	-0.04	7.28
Calculated[1]	-2.82	-0.21	0.07	0.00	-0.25	-3.35	-6.56	-1.16	-7.72
Estimated[2]	-2.54	0.00	0.06	-0.12	-0.39	-3.66	-6.64	-1.18	-7.72
Contribution in percentage points									
Aggregated approach, both genders, 15-24 age group									
Students	67	5	6	-3	0	1	77	23	100
Non-students	35	0	2	10	0	14	61	39	100
School enrolment	33	0	-1	2	9	91	134	-34	100
Calculated	48	2	2	-1	4	38	94	7	100
Estimated	36	0	0	0	9	51	96	4	100
Disaggregated approach									
Students	54	4	-1	1	12	0	70	30	100
Non-students	39	0	-3	-1	1	85	121	-21	100
School enrolment	19	0	0	-1	0	82	101	-1	100
Calculated	37	3	-1	0	3	43	85	15	100
Estimated	33	0	-1	2	5	47	86	14	100

1 Calculated = SER*SPR+(1-SER)*NSPR,

2 Estimated: participation rate estimated directly, without decomposition

and 20-24 in the five major Canadian regions but no regional results, between 1976 and 1996. First difference estimates are used to avoid the spurious correlation problem with non-stationary variables.

The study considers several economic policy variables among the possible influences on the evolution of participation rates: minimum wage as a proportion of the industrial hourly wage rate, an index of the disincentive effects of the employment/unemployment insurance, and the real average level of social assistance benefits paid to a couple with two children.

Our results indicate the business cycle has some significant effects on the youth labour force participation rate:

- The business cycle accounts for 33 to 50 per cent of the total decline in the youth participation rate from 1989 to 1996, or 2.8-3.7 percentage points of the 7.7 percentage point decline.
- The participation rates of students and young people aged 15-19 are more affected by the business cycle than those of other young people. Our estimates suggest the cyclical sensitivity of participation rates of 15- to 19-year-olds is slightly greater than that of young people aged 20-24 and that the participation rate of students is between four to five times more sensitive than that of non-students.
- The participation rates among 15- to 19-year-old women are as sensitive to the business cycle as are those of their male counterparts, while among women aged 20-24, sensitivity to the business cycle is a little more than 60 per cent that of men.
- School enrolment is also cyclical, as a certain number of youth go back to school because they have difficulty finding work. Our estimates suggest that, for every 100 young people who leave the labour force as a result of the cyclical job situation, 50-65 go back to school.

This last observation is good news, since the overall decline in the youth participation rate is accompanied by a decrease in the percentage of young people who are neither attending school nor in employment or looking for a job. The proportion of young people who do not attend school full-time or work went from 16.8 per cent in 1976 to 11.1 per cent in 1997. The proportion of youth who were neither in the labour force nor students rose from 10.3 per cent to 5.7 per cent over the same period. Our results indicate that the decrease in the youth participation rate and the concomitant increase in the school enrolment rate in the 1990s are mainly structural in nature, even though the business cycle played an important role, especially in accounting for the declining youth participation rate.

Our results also indicate that income support and UI have a modest effect on young people's decision to remain in the labour force or to attend school. Changes made to the UI program during the 1990s only account for 3 per cent of the decrease in the youth participation rate over this period, or 0.2 of the 7.7 percentage point decline; theses changes have no measurable effect on school enrolment. Changes in the UI program affect the participation rate of mainly young people in school. This rate is much more sensitive to economic and program influences than is the rate of young people who are not in school. It seems that, overall, changes to social assistance have had only a negligible effect on youth participation rates and school enrolment.

Increases in the minimum wage relative to the average industrial hourly wage in several provinces seem to have aggravated the employment situation among young people, the net effect of which has been their withdrawal from the labour force. Increases in the minimum wage account for between 0.3 and 0.7 percentage point, or 3 to 9 per cent of the decrease in the youth participation rate in the 1990s.

Our results indicate the youth participation rate will likely not return to its 1989 level in the near future, given that 50 per cent-60 per cent of the decline seen in the 1990s is structural. By applying the estimated percentage of the total effect attributable to the business cycle to the 8.3 percentage point decrease observed between 1990 and 1997, we can expect, other things being equal, an increase of between 3.2 and 4.1 percentage points in the youth participation rate by the time the economic recovery is complete, assuming that the intensity of economic activity attains a level comparable to that of 1989.

