Raising Canadian Living Standards: A Framework for Analysis

Andrew Sharpe*
Centre for the Study of Living Standards

Canada's living standards have been falling relative to those in the United States in recent years. The Chairman and CEO of the TD Bank Financial Group, Charles Baillie (2001) has proposed that Canadians adopt as a societal goal not only the reversal of this downward trend, but that Canadian living standards exceed US living standards within 15 years. Policies that might be adopted to attain this very ambitious objective were the focus of a the multi-stakeholder forum held October 7-8, 2002 in Ottawa.[1]

The objective of this article is to provide a framework for analysis of the issue of raising Canadian living standards. The article first discusses definitions of living standards and related concepts. It then examines trends of living standards historically in Canada, the United States and in OECD countries. The third section looks at the relative importance of the determinants of living standards, namely productivity, working time, demographic structures, labour force participation, and the unemployment rate, in the growth of living standards in Canada and in accounting for the income gap with the United States and other countries. The fourth section discusses what strategies need to be pursued in terms of the five determinants of living standards growth for Canada to exceed US living standards by 2016.

Definition of Living Standards

The general definition of living standards is the material basis of everyday life. While complex measures of living standards have been developed,[2] real income has become the standard proxy used to quantify levels and trends in living standards. However, economists recognize that income measures do not capture a number of variables affecting economic well-being, most importantly leisure time, but also the state of the environment, equality, and security.

The Centre for the Study of Living Standards (CSLS) has developed the Index of Economic Well-being to provide a much broader measure of trends in economic well-being than income measures provide. The Index is based on trends in consumption, broadly defined: stocks of wealth, including human capital and the degradation of the environment; inequality and poverty; and economic insecurity, including the income risks facing the unemployed, persons with health problems, single parents, and the elderly.[3]

This article, however, will not focus on economic well-being. Rather it will focus on the narrower concept of living standards, as proxied by income, with one important exception. Differences in the amount of non-working time

or leisure will be discussed in the context of living standards comparisons across countries. This is because there is wide agreement that the quantity of leisure time can be considered a component of a broad definition of living standards.

Three definitions of aggregate income can be used in the analysis of trends in living standards: GDP per capita, personal income (PI) per capita, and personal disposable income (PDI) per capita. GDP per capita is the most widely used income measure of living standards, particularly for international comparisons. It includes factor incomes from all sources as well as depreciation or capital consumption allowances. This measure of living standards will be the main measure used in the paper.

Personal income is defined as that income that accrues to individuals or households, including labour income, investment income (excluding capital gains), and government transfer payments to persons. It excludes undistributed corporate profits and depreciation. Personal disposable income or after-tax personal income is defined as personal income minus direct taxes (income and payroll taxes).

Some argue that trends in per capita personal disposable income provide a better indicator of trends in living standards than trends in per capita personal income because disposable income represents the individual's direct command over resources. Others argue that the benefits provided to society financed by tax revenues must also be factored into measures of living standards and from this perspective trends in disposable income are not necessarily superior to trends in personal income as a measure of the true trends in living standards.

Trends in Canadian Living Standards

Discussion of Canada's living standards focuses on both the level of living standards relative to other countries, with particular emphasis on the United States, and trends in living standards within Canada, and relative to other countries.

Canada-US Comparisons of Living Standards Levels in 2001

In 2001, GDP per capita in Canada, expressed in current dollars[4] at a purchasing power parity (PPP) exchange rate of $0.85 as estimated by Statistics Canada, was $29,870 US. GDP per capita in the United States was $35,264 US. Thus Canadian GDP per capita in 2001 was 84.7 per cent of that in the United States, an income gap of 15.3 percentage points.[5]

Personal income (PI) per capita in Canada in 2001 was $23,865 in current US dollars, compared to $30,378 in the United States, giving a Canada-US ratio of 78.6 per cent or an income gap of 21.4 percentage points. The larger gap relative to GDP per capita reflects the lower ratio of personal income to GDP in Canada than in the United States.[6]

Personal disposable income (PDI) per capita in Canada was $18,211 in 2001 in current US dollars, compared to $25,859 in the United States. Canada PDI per capita was thus 70.4 per cent of that of the United States, an income gap of 29.6 percentage points.

The higher share of direct taxes in personal income in Canada relative to the United States (23.7 per cent of PI versus 14.9 per cent) accounts for this greater Canada-US income gap for PDI than for PI. It is important to note that the nearly 30 points income gap between Canadian and US living standards implied by the PDI data is misleading. It assumes that Canadians do not receive any additional benefits from the additional 8.8 percentage points of PI they turn over to the government as taxes relative to their American counterparts. To the degree that higher taxes in Canada reflect the public's trade-off, as mediated through the political process, regarding the provision of public goods and services relative to private goods and services, PI represents a much better indicator of living standards than PDI.

Which of the three aggregate income measures outlined above represents the most appropriate measure for the debate on Canadian living standards? I would argue GDP per capita is the most appropriate because it provides the best proxy of the potential present and future consumption possibilities of the population. This is because it includes corporate profits, which can be distributed to individuals as dividends or reinvested to increase future consumption.[7]

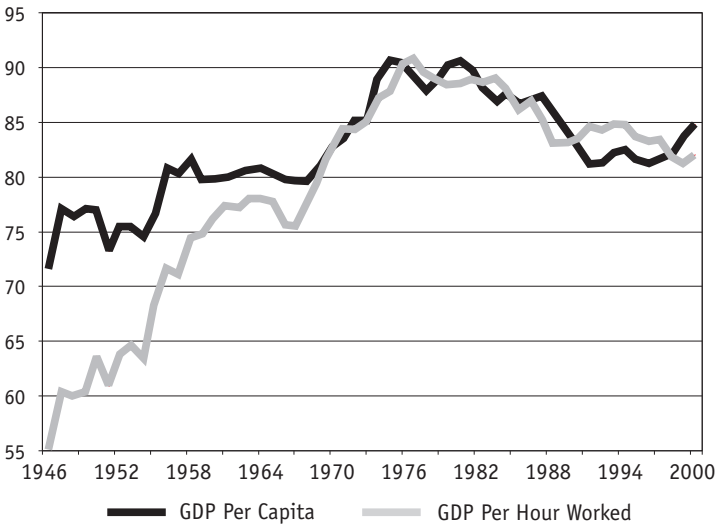
Trends in Canada-US Levels of GDP Per Capita

There have been two major trends in Canada's GDP per capita relative to that in the United States in the postwar period from 1946 to 2001, namely, an improvement from 1946 to 1981, followed by a deterioration from 1981 to the late 1990s (Chart 1 and Appendix Table 1).[8]

In 1946, Canada's GDP per capita, expressed in current US dollars at PPP exchange rates, was 71.6 per cent of the US level. Over the next three and one half decades the ratio increased, reaching a peak of 90.7 in 1975, declining slightly, but rebounding and nearly achieving its peak level again in 1981 at 90.6 per cent.[9] The rise was particularly rapid in the first half of the 1970s (from 80.9 per cent in 1969 to 90.7 in 1975). After 1981, the ratio began to fall, bottoming out at 81.1 per cent in 1997, with the lion's share of the decline concentrated in the 1988-92 period (from 87.4 per cent in 1988 to 81.2 per cent in 1992).[10] Since 1997, there has been an upward trend in Canada's relative GDP per capita, reaching 84.7 per cent of the US level by 2001.[11]

Two periods were thus crucial for the evolution of Canada's GDP per capita relative to that in the United States in the postwar period. During the boom of the first half of the 1970s (1969-1975), our relative income position improved remarkably, by 10 percentage points.

Chart 1
Trends in the Canada-US Nominal GDP Per Capita and GDP Per Hour Worked Gaps, 1946-2001
(Canada as a per cent of US)



Source: Appendix Tables 1 and 2.

During the recession of the late 1980s and early 1990s (1988-92), our relative position fell significantly, by 6 percentage points, a deterioration that has since not been reversed.

