

Recent Productivity Developments in Canada and the United States: Productivity Growth Deceleration versus Acceleration

Andrew Sharpe¹
Centre for the Study of Living Standards

THE RECENT AGGREGATE LABOUR productivity performance of the United States has been unprecedented in its robustness. In contrast, labour productivity growth has been much weaker in Canada. These developments have produced a significant divergence in productivity growth paths in Canada and the United States since 2000, particularly in 2002 and 2003. The objective of this article is to document this divergence, examine the factors behind it, and briefly explore the implications. The first section of the article examines recent developments in labour productivity, output, and employment trends in Canada and the United States. The second section attempts to explain the productivity growth deceleration in Canada and the productivity growth acceleration in the United States after 2000, comments on the sustainability of these trends, and discusses implications for Canada.

Recent Trends in the United States and Canada

Total Economy versus Business Sector Productivity Measures

Aggregate productivity growth can be measured at the total economy and business sector level.² Each measure has strengths and weaknesses. The strength of the total economy measure is that it is consistent with GDP per capita, the most widely used measure of living standards. Indeed, growth in GDP per capita can be easily decomposed into growth in GDP per worker and the employment/total population ratio. The main weakness of the total economy measure is that output in the non-business sector component of the total economy is measured by labour input. This by definition produces zero productivity growth for the sector and imparts a downward bias to total economy productivity growth.

The strength of the business sector definition of aggregate productivity is that output measurement problems are less severe than for the total economy measure. A serious weakness of

1 This article is based on a presentation at the 2004 Policy Conference "Economic Challenges and Opportunities Facing Canada" organized by the Canadian Association for Business Economics and the Ottawa Economics Association, March 24-25, 2004, Ottawa, Ontario. I would like to thank Jeremy Smith for research assistance and comments and Someshwar Rao for comments. Email: andrew.sharpe@csls.ca

2 See Smith (2004) for a detailed discussion of issues related to the appropriate measurement of aggregate labour productivity.

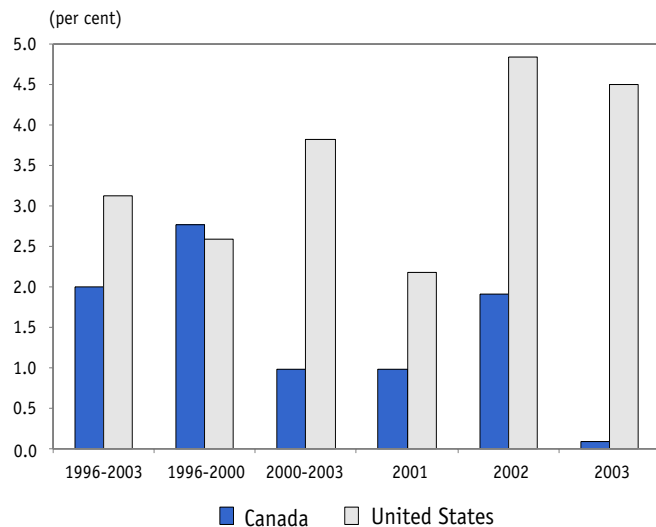
this measure, however, is that from the point of view of international comparisons the relative size of the business sector varies across countries. For example, a greater proportion of the health sector is found in the business sector (e.g. private hospitals) in the United States than in Canada, with implications for the relative size of the business sector in the two countries.

The official measure of aggregate labour productivity growth produced by both Statistics Canada and the Bureau of Labor Statistics is the business sector measure. This is the measure used in this paper. Fortunately, both measures have exhibited similar trends in recent years so the overall conclusions are not affected by the choice of measure.

Labour Productivity Developments

In the United States, business sector output per hour advanced a very strong 4.8 per cent in the United States in 2002, followed by 4.5 per cent in 2003 (Table 1 and Chart 1). The 2002 growth rate was the highest annual productivity growth rate on record in the United States according to the BLS output per hour series since 1950. The years 2002 and 2003 represent the only two-year period in recent U.S. economic history when output per hour growth exceeded 4 per cent for two consecutive years.³ The 4.6 per cent average annual productivity growth rate from 2001 to 2003 means that the productivity level (and living standards) would double in 16 years. With business sector output per hour growth registering a very strong 2.2 per cent in the recession year of 2001, output per hour has advanced at a 3.8 per cent average annual rate since 2000, well above the 2.6 per cent registered in 1996-2000 (Chart 1) and the 1.7 per cent in 1989-96 (Table 1). The initial productivity acceleration of the second half of

Chart 1
Business Sector Output per Hour Growth in Canada and the United States, 1997-2003
(average annual rates and annual rates of change)



Sources: GDP in chained dollars and total hours worked from the Productivity and Costs Program of the Bureau of Labor Statistics for the United States, and annual averages of quarterly estimates from the Productivity Program Database of Statistics Canada for Canada.