Though our results help explain the importance of some structural and cyclical influences on the evolution of the youth participation rate in the 1990s, they cannot claim to completely account for the decline in youth participation rates.

About 40 per cent of the decline is explained by the deterministic tendency of the model. The nature of the structural forces that have caused the decline in the youth participation rate of the 1990s is still not fully understood. Still less is known about the nature of structural influences on the decision to whether or not attend school.

Much work remains to be done. Longer data series would undoubtedly enable us to obtain stronger, more precise estimates of participation rates and school enrolment. The model does not completely explain the school enrolment rate. The addition of the rate of return to education as a variable might improve the results.

The approach could be expanded to take into account new data released by Statistics Canada in March 1998. These new data make it possible to distinguish part-time students from non-students. They also provide information on the participation of individuals aged 25-29 according to whether or not they are students.

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Notes

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Any errors or omissions are the responsibility of the authors. The analysis and opinions expressed in this paper are the authors' and do not necessarily reflect the opinions of Human Resources Development Canada or the federal government.

1. The data on participation and school enrolment rates are calculated on the basis of an annual average of eight months (January-April and September-December). The reason for this method of calculation is that there are two separate surveys on students at Statistics Canada. The first covers the aforementioned eight months while the second covers summer students who expect to return to school in September. We exclude the latter group from the annual average because the two surveys differ greatly methodologically.

2. We use the deviations in the employment rate for 25- to 54-year-olds since this group is less sensitive to structural changes than the other age groups. Thus, the historical movements in the series of employment rates for 25- to 54-year-olds are predominantly cyclical in nature. We also considered the unemployment rate and the growth rate of gross domestic product as cyclical variables. Unfortunately, the former is determined simultaneously with the unemployment insurance disincentive index and the latter is affected by changes of a structural nature.

3. On this subject, see the Fortin and Fortin (1999) study published in this issue.

4. Some provincial programs allow beneficiaries to earn income under specific rules without being penalized 100 per cent. For example, Quebec's Apport program lets beneficiaries keep some of their employment earnings. The purpose is to encourage beneficiaries to reenter the labor market.

5. Provincial data are also available. However, in the four Atlantic provinces and two of the Prairie provinces (Manitoba and Saskatchewan), the size of the samples is small and the series exhibit much statistical noise and volatility. To avoid these problems, we preferred to aggregate the series of participation and school enrolment rates of the Atlantic and Prairie provinces.

6. The data on student and non-student participation rates and the school enrolment rate are only available from 1976 to 1997. Moreover, the social assistance and unemployment insurance series ended in 1996 at the time when we were performing our calculations. Equation 6 is a first-difference equation and incorporates a lagged variable. Our reference period is therefore 1978 to 1996, giving us 19 observations per equation for a total of 95 observations.

7. To be "econometrically correct," we should have tested these constraints before imposing them. To do so, we would have had to estimate a model with a free coefficient, which takes us back to square 1, i.e. 95 observations with 70 parameters to be estimated, or five degrees of freedom per equation. With so many parameters to be estimated for so few observations, the power of the tests on the constraints would have been weakened seriously. Moreover, during the preliminary estimates, in which we left the coefficients unconstrained, we observed serious problems with the residuals of some equations. In particular, we obtained series of residuals with a negative slope or strong correlation. We therefore decided to estimate a constrained model.

8. This was done because in the school enrolment rate equations, this variable captures part of the cyclical effect. The general form of the SER series is a positive trend with cyclical movements, while that of the unemployment insurance indicators is a negative trend with cyclical movements. When we include it, the coefficient associated with the unemployment rate among the 25-44 age group, our cyclical variable is marginally significative. Once excluded, the coefficients of our cyclical variable are significantly different from zero.

9. This variable is excluded from the 15- to 19-year-olds equations, since individuals have to be at least 18 years old to qualify for social assistance.

10. The short period available for estimating the model also prevents us from running structural stability tests and which undoubtedly weakens the strength of most of the conventional statistical tests. The only solution that exists in the case of multicollinearity is to add observations; thus, several more years would be required, something we do not have available at this time.