Trends in Canada-US Rates of Growth of GDP Per Capita

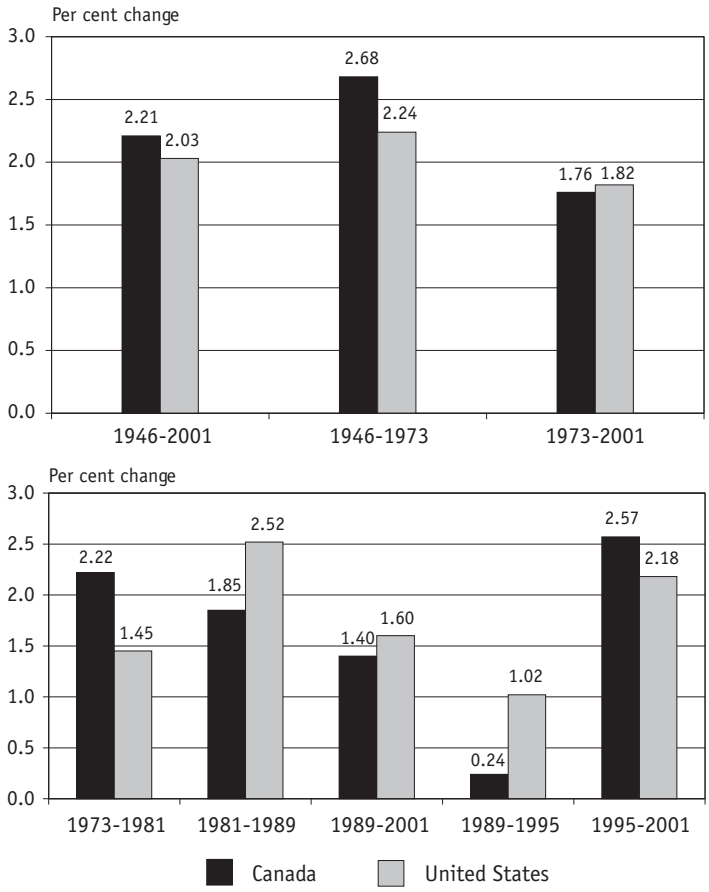
Trends in Canada's level of GDP per capita relative to that in the United States are determined by the relative growth rates of GDP per capita in the two countries. Chart 2 show these growth rates, in real terms, for a number of cyclically neutral periods.

Both Canada and the United States experienced a fall-off in the growth in living standards, as proxied by real GDP per capita after 1973. In the 1946-73 period in Canada, real GDP per capita increased at a 2.68 per cent average annual rate. This rate of advance fell almost one percentage point to an average annual 1.76 per cent in the 1973-2001 period.

Chart 2

Real GDP per Capita in Canada and the United States

(Average annual rates of change)



Source: Tables 2 and 3 of the unabridged version of the paper.

After 1973, the rate of growth progressively fell in successive cyclically neutral peak-to-peak periods, from 2.22 per cent per year in 1973-81 to 1.85 per cent in 1981-89 to 1.40 per cent in 1989-2001.[12] However, the average growth rate for the 1990s is misleading as it masks extremely low GDP per capita growth in the first half of the decade (0.24 per cent per year from 1989 to 1995) and the very robust growth of the second half of the 1990s and early 2000s (2.57 per cent from 1995 to 2001).

In the 1946-73 period in the United States, real GDP per capita rose at a 2.24 per cent average annual rate, falling only 0.42 percentage points to 1.82 per cent in the 1973-2001 period. Real GDP per capita growth was particularly weak in the 1973-81 period at 1.45 per cent per year. It picked up to a strong 2.52 per cent in the 1981-89 period, and then fell off to 1.60 per cent in the 1989-2001 period. As in Canada, real GDP per capita growth was much weaker in the first half of the 1990s (1.02 per cent from 1989 to 1995) than in the second half (2.18 per cent from 1995 to 2001).

Over the 1946-2001 period, real GDP per capita growth in Canada exceeded by 0.18 percentage points per year (2.21 per cent versus 2.03 per cent) that in the United States. This led to a 13.1 percentage point increase in Canada's GDP per capita, as a proportion (expressed in current dollars) of that in the United States from 71.6 per cent in 1946 to 84.7 per cent in 2001.[13]

In the 1946-73 period, Canada's real GDP per capita growth outpaced that in the United States by 0.44 percentage points (2.68 per cent versus 2.24 per cent), raising the relative income ratio to 85.2 per cent. After 1973, real GDP per capita growth in Canada lagged that in the United States (1.76 per cent versus 1.82 per cent), decreasing Canada's GDP per capita relative to the US level and increasing the Canada-US income gap. Canada's growth in real GDP per capita compared to that in the United States was particularly poor in the 1980s (1.85 per cent per year in 1981-89 versus 2.52 per cent). It was also somewhat lower in the 1990s (1.40 per cent per year in 1989-2001 versus 1.60 per cent in the United States).

The gap between Canadian and American performance was particularly stark in the first half of the 1990s, with real GDP per capita advancing only 0.24 per cent per year in Canada versus 1.02 per cent in the United States from 1989 to 1995. In contrast, in the second half of the 1990s and early 2000s, real GDP per capita growth in Canada slightly exceeded that in the United States (2.57 per cent versus 2.18 per cent from 1995 to 2001).

Trends in Canada GDP Per Capita Relative to OECD Countries

Data compiled by the Groningen Growth and Development Centre at the University of Groningen in the Netherlands for 22 OECD countries show that in 2001 Canada ranked sixth in terms of GDP per capita in the OECD area with 77.9 per cent of the US level (Table 1). Norway (84.0 per cent of the US level), Ireland (82.1 per cent), Switzerland (81.9 per cent), and Denmark (80.7 per cent), and, of course, the United States had higher levels of GDP per capita than Canada.[14]

Canada has suffered a relative deterioration in its living standards in the postwar period. In 1950, Canada's relative GDP per capita at 81.9 per cent of the US level ranked fourth in the OECD area, after Switzerland, the United States, and New Zealand. By 1973, Canada's GDP per capita at 87.3 per cent again ranked fourth, with West Germany replacing New Zealand. By 1989, Canada, with GDP per capita 87.5 per cent of the US level still ranked fourth. By 1995, Canada had dropped to sixth at 81.6 per cent, being overtaken by Denmark and Norway. By 2001, Canada at 77.9 per cent, was overtaken by Ireland.[15]

These trends in relative GDP per capita of course reflect the relative growth rates of GDP per capita in the different OECD countries. Over the 1950-2001 period Canada had the third lowest rate of growth in real GDP per capita in OECD countries. Only New Zealand and Switzerland fared worse.

Table 1
Relative Real Per Capita GDP in OECD Countries, 1950-2001, selected years
US=100 in all years

	1950	1973	1989	1995	2001
Australia	78.5	76.6	74.0	76.9	77.6
Austria	41.4	71.9	75.4	77.2	74.6
Belgium	60.4	77.1	76.8	77.6	75.9
Canada	81.9	87.3	87.5	81.6	77.9
Denmark	75.3	86.6	82.1	83.6	80.7
Finland	45.7	68.2	75.4	65.8	71.5
France	53.2	75.9	74.2	72.4	69.7
Unified Germany	na	na	81.4	75.5	69.7
West Germany	54.5	89.6	89.2	81.9	na
Greece	22.1	50.7	48.2	46.0	47.2
Ireland	38.1	43.5	49.9	61.5	82.1
Italy	38.5	67.1	73.0	72.9	69.1
Japan	20.2	68.8	78.2	80.3	72.9
Netherlands	62.9	78.9	72.9	75.1	75.1
New Zealand	88.8	75.3	61.2	59.8	55.8
Norway	56.5	66.7	78.0	85.8	84.0
Portugal	22.2	45.1	46.0	48.8	49.8
Spain	26.2	54.8	53.5	54.5	56.4
Sweden	70.9	81.3	76.7	71.5	71.0
Switzerland	100.6	115.7	96.9	88.3	81.9
Turkey	16.3	19.3	18.9	20.1	17.8
U.K.	71.0	70.8	70.0	69.1	68.2
USA	100.0	100.0	100.0	100.0	100.0
Unweighted Average Excluding USA	51.7	68.8	68.8	68.9	68.6

Source: Groningen Growth and Development Centre & The Conference Board, June 13 2002. www.eco.rug.nl/GGDC/index-dseries.html

Note: the unweighted average includes only countries for which data are available for all five years (ie. Unified Germany and West Germany are not included). New Zealand is also excluded for consistency with Tables 12 and 13 of the unabridged version of the paper.