Table 1
Business Sector Labour Productivity Growth in Canada and the United States
(annual or average annual rate of change)

	Canada	United States
1989-1996	1.22	1.74
1996-2000	2.76	2.59
2000-2003	0.99	3.83
2001	0.98	2.18
2002	1.91	4.83
2003	0.08	4.50

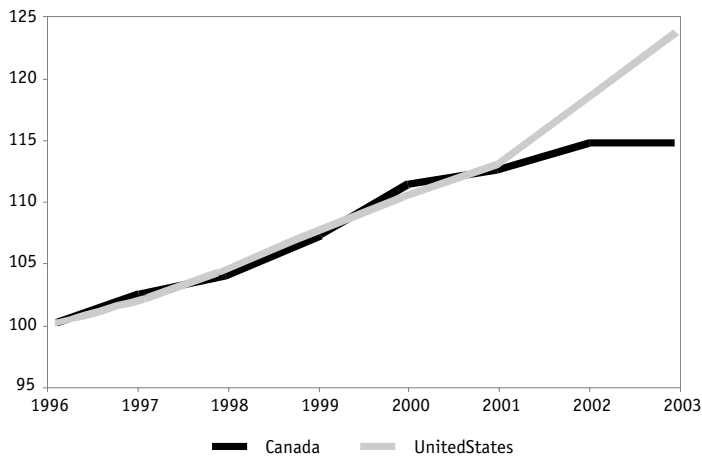
Source: Appendix Tables 1 and 2.

the 1990s appears to have been followed by a second acceleration after 2000.

In Canada, labour productivity growth has been much weaker since 2000 than experienced in the United States. Output per hour in the

³ Recent data released by the BLS indicate that U.S. business sector output per hour growth has remained strong so far in 2004. Preliminary estimates for the first quarter of 2004 show output per hour growth of 4.5 per cent at an annualized rate.

Chart 2
Business Sector Cumulative Output per Hour Growth in
Canada and the United States, 1997-2003, 1996=100



Sources: GDP in chained dollars and total hours worked from the Productivity and Costs Program of the Bureau of Labor Statistics for the United States, and annual averages of quarterly estimates from the Productivity Program Database of Statistics Canada for Canada.

business sector advanced 1.0 per cent in 2001, 1.9 per cent in 2002, and a meager 0.1 per cent in 2003,⁴ making a 1.0 per cent average annual rate over the 2000-2003 period. This represents a productivity growth fall-off or deceleration of 1.8 percentage points from the 2.8 per cent average growth experienced in 1996-2000. Post-2000 productivity growth has even been weaker than the 1.2 per cent average annual rate experienced in 1989-1996.

Given the 3.8 per cent average annual productivity growth in the United States between 2000 and 2003, productivity growth was 2.8 percentage points per year slower over this period in Canada, an accumulated 8.4 points over the three year period. This is in contrast to the 1996-2000 period when aggregate labour pro-

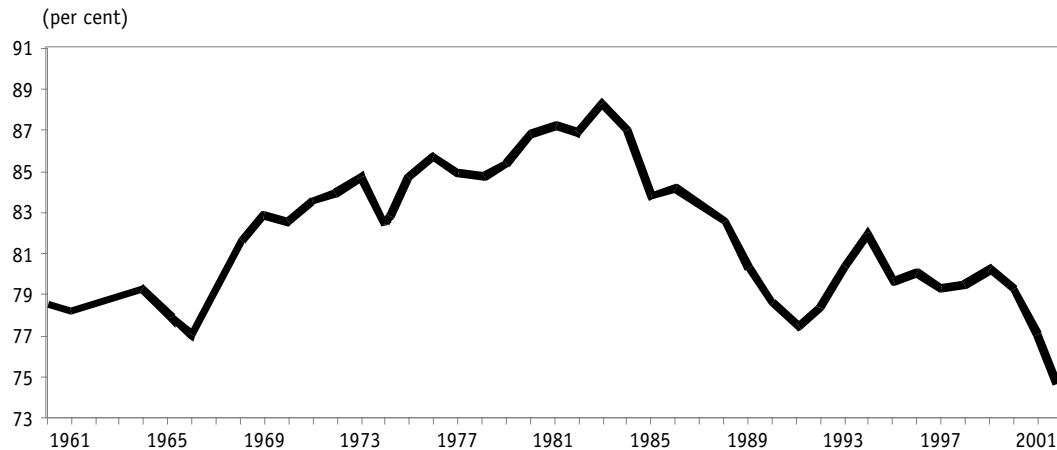
ductivity growth was slightly faster (2.8 per cent per year versus 2.6 per cent) in Canada than in the United States (Chart 2 and Table 1).