11. The level of the cyclical variable, the employment rate's deviations from the trend, was adjusted using the national output gap series estimated by Finance Canada. To do so, we estimated an equation in which the national employment rate's deviations from the trend are explained by a constant and the contemporaneous output gap, and lagged by one period. We then adjusted the level of deviations in the employment rate by subtracting from it the estimated constant, which was 0.12.

12. To calculate the effect on 15- to 24-year-olds, we weighted the results of simulations of the four demographic groups by using their corresponding weight of the population (student, non-student, total for the school enrolment rate and the overall rate) of each of these groups in relation to the corresponding population of 15- to 24-year-olds.

13. Except in the equations for the 15-19 age group, where the social assistance variable is excluded.

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Appendix 1

Theoretical Model

To determine what factors are responsible for the decline in participation rates among young people aged 15-24, we will use the following identities:

$$(1) \quad PR_j = \sum_{i=1}^{4} \alpha_{ij} PR_{ij}$$

$$(2) \quad PR_{ij} = SPR_{ij} * SER_{ij} + NSPR_{ij} * (1 - SER_{ij})$$

and the following behavioural equations:

$$(3) \quad SPR_{ij} = \beta_{10} + \beta_{12} (E_{ij} - \overline{E}_{ij}) + \beta_{13}\, ui_{ijt} + \beta_{14}\, sa_{ijt} + \beta_{15}\, w_{ijt} + \beta_{16}\, rmw_{ijt} + \varepsilon_{ijt}$$

$$(4) \quad NSPR_{ij} = \beta_{20} + \beta_{22} (E_{ij} - \overline{E}_{ij}) + \beta_{23}\, ui_{ijt} + \beta_{24}\, sa_{ijt} + \beta_{25}\, w_{ijt} + \beta_{26}\, rmw_{ijt} + \varepsilon_{ijt}$$

$$(5) \quad SER_{ij} = \beta_{30} + \beta_{32} (E_{ij} - \overline{E}_{ij}) + \beta_{33}\, ui_{ijt} + \beta_{34}\, sa_{ijt} + \beta_{35}\, w_{ijt} + \beta_{36}\, rmw_{ijt} + \varepsilon_{ijt}$$

PR: participation rate

SPR: student participation rate

NSPR: non-student participation rate

SER: school enrolment rate

: deviations in the employment rate for 25- to 54-year-olds from the trend as estimated by an HP filter

ui: unemployment insurance program dissuasion index.

sa: real social assistance benefits received by a couple with two children. The other choice we had for this variable was social assistance benefits received by a single mother, but this choice was more restrictive than the first.

w: average real wages for all workers.

rmw: relative minimum wage, where wm is the minimum wage and wh is the average industrial hourly wage.

i: an index corresponding to the four demographic groups, namely men and women aged 15-19 and 2024 and the aggregate 15-24 age group.

j: an index corresponding to the five Canadian regions.

t: an index to mark time.

The 20 equations we will estimate will have the following form:[13]

$$(6)\quad \Delta PR_{ij} = \beta_0 + \beta_1 \Delta T_{ij(t-1)} + \sum_{k=0}^{1} \beta_{2k}\, \Delta(E_{ij} - \bar{E}_{ij)_{t-k}} + \sum_{k=0}^{1} \beta_{3k}\, \Delta(ui_{ij)_{t-k}} + \sum_{k=0}^{1} \beta_{4k}\, \Delta\log(sa_{ij)_{t-k}} + \sum_{k=0}^{1} \beta_{5k}\, \Delta\log(w_{ij)_{t-k}} + \sum_{k=0}^{1} (\beta_{6k}\, \Delta(wm_{ij}/wh_{ij)_{t-k}} + \beta_{7k}\, \Delta(wm_{ij}/wh_{ij})^{2}_{t-k}) + \varepsilon_t$$

where

Δ: first difference

$\Delta\log$: rate of growth of (x)

k: an index to mark the lag structure.

The data

PR, SPR, NSPR, SER: The data on youth, student and non-student participation rates and school enrolment rates were taken from Statistics Canada's Labour Force Survey. These series are based on eight-month annual average. The survey covers the participation of full-time and part-time students and non-students during the months of January to April and September to December. The data for the summer months are not compatible with those for the other months because only respondents who intend to return to school in September are treated as students.