Determinants of Living Standards

GDP per capita is determined by five factors, namely:

- the amount of output, expressed in constant prices, produced by each worker per hour;
- the average annual number of hours the worker works;
- the proportion of the total population who are of working age as only persons of working age contribute directly to GDP;[16]
- the labour force participation rate, that is, the labour force divided by the working age population, as only persons in the labour force directly produce output; and

Table 2
Real Per Capita GDP and its Determinants in Canada, 1946-2001

	GDP per Hour (1997 chained dollars)	Average Weekly Hours	Working age Population to Total Population, %	Labour Force Participation Rate, %	1-Unemployment Rate, %	GDP per Capita (1997 chained dollars)
Average Annual Growth Rates						
1946-2001	2.59	-0.79	0.18	0.32	-0.07	2.21
1946-1973	3.91	-1.35	-0.06	0.31	-0.08	2.68
1973-2001	1.33	-0.25	0.41	0.33	-0.07	1.76
1973-1981	1.45	-0.80	0.88	0.97	-0.28	2.22
1981-1989	0.89	0.39	0.13	0.42	0.00	1.85
1989-2001	1.54	-0.30	0.28	-0.15	0.03	1.40
1989-1995	1.51	-0.51	0.18	-0.58	-0.34	0.24
1995-2001	1.58	-0.10	0.38	0.28	0.41	2.57

Source: Table 6 in the unabridged paper.

- the unemployment rate, defined as the unemployed divided by the labour force, as only employed persons contribute directly to GDP.[17]

The Decomposition of GDP Per Capita Growth in Canada

Over the 1946-2001 period, productivity growth accounted for 117.2 per cent of real GDP per capita growth in Canada (Table 2). The other four components of real GDP per capita growth were much less important. Declining average hours reduced real GDP per capita growth by 35.7 per cent over the period, while rising unemployment decreased it 3.4 per cent. In contrast, a more favourable demographic structure, defined as a higher proportion of persons of working age in the total population, contributed 8.1 per cent to overall per capita GDP growth, while increased labour force participation contributed 14.5 per cent.

The relative contribution of the five determinants of growth in living standards varied greatly in the different sub-periods within the 1946-2001 period. In the 1946-73 period, output per hour growth fueled living standards growth, accounting for 146.0 per cent of real GDP per capita growth. Falling average hours offset much of this productivity growth, making a contribution of -50.2 per cent to real GDP growth.

After 1973, productivity growth became less important, in both absolute terms, and in relative terms (75.6 per cent versus 146.0 per cent), as a driver of living standards growth for three main reasons. First, productivity growth was considerably slower in the post-1973 period, falling from an average annual rate of advance of 3.9 per cent in 1946-73 to 1.3 per cent in 1973-2001. Second, the pace of the decline in average hours in the pre-1973 period (1.4 per cent per year) was not sustainable so this component made a much smaller negative contribution to real GDP per capita growth (-14.2 per cent). Third, with the entry of the baby boom cohorts into the labour force in the 1970s, the size of the working age population relative to the total population rose and contributed significantly to growth in living standards, particularly in the 1973-81 period (39.7 per cent). A final less important reason is that labour force participation rate growth picked up slightly after 1973. This was particu-

Table 3
Nominal Per Capita GDP and its Determinants in Canada and the United States, 2001

	GDP per Hour (current US dollars) (1)	Average Weekly Hours (2)	Working age Population to Total Population, % (3)	Labour Force Participation Rate, % (4)	1-Unemployment Rate, % (5)	GDP per Capita (current US dollars) (6)
United States	41.97	34.20	74.10	66.94	95.25	35,264
Canada	34.44	34.39	77.87	66.23	93.13	29,870
Canada as a % of US	82.05	100.54	105.09	98.94	97.78	84.70
US-Canada (% points)	-17.95	0.54	5.09	-1.06	-2.22	-15.30
Contribution to Canada/US GDP Per Capita	117.33	-3.54	-33.26	6.92	14.51	100.00

Source: Data from Table 2 and Appendix Table 1 for Canada and Table 3 and Appendix Table 4 for the United States in the unabridged version of the paper.

Note: The data above cannot be obtained directly from the referenced tables because the data for Canada in this table have been adjusted to account for the differing definitions of working age (15 years and over in Canada and 16 years and over in the United States). This was accomplished by: subtracting the number of 15 year olds in Canada (413,834) from the working age population; multiplying the labour force participation rate of 15-19 year olds (52.3%) by the labour force and subtracting the result from the labour force; and multiplying the unemployment rate for 15-19 year olds (16.6%) by total unemployment and subtracting the result from unemployment. These adjusted estimates were then used to calculate the working age to total population ratio, labour force participation rate and unemployment rate shown here.

GDP Per Capita can be calculated as (6)=[(1)*(2)*52*(3)/100*(4)/100*(5)/100].

larly the case in the 1973-81 period, when this factor made a large contribution to real GDP growth (43.5 per cent).

Because of the very low real GDP per capita growth in the first half of the 1990s, the percentage or relative contributions of the different determinants of GDP become problematic. An examination of the absolute contributions of the five components is more useful. Output per hour growth contributed 1.54 points to real GDP per capita growth of 1.40 per cent over the 1989-2001 period. This contribution was nearly the same in the first half of the decade (1.51 points in 1989-95) as in the second half (1.58 points in 1995-2001), even though average annual real GDP per capita picked up from 0.24 per cent in 1989-95 to 2.57 per cent in 1995-2001.

Unlike productivity trends, the absolute contributions of the other four determinants of GDP differed considerably between the first and second half of the decades, reflecting macroeconomic conditions. In the first half of the 1990s, average hours fell 0.51 per cent per year, the participation rate declined 0.58 per cent, the unemployment rate variable, defined as one minus the unemployment rate, fell 0.34 per cent, and the relative size of the working population only increased 0.18 per cent. The first three of these developments reduced real GDP per capita growth and account for the gap between productivity and living standards growth.

In the second half of the 1990s, despite the constancy of productivity growth, real GDP per capita growth accelerated 2.3 points from 0.24 per cent in 1989-95 to 2.57 per cent because of favourable developments in all four other determinants of living standards. The developments were conditioned by the turnaround in the macroeconomic environment. Average hours fell only 0.10 per cent per year, down from 0.51 per cent in the first half of the decade. The growth in the relative size of the working age population

picked up to 0.38 per cent per year. The aggregate participation rate increased 0.28 per cent per year, a turnaround of 0.86 points from the first half of the 1990s. The decline in the unemployment rate added 0.41 per cent per year to real GDP growth, also a major turnaround (0.75 points) from the first half of the decade.

Decomposition of the Canada-US Income Gap in 2001

In 2001, GDP per capita, expressed in current US dollars, in Canada was 84.7 per cent of that in the United States, making an income gap of 15.3 percentage points. Table 3 decomposes this gap into the five determinants outlined above.[18]

Of the five variables that determine GDP per capita, in 2001 three had higher values in the United States and two in Canada. By far the most important was productivity, expressed as total economy output per hour, which in Canada was only 82.1 per cent of the US level, a 17.9 percentage point gap.[19] This variable alone more than explained all the income gap (117.3 per cent).

The unemployment rate was higher in Canada than in the United States in 2001 (6.9 per cent versus 4.7 per cent) and this 2.2 percentage point unemployment rate gap accounted for 14.5 per cent of the aggregate income gap. Canada's lower aggregate participation rate of 0.7 percentage points (66.2 per cent versus 66.9 per cent in the United States) also accounted for 6.9 per cent of the aggregate income gap. Finally, the slightly higher average number of hours worked per week by Canadians (34.4 versus 34.2 in the United States) contributed -0.5 points or -3.5 per cent to the 15.3 point aggregate income gap.

Canada has a demographic structure that favours a higher level of GDP per capita relative to the US level because of the larger relative size of the working age population in this country. In 2001, the working age population accounted for 77.9 per cent of the total population in Canada compared to 74.1 per cent in the United States, due to the lower fertility rate in Canada.[20] This difference offset 5.1 points or 33.3 per cent of the Canada-US income gap, a very large contribution.

Decomposition of GDP Per Capita into its Components in OECD Countries in 2001

The difference between the level of living standards and productivity in Canada relative to the United States is small compared to that in many other OECD countries. Indeed, in a number of countries fewer annual hours worked and lower labour force participation rates mean that productivity, relative to the United States, is much higher than GDP per capita. Indeed, four countries in 2001 had higher levels of output per hour worked than the United States — Belgium (113.3 per cent of the US level), Norway (110.6 per cent), France (102.6 per cent), and the Netherlands (101.8 per cent). Yet the United States had by far the highest level of GDP per capita, with Norway a distant second at 84.0 per cent of the US level.

Why do countries with higher labour productivity levels than the United States have lower levels of living standards as measured by levels of real GDP per capita? In the case of the Netherlands, Norway, and France, it is largely explained by the lower level of average annual hours worked. Workers in these countries, and in most other European countries, enjoy much more leisure time than American workers. In the case of Belgium, lower labour force participation is also an important factor.