Given recent trends in relative productivity growth between Canada and the United States, the Canada-U.S. productivity gap has increased significantly since 2000, with the business sector gap widening by 6.5 points. Estimates for the level business sector gap are not officially available as Statistics Canada does not produce official estimates of purchasing power parity (PPP) for the business sector. However, estimates can be developed on the assumption that the business sector PPP is the same as the PPP estimate produced for GDP or the total economy. Such estimates show that in 2000 business sector output per hour worked in Canada was 80.3 per cent of that in the United States. By 2003, it had fallen to 73.8 per cent (Chart 3).

Output Growth

What accounts for this divergence in labour productivity growth between Canada and the United States after 2000? Labour productivity growth is of course the difference between growth in output and labour input. Business sector output growth in the two countries has been virtually identical since 2000, averaging 2.1 per cent in Canada and 2.0 per cent in the United States between 2000 and 2003 (Chart 4). But this hides a very different annual growth pattern between the two countries. Growth in the business sector was stronger in Canada than in the United States in 2001 and 2002, but considerably weaker in 2003 (Appendix Tables 1 and 2).

⁴ It should be noted that more recent total hours data than those used in the official quarterly series — the series used in this paper — show a slightly different picture for 2003. The Statistics Canada Productivity Program has released annual labour input data since the most recent official productivity release, and the annual total hours series shows slower growth in 2003 than the quarterly series from which the official productivity series is constructed (1.1 per cent versus 1.5 per cent). Consequently, if the more recent annual hours series were used, the 2003 output per hour growth rate would be 0.51 per cent rather than 0.08 per cent. The official productivity release of June 11, 2004 will hence most likely show slightly less of a productivity growth deceleration between 1996-2000 and 2000-2003 than the data used in this paper.

Chart 3**Output per Hour in the Business Sector in Canada
as a percentage of the U.S. Level, 1961-2003**

Sources: Gross value added in chained dollars from the National Income and Product Accounts of the Bureau of Economic Analysis for the United States. For Canada, value added data are from the Productivity Program Database (quarterly data converted to annual averages) for 1987-2003, extended back to 1961 using growth rates from an old Aggregate Productivity Measures series, and benchmarked in 1997 to a level estimate from the National Income and Expenditure Accounts. This 1997 benchmark was calculated by subtracting imputed rents from the NIEA business sector output estimate, and was converted from basic prices and constant dollars to market prices and chained dollars by applying the ratio of the two measures at the total economy level. Total hours worked are taken from an unpublished version of the official series in level form from the Bureau of Labor Statistics for the United States. For Canada, the level estimate for 1997 from the Productivity Program Database is extended back to 1987 and up to 2003 using growth rates from the Productivity Program Database quarterly series converted to annual averages for 1987 to 2003 and back to 1961 using the growth rates of an old Aggregate Productivity Measures series. Canadian business sector GDP per hour was converted from 1997 chained dollars to 2000 chained dollars using an implicit chained price index (quarterly converted to annual averages) from the Productivity Program Database, and was converted to U.S. dollars using the total economy purchasing power parity estimate of U.S.\$0.84 per Canadian dollar in 2000 from Statistics Canada.

The year 2003 was a poor year for the Canadian economy because of a number of negative shocks, especially the large appreciation in the value of the Canadian dollar. In contrast, record low interest rates, large budget deficits, and a depreciation of the U.S. dollar lead to a rebound in the U.S. economy in 2003 from its lackluster performance in 2001 and 2002.

Labour Input

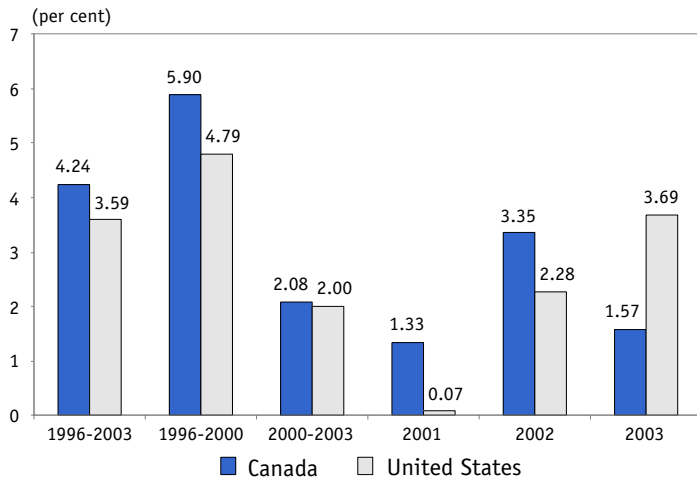
Thus it has been divergences in labour input growth that accounts for the divergence in labour productivity growth between Canada and the United States since 2000. Total hours worked in the business sector in the United States fell at a 1.8 per cent average annual rate in