E: employment rate for 25-54 year-olds, Statistics Canada's Labour Force Survey

$(\bar{E})$: trend in employment rate in the 25-54 age group as estimated by an HP filter

ui: employment insurance program dissuasion index calculated by Tim Sargent of Department of Finance Canada. This variable was made instrumental by estimating it on a constant, lagged by itself and the unemployment insurance index with a constant contemporaneous unemployment rate and lagged by one period.

sa: real social assistance benefits received by a couple with two children. These series were produced by Pierre Lefebvre at the Université du Québec à Montréal for each province.

W: average wages per employee divided by the CPI. Conference Board of Canada.

RMW: WM/WH

WM: Bureau of Labour Information, Human Resources Development Canada

WH: hourly industrial wages, Statistics Canada. There are two series of hourly industrial wages. The first begins in 1961 and ends in March 1983 (D708311), and the current series begins in January 1983 (L59959).

Table A1 Student participation rate equation, both sexes, 15-24 age group

	β	St. dev.	T	β	St. dev.	T
C	0.895	0.384	2.332	1.374	0.316	4.348
T^2	-0.032	0.031	1.015	-0.079	0.025	3.131
Endo -1	0.124	0.096	1.296	-	-	-
Gape	1.210	0.133	9.096	1.157	0.138	8.398
Gape –1	0.289	0.193	1.500	0.395	0.123	3.216
UI	0.020	0.012	1.749	0.023	0.010	2.278
UI –1	0.013	0.010	1.354	-	-	-
W	-0.063	0.059	1.065	-	-	-
W–1	-0.070	0.058	1.197	-0.094	0.059	1.587
SA	0.088	0.031	2.860	0.069	0.030	2.304
SA-1	-0.056	0.035	1.604	-0.071	0.033	2.160
RMW	-0.125	0.590	0.212	-	-	-
RMW2	-0.003	0.007	0.422	-	-	-
RMW –1	-0.499	0.588	0.849	-	-	-
RMW2 –1	0.006	0.007	0.986	-	-	-
R^2		0.496			0.492	
Adjus. R^2		0.409			0.452	
Standard dev. from regression		1.467			1.413	
Durbin Watson		2.374			2.169	

Table A2 Non-Student participation rate equation, both sexes, 15-24 age group

	β	St. dev.	T	β	St. dev.	T
C	0.813	0.296	2.747	0.565	0.222	2.535
T^2	-0.073	0.024	3.100	-0.035	0.017	2.039
Endo -1	-0.033	0.099	0.336	-	-	-
Gape	0.326	0.094	3.468	0.305	0.082	3.721
Gape –1	-0.240	0.107	2.239	-	-	-
UI	-0.011	0.008	1.380	-	-	-
UI –1	-0.018	0.007	2.398	-	-	-
SA	-0.022	0.020	1.084	-	-	-
SA-1	-0.019	0.022	0.876	-0.032	0.018	1.773

	β	St. dev.	T	β	St. dev.	T
W	0.053	0.041	1.280	-	-	-
W –1	0.077	0.040	1.943	0.107	0.037	2.876
RMW	-0.416	0.378	1.099	-	-	-
RMW2	0.005	0.004	1.212	-	-	-
RMW –1	-0.501	0.373	-1.344	-	-	-
RMW2 –1	0.005	0.004	1.191	-	-	-
R^2		0.388			0.249	
Adjus. R^2		0.280			0.217	
Standard dev. from regression		0.817			0.874	
Durbin Watson		2.004			2.046	

Table A3 School enrolment rate equation, both sexes, 15-24 age group

	β	St. dev.	T	β	St. dev.	T
C	0.358	0.225	1.591	0.149	0.277	0.538
T^2	0.030	0.019	1.619	0.038	0.024	1.594
Endo -1	0.284	0.093	3.040	0.323	0.087	3.721
Gape	0.089	0.074	1.194	-0.168	0.073	2.293
Gape –1	-0.152	0.083	1.838	-0.353	0.074	4.800
UI	0.034	0.007	4.959	-	-	-
UI –1	-0.001	0.007	0.084	-	-	-
W	0.022	0.012	1.767	-	-	-
W –1	0.017	0.015	1.171	0.066	0.033	2.006
SA	-0.024	0.033	0.715	0.025	0.014	1.832
SA-1	0.055	0.033	1.699	-	-	-
RMW	-0.411	0.379	1.086	-0.670	0.319	2.105
RMW2	0.007	0.004	1.577	0.009	0.004	2.428
RMW –1	1.039	0.360	2.888	0.607	0.308	1.971
RMW2 –1	-0.012	0.004	2.863	-0.007	0.004	1.927
R^2		0.327			0.268	
Adjus. R^2		0.209			0.181	
Standard dev. from regression		0.944			0.961	
Durbin Watson		2.174			2.026	