The much greater leisure time enjoyed by Europeans is of course not incorporated into GDP per capita figures. Yet a strong case could be made that this leisure contributes to a broad definition of living standards. Indeed, it is unclear whether Europeans are worse off in

terms of economic well-being than Americans despite their lower GDP per capita, particularly to the extent that Europeans have made a conscious choice to work fewer hours. Instead of using their very high productivity levels to achieve levels of material standards of living comparable to those in the United States, citizens in Belgium, Norway, France and the Netherlands appear to have adopted more moderate standards of living, measured in terms of per capita GDP, and taken part of the productivity gains in terms of fewer annual hours of work. This situation has great relevance to the objectives Canadians set for themselves.

Targets for Canadian Living Standards

What is Needed to Exceed US Living Standards

As noted in the introduction, Charles Baillie in 2001 proposed that Canadians adopt the objective of exceeding US living standards in 15 years, that is by 2016. This is an extremely ambitious but by no means impossible objective. With Canada's GDP per capita at 84.7 per cent of the US level in 2001, real GDP per capita growth would have to be 1.0 percentage points faster per year in Canada than in the United States to eliminate this 15.3 percentage point income gap by 2016. There has been no period in postwar Canadian economic history when real GDP per capita growth has exceeded that of the United States by such a magnitude for such a long period.

But other countries have achieved such a catch-up. The best recent example is Ireland. As Table 1 shows, Ireland's GDP per capita rose from 49.9 per cent of the US level in 1989 to 82.1 per cent in 2001, an increase of 32.2 percentage points in 12 short years or 2.7 per cent per year.[21] The small size of the Irish economy may mean the relevance of the Irish experience to Canada is limited.[22]

The actual growth rate in real GDP per capita that Canada would have to achieve to exceed US GDP per capita growth by 1.0 percentage points for 15 years depends of course on the rate of growth that the United States achieves over this period. The United States registered average annual real GDP per capita growth of 1.82 per cent over the 1973-2001 period, 1.60 per cent over the 1989-2001 period, and 2.18 per cent in the 1995-2001 period when productivity growth accelerated. Barring a major recession, it is likely that GDP per capita growth in the United States over the next 15 years will average a least 2 per cent per year. This means that real GDP growth in Canada must average at least 3.0 per cent per year to achieve parity in living standards with the United States.

As noted earlier, nothing is impossible. Indeed, over the 1946-2001 period there were 25 years (out of 55) when real GDP per capita growth in Canada equaled or exceeded 3.0 per cent. Many of these years were years of recovery and hence the robust GDP per capita growth was not sustainable. The 15 year period that experienced the strongest real GDP per capita growth in the postwar period was from 1961 to 1976. The 3.6 per cent average annual rate of growth during this period exceeds the 3.0 per cent annual growth rate in real GDP per capita needed for Canada to overtake US living standards by 2016, assuming US GDP per capita annual growth of 2.0 per cent.

Given the uncertainty about US real GDP per capita growth, it is more appropriate to frame scenarios for the attainment of US living standards in terms of the differential annual income growth rate needed (1.0 percentage points) rather than in terms of any absolute growth rate. Very strong real GDP per capita growth in Canada will not lead to the overtaking

of US living standards if the United States also experiences strong growth, as is likely.

Over the 1946-2001 period, there were 17 years (out of 55) when the difference between Canadian and US real GDP per capita growth rates equaled or exceeded 1.0 per cent. Many of these years were years of stronger recovery in Canada and hence the large differential was not sustainable. The 15 year period that experienced the largest Canada-US differential in real GDP per capita growth in the postwar period was from 1966 to 1981. However, the differential for this period was 0.9 percentage points, just slightly less than the 1.0 points needed for Canada to overtake US living standards by 2016.

Strategies for Overtaking US Living Standards

What would be needed to achieve a 1.0 per cent faster average annual growth rate in real GDP per capita in Canada than in the United States over the 2001-2016 period to eliminate the 15.3 percentage point gap in GDP per capita? Let us examine the determinants of living standards growth one by one.

The first way to close the income gap is to lower the unemployment rate. The official Canadian unemployment rate in 2001 averaged 6.9 per cent compared to the US official rate of 4.7 per cent (Table 3). About 0.8 percentage points of the gap was accounted for by definitional differences,[23] leaving a true gap of 1.4 points. The elimination of this gap would thus reduce the GDP per capita gap by only 1.4 points, about 9 per cent of the overall gap. While this is certainly a worthwhile objective, it is no solution to the closing of the income gap.

In theory, Canada could attempt to achieve an unemployment rate below that of the United States, as it did for several years in the 1960s. Such an achievement would certainly contribute more to the closing of the income gap than the attainment of unemployment rate parity with the United States. But with the more generous social safety in this country, the non-accelerating inflation unemployment rate (NAIRU) in Canada may be above that in the United States, making the achievement of a lower unemployment rate problematic.

A second way to close the income gap is to raise the labour force participation rate in this country to the US level. In 2001, the aggregate labour force participation rate in Canada was 66.2 per cent compared to 66.9 per cent in the United States. The elimination of this 0.7 percentage point gap would thus reduce the GDP per capita gap by only 1.1 points, about 6 per cent of the overall gap. While this may be again a worthwhile objective if the economic well-being of those who join the labour force is increased by this decision to participate, it is no solution to the closing of the income gap.

In theory, Canada could target a labour force participation rate above that of the United States, although Canada has never had higher labour force participation (countries such as Sweden have). Such a development would contribute more to the closing of the income gap than the mere attainment of parity with the United States. This again may be a worthy objective, but it is very difficult to achieve as the impact of policy on labour force participation is problematic. The aggregate participation rate is expected to fall in the next 15 years through a composition effect in both countries as the baby boom generation reaches retirement age. One way for the Canadian participation rate to exceed the US participation rate would be to develop policies to entice a larger proportion of the baby boom generation to voluntarily remain in the labour force, even if on a part-time basis.

A third way for Canada to close the income gap with the United States is for Canadians to work longer hours and thereby produce more out-

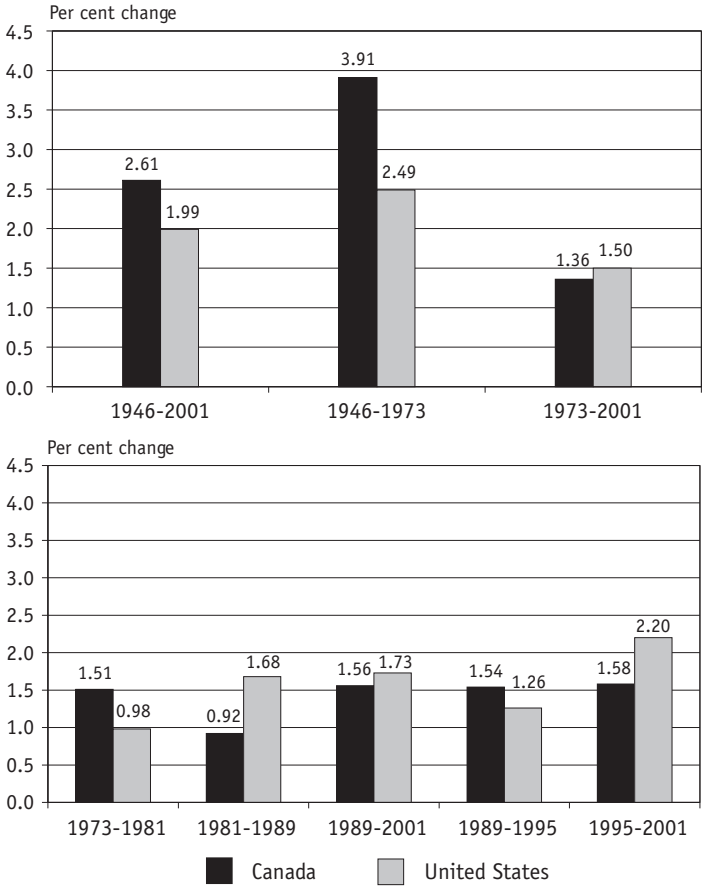
put. However, the data sources used in this paper suggest that Canadians already work about as many hours as their American counterparts. Nonetheless, it would still be possible for Canadians to work longer hours if they so choose and thereby close part of the income gap.

The main problem with this strategy is that most Canadians do not want to work longer hours. While their income would rise, they would consider themselves worse off if forced to work more. From this perspective, longer working time does not represent a solution to the income gap, except in the case of part-time workers seeking full-time work or more hours and full-time workers desiring to work additional overtime hours or longer uncompensated hours on a sustained basis.