Table 2**Business Sector Output, Total Hours Worked, Output Per Hour and Productivity Elasticities in Canada and the United States, 2000-2003**

(average annual rate of change)

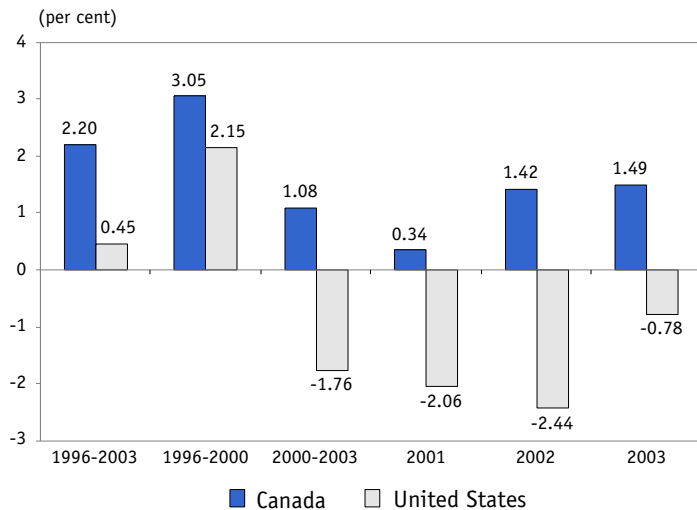
	Canada	United States
Output	2.1	2.0
Total Hours Worked	1.1	-1.8
Output Per Hour	1.0	3.8
Productivity Elasticity (productivity/output)	0.5	1.9

Chart 4
Output Growth in the Business Sector in Canada and the United States, 1997-2003
 (average annual and annual rates of change)



Sources: GDP in chained dollars from the Productivity and Costs Program of the Bureau of Labor Statistics for the United States, and annual averages of quarterly estimates from the Productivity Program Database of Statistics Canada for Canada.

Chart 5
Growth in Total Hours Worked in the Business Sector in Canada and the United States, 1997-2003
 (average annual and annual rates of change)



Sources: Total hours worked from the Productivity and Costs Program of the Bureau of Labor Statistics for the United States, and annual averages of quarterly estimates from the Productivity Program Database of Statistics Canada for Canada.

2000-2003, compared to a 1.1 per cent increase in Canada (Chart 5). Divergences in employment accounted for almost all the differences in total hours growth, as employment fell 1.1 per cent per year in the United States and rose 1.7 per cent in Canada over the period (Chart 6). Differences in trends in average hours worked were minimal (-0.7 per cent in the United States and -0.6 per cent in Canada).

The relationship between output growth and productivity growth, that is the proportion of output growth accounted for by productivity growth, is known as the productivity elasticity. The differences in labour input and output per hour growth between Canada and the United States since 2000, despite the virtually identical output growth, means that the productivity elasticities have been very different in the two countries. In Canada, output per hour growth of 1.0 per cent per year and output growth of 2.1 per cent produced a productivity elasticity of around 0.5 (Table 2). In contrast, in the United States, output per hour growth of 3.8 per cent and output growth of 2.0 per cent resulted in a productivity elasticity of nearly 2, four times that in Canada.

Explaining the Post-2000 Productivity Growth Deceleration in Canada

It is now widely recognized that Canada experienced a productivity growth acceleration after 1996. For example, the recent federal budget (Finance Canada, 2004:292) points out that GDP per hour in Canada rose from an average 1.1 per cent per year in 1980-1996 to 1.9 per cent in 1997-2003, boosting the country's relative performance from seventh in the G-7 to third. Does the deceleration in productivity growth in the 2000-2003 period relative to 1996-2000 call into question the post-1996 acceleration? This is unlikely given that the key factor behind the deceleration appears to be the cyclical slowdown of the economy. Once eco-