Table A4 Participation rate equation, both sexes, 15-24 age group

	β	St. dev.	T	β	St. dev.	T
C	0.777	0.264	2.940	0.730	0.196	3.722
T^2	-0.095	0.022	4.236	-0.092	0.016	5.674
Endo -1	-0.025	0.092	0.275	-0.260	0.091	2.866
Gape	0.578	0.067	8.661	0.686	0.056	12.320
Gape –1	0.109	0.091	1.196	0.424	0.092	4.601
UI	-0.018	0.006	2.858	-	-	-
UI –1	-0.020	0.005	3.755	-0.018	0.006	3.107
W	-0.004	0.014	0.301	-	-	-
W –1	-0.007	0.018	0.406	-	-	-
SA	0.055	0.038	1.475	-	-	-
SA-1	0.005	0.035	0.135	-	-	-
RMW	-0.158	0.459	0.345	-	-	-
RMW2	-0.001	0.005	0.206	-	-	-
RMW –1	-2.280	0.414	5.508	-1.147	0.387	2.962
RMW2 –1	0.026	0.005	5.345	0.010	0.004	2.325
R^2		0.541			0.576	
Adjust. R^2		0.461			0.543	
Standard dev. from regression		1.036			0.938	
Durbin Watson		2.221			2.044	

Table A5 Results of simulations, by age group, percentage point contributions

	Cycle	UI	SA	W	RMW	Trend	Total	Res.	Observed
Men 15-19									
Students	-3.81	0.00	0.00	-0.24	-1.16	-0.77	-5.97	-4.11	-10.08
Non-Students	-2.29	0.00	0.00	0.27	-0.27	-3.63	-5.92	1.42	-4.51
School enrol.	2.25	0.00	0.00	-0.38	-0.13	2.60	4.34	-0.34	4.00
Calculated [1]	-4.37	0.00	0.00	0.04	-0.89	-2.42	-7.65	-2.92	-10.57
Estimated [2]	-3.85	0.00	0.00	-0.35	-1.56	-1.80	-7.55	-3.34	-10.90
Women 15-19									
Students	-4.38	-0.50	0.00	0.00	0.00	-2.37	-7.25	-1.44	-8.69
Non-Students	-2.42	0.00	0.00	0.00	0.00	-4.77	-7.19	3.00	-4.20

	Cycle	UI	SA	W	RMW	Trend	Total	Res.	Observed
School enrol.	1.27	0.00	0.00	-0.25	0.00	3.92	4.95	-1.67	3.28
Calculated	-4.36	-0.39	0.00	0.07	0.00	-3.98	-8.66	-0.18	-8.84
Estimated	-4.23	0.00	0.00	0.00	0.00	-4.74	-8.97	-0.51	-9.48
Men 20-24									
Students	-1.01	0.00	0.60	-0.38	-0.41	3.02	1.81	-0.56	1.25
Non-Students	-0.80	0.00	-0.03	0.00	0.00	-0.79	-1.63	0.53	-1.10
School enrol.	1.51	0.00	-0.21	0.23	0.00	7.83	9.36	-2.10	7.27
Calculated	-1.66	0.00	0.23	-0.22	-0.10	-3.71	-5.45	1.25	-4.20
Estimated	-1.80	0.00	0.22	0.00	0.00	-4.48	-6.06	2.00	-4.06
Women 20-24									
Students	-2.66	-2.10	0.00	0.46	0.00	5.51	1.22	-0.36	0.85
Non-Students	-0.23	0.00	0.23	0.00	0.00	-2.06	-2.06	-0.49	-2.55
School enrol.	0.64	0.00	0.32	0.00	0.00	9.37	10.33	0.04	10.37
Calculated	-1.06	-0.48	0.05	0.11	0.00	-3.31	-4.69	-0.82	-5.51
Estimated	-0.43	0.00	0.00	-0.13	0.00	-3.62	-4.17	-0.54	-4.71