A fourth possible mechanism to reduce the income gap is to increase the size of the working age population in the total population relative to that in the United States. In Canada in 2001, the population 16 and over represented 77.9 per cent of the total population, the highest proportion in Canada's history and 3.8 points higher than the US proportion of 74.1 per cent. Canada's lower fertility rate accounts for this difference in demographic structure with the United States. With the expected continuation of lower fertility in Canada, the gap between the relative size of the working age populations in the two countries will likely increase in the future, contributing to the closing of the income gap.

The fifth and final way to reduce the Canada-US income gap is by reducing the productivity gap. This is by far the most important strategy to pursue. In 2001, total economy output per hour, expressed in current dollars, in Canada was 82.1 per cent of the US level, down from 84.8 per cent in 1995 and a peak of 90.8 per cent in 1977 (Chart 1 and Appendix Table 2).[24] Indeed, the growth of the Canada-US GDP per capita gap in the 1980s and 1990s was largely accounted for by the rising productivity gap.

Chart 3
Real GDP per Hour Worked in Canada and the United States
(Average annual rates of change)



Source: Table 14 of the unabridged version of the paper.

The elimination of the 17.9 percentage point productivity gap registered in 2001 by 2016 would be more than sufficient to close the income gap. Such a closing would imply that total economy real output per hour would have to grow 1.2 per cent faster in Canada than in the United States over the 2001-2016 period. There has in fact been 17 years in postwar Canadian economic history when output per hour growth has exceeded that of the United States by such a magnitude.

Other countries have achieved even more impressive catch-ups. The best recent example is Ireland. Ireland's GDP per hour rose from 44.3 per cent of the US level in 1973 to 71.7 per cent in 1989, an increase of 27.4 percentage points in 16 years. This productivity growth rate at 4.4 per

cent per year was 3.1 per cent per year faster than experienced in the United States.

The actual output per hour growth rate that Canada would have to achieve to exceed US GDP per hour growth by 1.2 percentage points for 15 years depends on the rate of productivity growth that the United States achieves over this period. The United States registered total economy output per hour growth of 1.50 per cent over the 1973-2001 period, 1.73 per cent over the 1989-2001 period, and 2.20 per cent in the 1995-2001 period when productivity growth accelerated (Chart 3).

Barring a major recession, it is likely that productivity growth in the United States over the next 15 years will average at least 2 per cent per year. Indeed, many economists are forecasting much stronger productivity growth. For example, Martin Baily (2002), former Chair of the US Council of Economic Advisors, is projecting annual productivity growth in the range of 2.2-2.7 per cent for the remaining years of this decade because of the continuing impact on productivity from information technologies.[25]

This means that productivity growth in Canada must average at least 3.2 per cent per year, and likely more, for Canada to achieve parity in productivity levels and living standards with the United States by 2016. Over the 1946-2001 period, there were in fact 20 years (out of 55) when total economy real output per hour growth in Canada equaled or exceeded 3.2 per cent, although only one of them was after 1976. The strongest average annual growth rate in output per hour over any 15 year period in the postwar era was an amazing 4.6 per cent per year recorded from 1949 to 1964. This suggests that achieving a 3.2 per cent productivity growth over the next 15 years might not be mission impossible. But the past may not always be an accurate guide to future potential.

Again, given the uncertainty about US productivity growth, it is more appropriate to frame scenarios for the elimination of the Canada-US productivity gap in terms of the differential annual productivity growth rate needed (1.1 percentage points) rather than in terms of any absolute growth rate. Very strong productivity growth in Canada will not lead to the overtaking of US productivity levels if the United States also experiences strong growth, as is likely.

Over the 1946-2001 period there were 17 years (out of 55) when the difference between Canadian and US real output per hour growth rates equaled or exceeded 1.1 per cent, but only one year since 1976. Many of these years were years of a strong cyclical productivity recovery in Canada and hence the large differential was not sustainable. The 15 year period that experienced the largest Canada-US differential in real GDP per hour worked in the postwar period was from 1946 to 1961. The differential was a very impressive 1.9 percentage points, based on 4.3 per cent average annual output per hour growth in Canada and 2.4 per cent in the United States. Of course, Canada's relative productivity level in 1946 was lower than in 2001 (55.3 per cent of the US level versus 82.1 per cent), suggesting that catch-up possibilities were greater then.

To the degree that the Canada-US productivity gap reflects lags in the introduction of US best practice technologies into Canadian industry, there may be potential to close a significant part, if not all, of the productivity gap in the long run. This is particularly so if the pace of technological progress in the United States falls off in the future.

One school of thought on technological change suggests that technological innovation comes in spurts or waves and that the United States is currently experiencing such a wave. When this phase of technical progress comes to an end, according to this view, productivity growth will decelerate in the United States. Other countries will then have an opportunity to catch-up to US productivity levels. This convergence phenomenon was experienced by many countries

in the postwar period. But as we do not know when the productivity impacts of the IT revolution in the United States will fall off, we can say little about the possible implications of this phenomenon for the evolution of the Canada-US productivity gap, at least for the next 15 years.

From a long-term perspective, the widening of the Canada-US productivity and income gaps may not be as unfavourable a development as it is commonly portrayed, particularly in certain media. To the degree that this growing gap is driven by an acceleration in productivity growth in the United States and to the degree than Canada is able to eventually adopt these US best practice technologies, Canadians will be materially better off in the long run from this faster pace of technical progress.

The only politically acceptable and effective strategy that can significantly contribute to the closing of the Canada-US income gap is to greatly reduce or eliminate the productivity gap. There are many specific public policies and private sector actions that can contribute to the attainment of this objective.[26]

Indeed, a case can be made that closing the productivity gap should in fact be a more important national objective than closing the income gap. This is because closing the productivity gap would give Canadians the possibility of trading off income for more leisure, an option many European countries have already chosen. The elimination of the 17.9 percentage point productivity gap with the United States would allow Canadians to choose between a 17.9 per cent increase in real income relative to the United States, or to work 17.9 per cent less, or some combination of these outcomes. If Canadians chose more leisure time and consequently did not close the narrowly defined gap with the United States in living standards, it would be incorrect to conclude that Canadians were worse of in terms of economic well-being or living standards, broadly defined than Americans. Productivity allows choices.

Conclusion

The key conclusions of this article are twofold. First, a focus on improving Canada's productivity growth performance, and in particular eliminating the Canada-US productivity gap, is by far the most important and effective way to attain the objective of Canadian living standards exceeding US living standards by 2016. Second, an objective for Canada of matching or exceeding the US productivity level is probably a better societal objective than equaling or exceeding US living standards, as measured by GDP per capita. Attaining this objective would certainly give Canadians the opportunity to have the same level of per capita income as Americans, but it would also give Canadians the option of choosing more leisure time, a component of economic well-being that is currently not incorporated into GDP.

Notes

* Abridged version of a paper prepared for the TD Forum on Canada's Living Standards, October 7-8, 2002, Ottawa, Ontario. I would like to thank Don Drummond for the invitation to prepare this article, the TD Financial Group for financial support, Dale Orr for comments, and Jeremy Smith for excellent research assistance. The unabridged version of the paper is posted at www.csls.ca under the *International Productivity Monitor*. Email: csls@csls.ca.

1 The report from the TD Forum on Canada's Standard of Living as well as the background papers prepared for the event are posted at www.td.com\economics.

2 For example, Claire Brown (1994) in *American Standards of Living* develops an index of living standards based on three functional categories of expenditures: basic, variety, and status, with each category representing the use of expenditures to accomplish a different goal.

3 Estimates of the Index of Economic Well-being (IEW) have been developed for Canada and the provinces, the United States, and OECD countries and are posted at www.csls.ca. In general, this Index has grown at a slower rate than per capita income. For discussion of the IEW, see Osberg (1985) and Osberg and Sharpe (1998, 2002a, 2002b).

4 Statistics Canada recommends that current price income estimates be used for international comparisons of income levels over constant price estimates because the former take account of shifts in the components of GDP, unlike constant price GDP estimates. This means that PPPs for each year are applied to the domestic currency (Canadian dollar) current price series to convert the series into a common currency series. The PPP of a base year is not used, as is the case for converting a domestic currency constant price series into a common currency. This paper follows this recommendation for comparisons of Canada-US income levels. The levels and trends based of constant price Canada-US relative income estimates are however very similar to those based on current price estimates (see Table 3A and Charts 4-6 in the unabridged version of this article). Growth rate comparisons across countries are based on trends in constant price GDP estimates expressed in domestic currency and do not require conversion into a common currency by purchasing power parities.