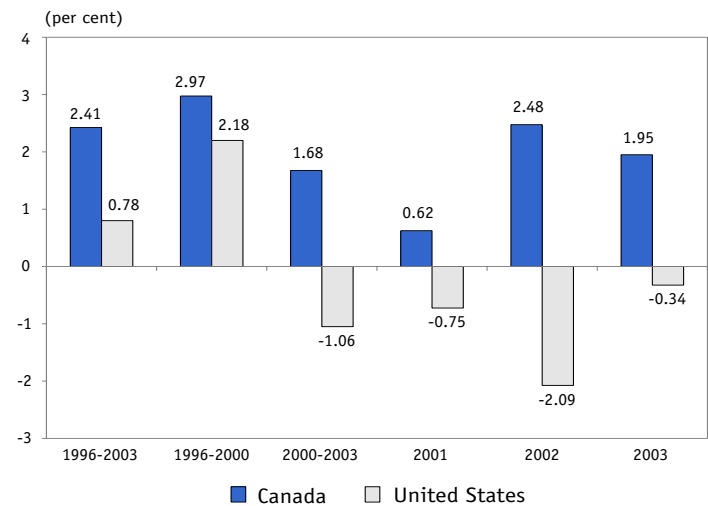
conomic growth resumes productivity will pick up. Evidence that the deceleration is cyclical in nature comes from an examination of the productivity elasticities, which were virtually identical at 0.47 in both the 1996-2000 and 2000-2003 periods. This means that about half of business sector output growth came from productivity growth in the late 1990s and in the early 2000s. What changed was the pace of output growth, falling from 5.9 per cent to 2.1 per cent.

The virtual absence of productivity growth in 2003 (0.1 per cent) contributed disproportionately to the slower productivity growth after 2000 given that productivity growth averaged 1.4 per cent from 2000 to 2002. The year 2003 was an unusual one for the Canadian economy because of the large number of negative shocks. Statistics Canada has noted that the severe acute respiratory syndrome (SARS) episode in Ontario had repercussions across the country; the sharp rally in the dollar hampered manufacturing; the mad cow scare hurt farm income; and that forest fires in British Columbia and a power outage in Ontario also left their marks. Economic growth projections were continuously revised downward throughout the year. It is likely that firms were slower to adjust employment and hours than output to these changing conditions, with the result that productivity growth vanished.

Explaining the Post-2000 U.S. Productivity Growth Acceleration

A normal first step in the identification of the factors behind the productivity growth acceleration in the United States would be to decompose labour productivity growth into capital deepening and total factor productivity components. Unfortunately, such a decomposition is not possible for the post-2000 period in the United States because estimates of the capital stock and

Chart 6
Growth in the Number of Jobs in the Business Sector in Canada and the United States, 1997-2003
 (average annual and annual rates of change)



Sources: Total number of jobs from the Productivity and Costs Program of the Bureau of Labor Statistics for the United States, and annual averages of quarterly estimates from the Productivity Program Database of Statistics Canada for Canada.

total factor productivity are currently available only to 2001. Equally, the lack of estimates of GDP by industry after 2001 precludes an analysis of the sources by industry of the productivity growth acceleration.

Three possible explanations of the acceleration in productivity growth in the United States after 2000 can be put forward. The first sees faster productivity growth arising from an acceleration in the pace of technological change, or at least an acceleration in the impact of underlying technical change on productivity. It is now widely recognized that the large increases in investment in information and communications technologies (ICT) in the second half of the 1990s contributed significantly to the pick-up in productivity growth during that period. Despite this positive impact, the full productivity-enhancing effect of ICTs may not have been fully realized because of the organizational changes needed to effectuate these gains. It is thus possible that because of the

Table 3
Trends in the Price of Capital and Labour
in the United States

(average annual rate of change, unless otherwise indicated)

	1996-2000	2000-03
Non-residential investment deflator	-1.21	-0.45
Prime rate (average level)	8.51	5.23
Nominal hourly labour compensation	5.22	3.22

Sources: Bureau of Economic Analysis, Federal Reserve and Bureau of Labor Statistics, April 23, 2004.

lags required for the effective use of ICTs, only since 2000 has the full impact of ICTs on productivity been realized.

This may be particularly true in service industries. While data on the productivity performance of specific U.S. service industries after 2001 are not currently available, it appears that most of the post-2000 acceleration in business sector productivity growth in the United States has been in the service industries. The BLS publishes indexes of business sector and manufacturing productivity growth to 2003. An index for the non-manufacturing business sector, which is largely composed of service industries, can be derived from the two indexes given the weight of manufacturing in business sector labour input (around 20 per cent). This shows that output per hour growth in the non-manufacturing business sector in 2000-2003 averaged 3.6 per cent per year, up from 2.2 per cent in 1996-2000. This acceleration of 1.4 percentage points was more than double the 0.6 point acceleration in manufacturing. Thus it appears that it has been the acceleration in productivity growth in business sector service industries that account for the

lion's share of the acceleration in the overall business sector.

A second explanation of the post-2000 productivity acceleration is that U.S. industries faced intense competitive pressures and have reacted by being more vigilant in cost cutting.⁵ Outsourcing of both manufacturing and service activities in low wage countries such as China and India is one form this cost-cutting has taken, but it accounts for only a small proportion of the 2.2 million jobs lost between 2000 and 2003. It is unclear why competitive pressures became more intense after 2000. It may be related to the recession in 2001 and the weak recovery since then. It is also possible that the intensity of competitive pressures has been stable or constant, but new technologies have permitted cost-cutting to take new forms. This is especially the case in service industries where it is now possible to have routine tasks performed in other countries.