1 Calculated = ser*spr+(1-ser)*nspr

2 Estimated: participation rate estimated directly without decomposition

Table A6 Results of simulations, percent contributions

	Cycle	UI	SA	W	RMW	Trend	Total	Res.	Observed
Men 15-19									
Students	0.38	0.00	0.00	0.02	0.11	0.08	0.59	0.41	1
Non-Students	0.51	0.00	0.00	-0.06	0.06	0.81	1.31	-0.31	1
School enrol.	0.56	0.00	0.00	-0.09	-0.03	0.65	1.09	-0.09	1
Calculated	0.41	0.00	0.00	0.00	0.08	0.23	0.72	0.28	1
Estimated	0.35	0.00	0.00	0.03	0.14	0.17	0.69	0.31	1
Women 15-19									
Students	0.50	0.06	0.00	0.00	0.00	0.27	0.83	0.17	1
Non-Students	0.58	0.00	0.00	0.00	0.00	1.14	1.71	-0.71	1
School enrol.	0.39	0.00	0.00	-0.08	0.00	1.20	1.51	-0.51	1
Calculated	0.49	0.04	0.00	-0.01	0.00	0.45	0.98	0.02	1
Estimated	0.45	0.00	0.00	0.00	0.00	0.50	0.95	0.05	1

	Cycle	UI	SA	W	RMW	Trend	Total	Res.	Observed
Men 20-24									
Students	-0.81	0.00	0.48	-0.31	-0.33	2.42	1.45	-0.45	1
Non-Students	0.73	0.00	0.03	0.00	0.00	0.72	1.48	-0.48	1
School enrol.	0.21	0.00	-0.03	0.03	0.00	1.08	1.29	-0.29	1
Calculated	0.40	0.00	-0.06	0.05	0.02	0.88	1.30	-0.30	1
Estimated	0.44	0.00	-0.05	0.00	0.00	1.10	1.49	-0.49	1
Women 20-24									
Students	-3.12	-2.46	0.00	0.54	0.00	6.46	1.42	-0.42	1
Non-Students	0.09	0.00	-0.09	0.00	0.00	0.81	0.81	0.19	1
School enrol.	0.06	0.00	0.03	0.00	0.00	0.90	1.00	0.00	1
Calculated	0.19	0.09	-0.01	-0.02	0.00	0.60	0.85	0.15	1
Estimated	0.09	0.00	0.00	0.03	0.00	0.77	0.88	0.12	1

Table A7 Changes observed in participation, school enrolment, inactivity and non-employment rates between 1976 and 1997

	Men		Women		Total	Men		Women		Total
	15-19	20-24	15-19	20-24	15-24	15-19	20-24	15-19	20-24	15-24
	Participation rate					School enrolment rate				
Δ1976-89	7.7	-1.0	8.5	8.3	7.0	8.7	5.1	13.3	9.3	6.9
Δ1989-97	-12.4	-5.7	-10.3	-6.7	-9.4	5.7	10.0	6.1	14.4	10.5
Total	-4.7	-6.7	-1.8	1.6	-2.4	14.4	15.1	19.4	23.7	17.4
	Student participation rate					Non-student participation rate				
Δ1976-89	16.7	13.8	18.2	14.4	16.5	0.8	-0.9	2.9	11.8	5.3
Δ1989-97	-11.4	1.4	-8.9	2.1	-6.7	-4.4	-1.1	-5.4	-2.5	-2.3
Total	5.3	15.2	9.3	16.5	9.8	-3.6	-2.0	-2.5	9.3	3.0
	Percentage of youths neither in school nor in labour force					Percentage of youths neither at school nor in employment				
Δ1976-89	-1.4	0.3	-4.2	-11.8	-4.0	-3.4	0.2	-6.5	-11.8	-5.0
Δ1989-97	-0.2	-0.1	-0.7	-1.0	-0.6	-0.9	0.4	-1.0	-0.5	-0.7
Total	-1.6	0.2	-4.9	-12.8	-4.6	-4.3	0.6	-7.5	-12.3	-5.7