5 The revision of the US national accounts on July 31, 2002 lowered US GDP estimates for the 1999-2001 period and hence reduced Canada-US income gap. In the original version of this paper, Canada's GDP per capita in 2001 was 83.7 per cent of that in the United States. The revisions increased it 1.0 percentage points to 84.7 per cent, lowering that gap from 16.3 points to 15.3 points.

6 In 2001, PI was equal to 79.9 per cent of GDP in Canada, compared to 85.1 per cent in the United States. The PI/GDP ratio moves inversely to the proportion of corporate profits in GDP since corporate profits are a component of GDP but not of PI. Corporate profits have shrunk in relation to GDP in the United States since the mid-1990s while the opposite has been true in Canada, with the result that the gap in the PI/GDP ratios of Canada and the United States has grown rapidly since then, from 0.9 percentage points in 1995 to 5.2 points in 2001. Corporate profits have been a major determinant of the gap between the Canada and US PI/GDP ratios since at least the mid-1970s; the historically greater importance in Canada of natural resources-based economic rents, which are included in GDP but not in PI, may account for the lower PI/GDP ratio in Canada in earlier decades.

7 A country that consumes a higher proportion of output and hence has higher PI per capita may have a higher living standard, as proxied by PI per capita, in the short run than a country with higher GDP per capita, but lower PI per capita because it reinvests a larger proportion of GDP. In the long run, the country with the higher GDP per capita will be better able to sustain high levels of living standards.

8 Maddison (2001) provides estimates of real GDP and population estimates for Canada and the United States that allow calculation of Canada's GDP per capita as a proportion of the US level in 1820 (71.0 per cent), 1870 (69.3 per cent), 1913 (83.9 per cent), and for all years from 1950 (77.8 per cent) to 1998 (75.2 per cent). These estimates are not strictly comparable with the estimates for the 1946-2001 period in this article because of the use of different data sources.

9 PI per capita and PDI per capita also peaked as a proportion of that in the United States in 1981, at 93.5 per cent and 88.7 per cent respectively.

10 In contrast to GDP per capita, relative PI per capita and PDI per capita continued to decline over the 1992-97 period, the former from 85.4 per cent to 79.7 per cent of the US level and the latter from 75.4 per cent to 70.8 per cent.

11 Again, in contrast to the improvement in GDP per capita relative to the United States, PI and PDI per capita have declined slightly over the 1997-2001 period (from 79.7 per cent of the US level in 1997 to 78.6 per cent in 2001 for PI and from 70.8 per cent in 1997 to 70.4 per cent in 2001 for PDI).

12 Technically, the year 2000 was the cyclical peak, not 2001. The average annual growth rate for the 1989-2000 period was 1.48 per cent.

13 When GDP is expressed in constant dollars (Table 3A in the unabridged version) the average annual growth rate gap for GDP per capita of 0.18 points translates into a 9.9 percentage point change over the 55 year period. The increase was 14.5 percentage points for PI per capita (from 64.1 per cent of the US level in 1946 to 78.6 per cent in 2001), but only 5.4 points for PDI from 65.0 per cent to 70.4 per cent (Appendix Table 1).

14 West Germany was replaced by Unified Germany in the sample after 1995. If West Germany had still been included as a separate country, Canada would likely have ranked seventh.

15 It should be noted that the Groningen estimate of Canada's GDP per capita as a proportion of the US estimates of 77.9 per cent in 2001 is significantly lower than the estimate of 84.7 per cent calculated by the Centre for the Study of Living Standards (CSLS) as shown in Chart 1 and Appendix Table 1. This discrepancy reflects the incorporation of more recent national accounts data into the CSLS estimate. Recent revisions have raised GDP in Canada and lowered it in the United States. It also reflects the use of different estimates of Canada-US purchasing power parities — the Statistics Canada bilateral GDP deflator PPP by the CSLS and the OECD multilateral GDP deflator PPP by the Groningen group.

16 The working age population is defined as the population 15 and over in Canada and 16 and over in the United States. In OECD statistics, the working age population is generally defined as those aged 15 to 64.

17 The labour force participation rate and the unemployment rate can be combined to form the employment rate (employed persons divided by the working age population).

18 It is important to note that the labour market variables in the table have been adjusted to be consistent with the US definition of the working age population as 16 and over,

not 15 and over. Consequently, the estimates for the labour market variables for Canada for 2001 in this table differ somewhat from those used elsewhere in the paper.

19 The US output per hour level estimated is based on average weekly hours data from the establishment-based Current Employment Statistics (CES) survey. In 2001, this estimate was 34.2 hours per week (Table 14 in the unabridged version of the paper). The CES survey excludes employees on farms, proprietors (unincorporated self-employed workers), and unpaid family workers. Hours data are not collected by the CES for non-production workers in the goods-producing industries and for supervisory workers in service-producing industries. For non-manufacturing industries, it is assumed that the hours of non-production and supervisory workers move at the same rate and have the same level as production and nonsupervisory workers. An alternative source of US data on hours is the Current Population Survey (CPS), a household survey which covers all civilian workers. This survey collects data from all workers on actual hours worked so does not require adjustments for incomplete coverage and hours assumptions for non-production and supervisory workers. According to the CPS, average weekly hours in 2001 were 39.2, 5.0 hours or 14.6 per cent greater than the CES estimate (Appendix Table 8 in the unabridged version of the paper). The productivity implications of the alternative hours series are very significant, with the level of output per hour in the United States in 2001 14.6 per cent lower with the CPS estimate. This means that Canada's output per hour in 2001 would be 94.1 per cent of that of the United States (Appendix Table 7 in the unabridged version of the paper), instead of the 82.1 per cent reported in Table 11. As the rate of growth in the two hours series was very close over the 1995-2001 period, the increase in the Canada-US productivity gap between 1995 and 2001 is not affected. However, there is a decrease in the Canada-US productivity gap over the 1981-95 when the CPS hours series is used, in contrast to a large increase when the CES hours series is used. The BLS and the OECD (1998 and 2001) use the CES hours series because it is believed that the CPS series overestimates hours worked and that in general establishment-based hours data are superior to household-based data for productivity estimates. For a detailed discussion of these issues, see Van Ark (1998) and Eldridge, Manser, Otto, and Robinson (2001). More work is badly needed in this area.

20 Statistics Canada (2002b) reports that in 1999 Canada's fertility rate hit a record low of 1.58 children per woman, compared to the American rate of 2.08 per cent, a difference of more than one half a child per woman. Only 20 years ago the gap was less than one-third of that size.

21 Just as certain countries have enjoyed periods of rapid catch-up, other countries have experienced periods of significant deterioration in their relative standard of living. For example, New Zealand's relative GDP per capita plummeted 27.6 percentage points from 88.8 per cent of the US level in 1950 to 61.2 per cent in 1989 while that of Switzerland fell 33.8 points from 115.7 per cent in 1973 to 81.9 per cent in 2001 (see Table 1).

22 For discussion of the Irish economic miracle and lessons for Canada , see Fortin (2001).

23 The major difference in the compilation of the unemployment rates in Canada and the United States lies in the treatment of passive job searchers, defined at those whose only job search method is reading newspaper want ads. These passive job searchers are included in the labour force in Canada, but are excluded in the United States. According to Sunter (1998), this difference in 1998 accounted for 0.7 points of the gap.

24 From 1946 to 1977, Canada's aggregate level of output per hour had converged toward the higher US level, rising from 55.5 per cent to 90.8 per cent of the US level.

25 For discussion of factors influencing future productivity growth in Canada, see Sharpe and Gharani (2002). See Sharpe (2002a) for a discussion of recent productivity developments in Canada and the United States.

26 See Rao and Sharpe (2002) for a recent collection of papers that discuss many policies to improve Canada's productivity performance. See Sharpe (2002b) for an overview of productivity concepts, trends and issues in Canada.

References

Baillie, Charles (2001) "Speech to the Canadian Club," Toronto, Ontario, February 26.

Baily, Martin Neil (2002) "The New Economy: Post Mortem or Second Wind?" *Journal of Economic Perspectives*, Spring, Volume 16, Number 2, pp. 3-22.

Brown, Claire (1994) *American Standards of Living, 1918-1988* (Cambridge. Mass.: Blackwell).

Eldridge, Lucy, Marilyn Manser, Phyllis Otto, and Brooks Robinson (2001) "Hours Data in Productivity Measures," paper prepared for the FESAC meeting, June 7-8.