The third explanation for the post-2000 productivity growth acceleration may be linked to the increased substitution of capital for labour because of the falling relative price of capital. The price of capital, as reflected by the investment goods deflator, fell 0.5 per cent per year in 2000-2003 (Table 3). Nominal interest rates, as represented by the prime rate, averaged 5.2 per cent in 2001-2003, down from 8.5 per cent in 1996-2000. On the other hand, the price of labour, as represented by business sector nominal hourly labour compensation, advanced 3.2 per cent in 2000-2003.

The three factors discussed above are not independent of one another. Indeed, technological change is largely embodied in the capital

5 Gordon (2003:247) writes that to account for the post-2000 productivity acceleration "the two most compelling hypotheses are, first, that an unusual degree of downward pressure on profits led to unusually aggressive cost cutting by firms, and second, that intangible capital acted as a source of dynamic adjustment in the response of productivity growth to a boom in ICT capital investment." Gordon argues both these factors played an important role in the acceleration. Also see *Business Week* (2004) for a recent discussion of the productivity acceleration and the links between this development and the massive job losses experienced by U.S. industry.

stock, so the faster rate of capital deepening linked to the cheapening of the price of capital relative to labour has fostered the diffusion of new technologies. Capital deepening is also driven by the need to remain competitive.

Is the U.S. Productivity Performance Sustainable?

In my view, it is extremely unlikely that the 3.8 per cent average annual output per hour growth in the U.S. business sector recorded over the 2000-2003 period is sustainable in the long term (over the next 20 years) or even in the medium term (3-5 years). Such a growth rate greatly exceeds that registered in the postwar golden age of capitalism, namely 3.2 per cent per year from 1947 to 1973. It would imply that productivity levels and hence living standards would double every 19 years, an amazing rate of advance for a country on the technological frontier in most industries and hence not able to benefit from technological catch-up.

At least in the short run, the downside of robust productivity gains has been employment declines. Indeed, given the size of employment losses since 2000, it is very likely that President Bush will be the first president since Herbert Hoover to see no net job growth during his first term in office. This political reality means that there are political forces at work to promote employment growth, or at least reduce job losses, and these measures may be at the expense of productivity gains. Restrictions on outsourcing of jobs may be an example.

There is also the risk that the current robust productivity gains may be dampened through revisions to real output and labour input data. For example, employment growth since 2000 may be found to be stronger, more in line with estimates from the household Current Population Survey than the establishment survey that is largely the basis for current employment estimates. This would reduce productivity growth.

Yet most productivity analysts believed that the output per hour growth rate of 2.8 per cent per year in the 1996-2000 period was unsustainable. So far this decade they have been proven wrong. It is possible the pessimism concerning the possibility of the continuation of the current trend may equally prove unfounded and that we have entered a new golden age of productivity advance.

Implications for Canada from the U.S. Productivity Acceleration

The recent productivity acceleration in the United States has important implications for Canada. The key issue is whether faster productivity growth will spill over to Canada, as it did in the second half of the 1990s. From 1996 to 2000, aggregate labour productivity growth was actually slightly faster in Canada than in the United States (Chart 1). A second question is if Canada does follow the U.S. productivity growth path, whether employment will also plummet as in the United States.

Of course, if Canada does not follow the U.S. path, the Canada-U.S. productivity gap will widen, as it did significantly in the 2000-2003 period. During this period, moderate employment growth and a rising employment rate in Canada (and falling employment levels and a falling employment rate in the United States) offset the growing productivity gap and prevented a major deterioration in Canadian living standards (GDP per capita) relative to those in the United States. Given the long run limits to labour supply associated with the aging of the population, further increases in the employment rate to boost living standards may not be possible.

At least in the medium term, it is in my view likely that Canada will follow the U.S. experience and see an improvement in labour productivity growth, at least to the 1996-2000 rate and probably more, although likely not equal to the U.S. rate of 3.8 per cent. This view is based on

the premise that the driving factor behind the U.S. post-2000 labour productivity growth acceleration has been the quickening pace of technological change, or at least the increased impact of technological change. In the past, Canada has benefited from U.S. technological advances through a variety of mechanisms, although often with a lag. It is likely that these forces are still at work and will continue to diffuse best practice U.S. technologies throughout Canada. From this perspective, the second U.S. productivity growth acceleration augurs well for Canada in the medium to long term, if not the short term. Canada, indeed the world, will eventually benefit from the technological advances south of the 49th parallel that are fueling productivity gains in that country.

Conclusion

Since 2000, aggregate labour productivity growth in the United States has been extremely strong, accelerating substantially from the robust pace observed during the second half of the 1990s. In contrast, productivity growth in Canada has been much more moderate, and has actually fallen off from that recorded in the 1996-2000 period. These developments have resulted in a significant widening of the Canada-U.S. labour productivity gap.

The productivity growth deceleration in Canada after 2000 appears to be largely a cyclical

phenomenon reflecting the fall-off in economic growth. It will likely be reversed as the economy recovers. The factors behind the post-2000 labour productivity acceleration in the United States are more difficult to understand. The most important source appears to be the rapid pace of technological change. This development has been fostered by pressures on firms to cut costs, organizational changes which allow the productivity-enhancing potential of ICTs to be fully realized, and the cheapening of the price of capital goods relative to labour.

Canadian productivity performance tends to follow U.S. performance with a lag. Thus the recent U.S. productivity growth acceleration augurs well for Canada as it is likely that productivity growth in this country will be positively affected by the forces working to improve productivity growth in the United States.

References

- Business Week* (2004) "Special Report: Where Are the Jobs?" March 22, pp. 37-55.
- Finance Canada (2004) *The Budget Plan 2004*, (Ottawa), March.
- Gordon, Robert J. (2003) "Exploding Productivity Growth: Context, Causes and Implications," *Brooking Papers on Economic Activity*, 2, pp, 207-298.
- Smith, Jeremy (2004) "Assessing Aggregate Labour Productivity Trends in Canada and the United States: Total Economy Versus Business Sector Perspectives," *International Productivity Monitor*, this issue.

Appendix Table 1

Output, Employment, Hours and Output per Hour in Canada in the Business Sector, 1961-2003

	Real GDP (1997 =100, based on a chained index)	annual % change	Total Number of Jobs (1997 =100)	annual % change	Average Weekly Hours per Job (1997 =100)	annual % change	Total Hours Worked (1997 =100)	annual % change	Output per Hour (1997 =100, based on a chained index)	annual % change
1961	25.3		47.8		114.2		54.6		46.3	
1973	49.4	8.41	65.1	5.12	105.5	-0.47	68.6	4.63	71.9	3.61
1981	66.1	7.15	80.6	3.61	100.1	-0.29	80.7	3.30	81.8	3.72
1989	84.8	2.29	94.2	2.56	100.6	-0.23	94.7	2.32	89.6	-0.03
1990	83.7	-1.39	94.3	0.08	99.9	-0.66	94.1	-0.58	88.8	-0.81
1991	79.9	-4.45	91.5	-2.89	98.5	-1.37	90.2	-4.22	88.6	-0.24
1992	80.3	0.47	90.3	-1.34	98.0	-0.53	88.5	-1.86	90.7	2.37
1993	82.7	2.99	91.3	1.05	98.4	0.41	89.8	1.47	92.1	1.50
1994	88.7	7.19	93.3	2.27	99.5	1.10	92.8	3.40	95.5	3.67
1995	92.2	3.95	95.3	2.09	99.0	-0.46	94.3	1.62	97.7	2.30
1996	94.4	2.39	97.2	1.99	99.6	0.57	96.8	2.57	97.5	-0.18
1997	100.0	5.99	100.0	2.91	100.0	0.41	100.0	3.33	100.0	2.57
1998	104.5	4.50	102.9	2.88	100.2	0.20	103.1	3.08	101.4	1.38
1999	111.7	6.87	106.4	3.38	100.4	0.16	106.7	3.54	104.6	3.21
2000	118.7	6.25	109.2	2.70	99.9	-0.44	109.1	2.25	108.7	3.91
2001	120.2	1.33	109.9	0.62	99.6	-0.27	109.5	0.34	109.8	0.98
2002	124.3	3.35	112.6	2.48	98.6	-1.04	111.1	1.42	111.9	1.91
2003	126.2	1.57	114.8	1.95	98.2	-0.46	112.7	1.49	112.0	0.08
Compound average annual growth rates										
1961-2003	3.90		2.11		-0.36		1.74		2.12	
1961-2000	4.04		2.14		-0.34		1.79		2.21	
1961-1973	5.74		2.60		-0.66		1.92		3.74	
1973-1981	3.71		2.71		-0.65		2.05		1.62	
1981-2003	2.99		1.62		-0.09		1.53		1.44	
1981-2000	3.13		1.61		-0.01		1.60		1.51	
1981-1989	3.17		1.96		0.05		2.01		1.14	
1989-2003	2.88		1.43		-0.17		1.25		1.61	
1989-2000	3.10		1.36		-0.06		1.30		1.78	
1989-1996	1.53		0.45		-0.14		0.31		1.22	
1996-2003	4.24		2.41		-0.21		2.20		2.00	
1996-2000	5.90		2.97		0.08		3.05		2.76	
2000-2003	2.08		1.68		-0.59		1.08		0.99	