Fortin, Pierre (2001) "The Irish Economic Boom: What Can We Learn?" *International Productivity Monitor*, Number 3, Fall, pp. 19-31, posted at www.csls.ca.

Maddison, Angus (2001) *The World Economy: A Millennial Perspective* Paris: OECD Development Centre).

OECD (1998) "Annual Hours of Work: Definitional and Comparability Issues," paper prepared for the 16th Meeting of the Working Party on Employment and Unemployment Statistics, March 23-24, Paris.

OECD (2001) "Activities of the Working Party on Employment and Unemployment Statistics — Estimates of Annual Hours Actually Worked in OECD Countries," DSTI/EAS/IND/SWP (2001)16.

Osberg, Lars (1985) "The Measurement of Economic Well-Being" in David Laidler (coordinator) *Approaches to Economic Well-Being*, The Royal Commission on the Economic Union and Development Prospects for Canada (MacDonald Commission), Volume 26, (Toronto: University of Toronto Press).

Osberg, Lars and Andrew Sharpe (1998) "An Index of Economic Well-Being for Canada," Research Report 99-1, Applied Research Branch, Strategic Policy, Human Resources Development Canada, December.

Osberg, Lars and Andrew Sharpe (2002a) "The Index of Economic Well-being; An Overview," *Indicators: The Journal of Social Health*, Spring, pp. 24-62.

Osberg, Lars and Andrew Sharpe (2002b) "An Index of Economic Well-being for Selected OECD Countries," *Review of Income and Wealth*, September, Series 48, Number 3, pp. 291-316.

Rao, Someshwar and Andrew Sharpe, editors (2002) *Productivity Issues in Canada*, (Calgary: University of Calgary Press).

Sharpe, Andrew (2002a) "Recent Productivity Developments in the United States and Canada: Implications for the Canada-U.S. Productivity and Income Gaps," *International Productivity Monitor*, Number Four, Spring, pp. 3-14. (posted at www.csls.ca).

Sharpe, Andrew (2002b) "Productivity Concepts, Trends and Prospects: An Overview," in Andrew Sharpe, France St-Hilaire and Keith Banting *Review of Economic Performance and Social Progess, 2002: Towards a Social Understanding of Productivity* (Ottawa: Centre for the Study of Living Standards and Montreal: Institute for Research on Public Policy).

Sharpe, Andrew and Leila Gharani (2002) "Trend Productivity and the New Economy," in Someshwar Rao and Andrew Sharpe (eds.) *Productivity Issues in Canada* (Calgary: University of Calgary Press).

Statistics Canada (2002a) "Purchasing Power Parities and Real Expenditures, United States and Canada, 1992-2001," Cat. 13-604-MIB no. 39, June.

Statistics Canada (2002b) "Trends in Canadian and American Fertility," *The Daily*, July 3.

Sunter, Deborah (1998) "The UR Gap- Small Differences in Measurement May Matter," *Labour Force Update*, Vol. 2, Number 4, Autumn, Statistics Canada.

Van Ark, Bart (1998) "Annual Working Hours in the United States: Which Measure Should be Used for International Comparisons?" Groningen Growth and Development Centre, unpublished paper, July.

Van Ark, Bart (2002) "Understanding Productivity and Income Differentials in the OECD Area: A Survey," in Andrew Sharpe, France St-Hilaire and Keith Banting *Review of Economic Performance and Social Progesss, 2002: Towards a Social Understanding of Productivity* (Ottawa: Centre for the Study of Living Standards and Montreal: Institute for Research on Public Policy).

Appendix Table 1
Nominal Aggregate Per Capita Income Levels in Canada and the United States, 1946-2001

	Canada								United States			Canada as a % of the United States		
	GDP per capita, current $	Personal Income per capita, current $	Personal Disposable Income per capita, current $	GDP PPP	Individual Expenditure PPP	GDP per capita, current US $	Personal Income per capita, current US $	Personal Disposable Income per capita, current US $	GDP per capita, current US $	Personal Income per capita, current US $	Personal Disposable Income per capita, current US $	GDP per capita	Personal Income per capita	Personal Disposable Income per capita
1946	988	802	735	1.143	1.018	1,130	816	748	1,578	1,275	1,150	71.57	64.05	65.03
1947	1,097	868	802	1.197	1.060	1,312	920	849	1,702	1,338	1,199	77.09	68.75	70.85
1948	1,236	979	910	1.141	1.006	1,410	985	916	1,846	1,445	1,312	76.37	68.17	69.80
1949	1,277	994	930	1.088	0.959	1,390	953	892	1,801	1,401	1,286	77.13	68.03	69.36
1950	1,378	1,037	978	1.084	0.945	1,494	981	925	1,940	1,516	1,389	76.98	64.69	66.60
1951	1,578	1,195	1,112	1.020	0.927	1,611	1,108	1,031	2,201	1,677	1,499	73.20	66.05	68.78
1952	1,738	1,282	1,182	0.992	0.916	1,724	1,175	1,083	2,285	1,759	1,552	75.43	66.80	69.76
1953	1,778	1,313	1,205	1.010	0.934	1,795	1,227	1,126	2,381	1,834	1,622	75.39	66.92	69.42
1954	1,732	1,286	1,180	1.010	0.936	1,749	1,204	1,104	2,347	1,818	1,629	74.54	66.22	67.80
1955	1,857	1,351	1,243	1.036	0.932	1,924	1,260	1,159	2,512	1,917	1,715	76.58	65.72	67.60
1956	2,037	1,459	1,338	1.033	0.930	2,104	1,357	1,244	2,603	2,021	1,800	80.81	67.13	69.10
1957	2,062	1,511	1,381	1.048	0.933	2,161	1,410	1,288	2,694	2,097	1,866	80.21	67.24	69.04
1958	2,081	1,556	1,437	1.054	0.938	2,194	1,460	1,349	2,686	2,124	1,899	81.68	68.75	71.02
1959	2,154	1,603	1,469	1.060	0.929	2,283	1,490	1,365	2,865	2,224	1,983	79.69	67.00	68.87
1960	2,193	1,652	1,501	1.062	0.935	2,329	1,545	1,404	2,918	2,283	2,026	79.81	67.65	69.29
1961	2,221	1,646	1,489	1.069	0.935	2,375	1,538	1,392	2,970	2,342	2,081	79.96	65.69	66.88
1962	2,365	1,757	1,590	1.066	0.934	2,522	1,640	1,485	3,143	2,454	2,174	80.24	66.85	68.32
1963	2,493	1,840	1,666	1.056	0.931	2,633	1,714	1,552	3,268	2,541	2,249	80.56	67.47	69.01
1964	2,680	1,942	1,743	1.044	0.924	2,797	1,795	1,612	3,462	2,687	2,412	80.81	66.80	66.81
1965	2,902	2,095	1,874	1.025	0.921	2,973	1,928	1,725	3,705	2,868	2,567	80.24	67.24	67.21
1966	3,186	2,311	2,028	1.004	0.910	3,199	2,104	1,847	4,015	3,084	2,742	79.68	68.21	67.34
1967	3,365	2,478	2,143	0.992	0.908	3,337	2,249	1,945	4,197	3,272	2,899	79.51	68.74	67.11
1968	3,619	2,669	2,277	0.998	0.908	3,611	2,423	2,068	4,541	3,559	3,119	79.53	68.08	66.28
1969	3,928	2,930	2,451	1.001	0.917	3,932	2,685	2,247	4,860	3,851	3,329	80.90	69.73	67.49
1970	4,167	3,133	2,584	1.005	0.937	4,188	2,935	2,422	5,070	4,101	3,591	82.61	71.57	67.43
1971	4,491	3,399	2,790	1.022	0.951	4,589	3,231	2,652	5,434	4,358	3,860	84.45	74.15	68.71
1972	4,956	3,804	3,138	1.005	0.936	4,980	3,561	2,937	5,909	4,736	4,138	84.28	75.18	70.99
1973	5,744	4,388	3,620	0.970	0.923	5,571	4,052	3,343	6,537	5,253	4,619	85.21	77.13	72.38
1974	6,765	5,180	4,240	0.922	0.926	6,235	4,799	3,929	7,017	5,730	5,013	88.85	83.75	78.37
1975	7,514	5,930	4,882	0.913	0.911	6,863	5,405	4,450	7,571	6,166	5,470	90.65	87.66	81.35
1976	8,541	6,683	5,462	0.884	0.896	7,551	5,990	4,896	8,363	6,765	5,960	90.29	88.54	82.15
1977	9,330	7,320	5,988	0.881	0.885	8,219	6,481	5,302	9,222	7,432	6,519	89.13	87.22	81.34
1978	10,246	8,093	6,699	0.885	0.874	9,069	7,074	5,855	10,313	8,302	7,253	87.94	85.20	80.72
1979	11,582	9,024	7,488	0.875	0.891	10,139	8,044	6,675	11,401	9,247	8,033	88.94	86.99	83.10
1980	12,859	10,147	8,413	0.861	0.919	11,075	9,326	7,733	12,276	10,205	8,869	90.22	91.39	87.18
1981	14,523	11,716	9,613	0.849	0.902	12,327	10,568	8,671	13,614	11,301	9,773	90.55	93.51	88.72
1982	15,123	12,810	10,489	0.831	0.864	12,571	11,064	9,059	14,035	11,922	10,364	89.57	92.81	87.41
1983	16,217	13,364	10,862	0.820	0.842	13,291	11,259	9,150	15,085	12,576	11,036	88.11	89.53	82.92
1984	17,557	14,345	11,683	0.823	0.842	14,450	12,082	9,840	16,636	13,853	12,215	86.86	87.21	80.55
1985	18,795	15,395	12,498	0.823	0.839	15,477	12,909	10,480	17,664	14,738	12,941	87.62	87.59	80.98
1986	19,637	16,312	13,042	0.817	0.820	16,041	13,379	10,697	18,501	15,425	13,555	86.70	86.74	78.91
1987	21,132	17,304	13,693	0.804	0.815	16,997	14,097	11,155	19,529	16,317	14,246	87.04	86.40	78.31
1988	22,878	18,753	14,748	0.796	0.815	18,210	15,290	12,025	20,845	17,433	15,312	87.36	87.71	78.53
1989	24,105	20,022	15,860	0.790	0.814	19,052	16,304	12,915	22,188	18,594	16,235	85.87	87.69	79.55
1990	24,545	21,175	16,512	0.796	0.819	19,535	17,337	13,519	23,215	19,614	17,176	84.15	88.39	78.71
1991	24,450	21,595	16,857	0.801	0.808	19,589	17,452	13,623	23,629	20,074	17,663	82.90	86.94	77.12
1992	24,685	21,872	17,034	0.81	0.82	19,995	17,935	13,968	24,618	21,001	18,524	81.22	85.40	75.41
1993	25,335	22,055	17,244	0.82	0.83	20,774	18,306	14,312	25,544	21,574	18,979	81.33	84.85	75.41
1994	26,549	22,260	17,278	0.83	0.83	22,036	18,476	14,341	26,799	22,369	19,623	82.22	82.60	73.08
1995	27,609	22,897	17,701	0.83	0.84	22,915	19,233	14,869	27,783	23,280	20,358	82.48	82.62	73.04
1996	28,204	23,160	17,787	0.84	0.85	23,691	19,686	15,119	28,993	24,296	21,069	81.71	81.03	71.76
1997	29,437	23,860	18,213	0.84	0.85	24,727	20,281	15,481	30,498	25,433	21,881	81.08	79.74	70.75
1998	30,249	24,739	18,803	0.86	0.85	26,014	21,028	15,983	31,822	26,910	23,031	81.75	78.14	69.40
1999	32,149	25,692	19,563	0.85	0.85	27,327	21,838	16,629	33,224	27,894	23,742	82.25	78.29	70.04
2000	34,612	27,263	20,724	0.84	0.85	29,074	23,174	17,615	34,779	29,759	25,205	83.60	77.87	69.89
2001	35,141	28,076	21,425	0.85	0.85	29,870	23,865	18,211	35,264	30,378	25,859	84.70	78.56	70.43