Sources: (current as of April 28, 2004)

Output from CANSIM v1409154 (Productivity Program Database) converted to annual averages for 1987-2003, taking growth rates from CANSIM v716156 (Aggregate Productivity Measures) for 1961-1987. Jobs and total hours from CANSIM v15900939 and v15901203 for 1987-2003 (Productivity Program Database, quarterly converted to annual averages), taking growth rates from CANSIM v716378 and v716822 (Aggregate Productivity Measures) for 1961-1987. The Timeline Continuity Project will extend the Productivity Program Database series back to 1961, and should be complete sometime in the Spring of 2004. At that time the Aggregate Productivity Measures series will be officially terminated. Average hours and output per hour were calculated from the underlying data, and so may not exactly match the official series that are available for these variables.

Appendix Table 2

Output, Employment, Hours and Output per Hour in the United States in the Business Sector, 1961-2003

	Real GDP (1992= 100, based on a chained index)	annual % change	Total Number of Jobs (1992= 100)	annual % change	Average Weekly Hours per Job (1992= 100)	annual % change	Total Hours Worked (1992= 100)	annual % change	Output per Hour (1992 =100, based on a chained index)	annual % change
1961	32.7		58.0		111.9		64.9		50.4	
1973	57.6	6.86	73.5	4.26	107.1	-0.54	78.7	3.69	73.2	3.06
1981	70.7	2.76	86.4	1.05	101.6	-0.36	87.8	0.69	80.5	2.06
1989	95.4	3.58	101.4	2.11	101.6	0.47	103.0	2.59	92.6	0.97
1990	96.9	1.57	102.1	0.69	100.5	-1.07	102.6	-0.39	94.4	1.97
1991	96.1	-0.83	100.4	-1.67	99.7	-0.78	100.1	-2.44	96.0	1.65
1992	100.0	4.06	100.0	-0.40	100.0	0.30	100.0	-0.10	100.0	4.16
1993	103.1	3.10	102.2	2.20	100.6	0.59	102.8	2.80	100.3	0.29
1994	108.2	4.95	105.6	3.33	101.0	0.45	106.7	3.79	101.4	1.11
1995	111.4	2.96	108.4	2.65	101.0	-0.03	109.5	2.62	101.7	0.32
1996	116.5	4.58	110.8	2.21	100.6	-0.38	111.5	1.83	104.5	2.70
1997	122.7	5.32	113.8	2.71	101.2	0.59	115.2	3.32	106.5	1.94
1998	128.6	4.81	116.4	2.28	101.1	-0.11	117.7	2.17	109.3	2.58
1999	135.2	5.13	118.7	1.98	101.3	0.15	120.2	2.12	112.5	2.95
2000	140.5	3.92	120.8	1.77	100.5	-0.76	121.4	1.00	115.7	2.89
2001	140.6	0.07	119.9	-0.75	99.2	-1.32	118.9	-2.06	118.3	2.18
2002	143.8	2.28	117.4	-2.09	98.8	-0.36	116.0	-2.44	124.0	4.83
2003	149.1	3.69	117.0	-0.34	98.4	-0.44	115.1	-0.78	129.5	4.50
Compound average annual growth rates										
1961-2003	3.68		1.68		-0.31		1.37		2.27	
1961-2000	3.81		1.90		-0.28		1.62		2.16	
1961-1973	4.83		1.99		-0.37		1.62		3.16	
1973-1981	2.59		2.04		-0.65		1.38		1.20	
1981-2003	3.45		1.39		-0.15		1.24		2.18	
1981-2000	3.68		1.78		-0.06		1.72		1.93	
1981-1989	3.82		2.02		-0.01		2.02		1.76	
1989-2003	3.24		1.03		-0.23		0.80		2.43	
1989-2000	3.58		1.60		-0.10		1.51		2.05	
1989-1996	2.90		1.27		-0.13		1.14		1.74	
1996-2003	3.59		0.78		-0.32		0.45		3.12	
1996-2000	4.79		2.18		-0.03		2.15		2.59	
2000-2003	2.00		-1.06		-0.71		-1.76		3.83	

Sources: (current as of April 23, 2004)

Bureau of Labor Statistics series PRS84006043, PRS84006013 and PRS84006033 for output, jobs and total hours respectively. Average hours and output per hour were calculated from the underlying data, and so may not exactly match the official series that are available for these variables.