The GDP PPPs for 1946-1991 were calculated by multiplying the 1992 PPP estimate by the index value (1992=1.00) of the US GDP deflator as a percentage of the Canadian GDP deflator in each year. A similar process was followed for the individual expenditure PPPs using the CPI. PPPs for 1992-2001 are from *Purchasing Power Parities and Real Expenditures, United States and Canada, 1992-2001*, Statistics Canada publication 13-604-MIB no. 39, June 2002. Income and population data for Canada from Table 2 and Appendix Table 1, and for the United States from Table 3 and Appendix Table 4 of the unabridged version of the paper.

Appendix Table 2
Nominal Aggregate Labour Productivity Levels in Canada and the United States, 1946-2001

	Canada					United States		Canada/US, %	
	GDP per Person Employed, current $	GDP per Hour, current $	GDP PPP	GDP per Person Employed, current US $	GDP per Hour, current US $	GDP per Person Employed, current US $	GDP per Hour, current US $	GDP per Person Employed	GDP per Hour
1946	2,569	0.93	1.143	2,938	1.06	4,024	1.92	73.01	55.33
1947	2,813	1.03	1.197	3,365	1.24	4,285	2.04	78.54	60.42
1948	3,209	1.17	1.141	3,660	1.33	4,621	2.22	79.21	60.03
1949	3,449	1.26	1.088	3,754	1.37	4,643	2.27	80.85	60.43
1950	3,748	1.42	1.084	4,063	1.54	4,995	2.41	81.34	63.63
1951	4,283	1.63	1.020	4,370	1.66	5,662	2.73	77.19	60.91
1952	4,798	1.84	0.992	4,759	1.83	5,952	2.87	79.96	63.79
1953	4,978	1.93	1.010	5,025	1.95	6,210	3.02	80.92	64.67
1954	4,986	1.96	1.010	5,035	1.98	6,340	3.12	79.41	63.48
1955	5,365	2.15	1.036	5,557	2.22	6,678	3.24	83.21	68.59
1956	5,790	2.33	1.033	5,979	2.41	6,865	3.36	87.10	71.63
1957	5,898	2.42	1.048	6,182	2.54	7,203	3.57	85.83	71.18
1958	6,148	2.61	1.054	6,482	2.76	7,423	3.71	87.33	74.32
1959	6,332	2.73	1.060	6,712	2.89	7,851	3.87	85.49	74.73
1960	6,487	2.87	1.062	6,886	3.05	8,018	3.99	85.89	76.36
1961	6,605	2.99	1.069	7,061	3.20	8,300	4.14	85.07	77.40
1962	6,970	3.16	1.066	7,432	3.37	8,793	4.37	84.53	77.14
1963	7,308	3.35	1.056	7,718	3.53	9,130	4.53	84.53	78.10
1964	7,723	3.56	1.044	8,060	3.72	9,587	4.76	84.07	78.02
1965	8,201	3.81	1.025	8,402	3.90	10,130	5.02	82.94	77.66
1966	8,693	4.07	1.004	8,727	4.08	10,828	5.39	80.60	75.68
1967	9,086	4.32	0.992	9,008	4.28	11,215	5.68	80.32	75.45
1968	9,739	4.76	0.998	9,718	4.75	12,006	6.11	80.94	77.71
1969	10,398	5.16	1.001	10,407	5.16	12,648	6.45	82.28	80.05
1970	11,062	5.62	1.005	11,118	5.65	13,215	6.85	84.13	82.46
1971	11,798	6.06	1.022	12,056	6.19	14,220	7.41	84.78	83.53
1972	12,794	6.65	1.005	12,855	6.69	15,099	7.85	85.14	85.20
1973	14,295	7.45	0.970	13,865	7.23	16,288	8.49	85.12	85.18
1974	16,391	8.61	0.922	15,107	7.94	17,294	9.11	87.36	87.14
1975	18,157	9.74	0.913	16,584	8.90	19,048	10.15	87.07	87.72
1976	20,488	11.15	0.884	18,112	9.86	20,551	10.95	88.13	90.08
1977	22,326	12.16	0.881	19,668	10.71	22,076	11.79	89.09	90.83
1978	24,042	12.97	0.885	21,282	11.48	23,904	12.84	89.03	89.40
1979	26,301	14.18	0.875	23,025	12.42	25,969	13.99	88.66	88.75
1980	28,737	15.74	0.861	24,752	13.56	28,152	15.34	87.92	88.40
1981	31,909	17.75	0.849	27,084	15.06	31,189	17.04	86.84	88.40
1982	34,700	19.38	0.831	28,843	16.11	32,747	18.10	88.08	89.01
1983	37,307	20.81	0.820	30,576	17.06	35,057	19.26	87.22	88.55
1984	39,786	22.16	0.823	32,746	18.24	37,453	20.46	87.43	89.12
1985	41,810	23.14	0.823	34,428	19.05	39,319	21.67	87.56	87.94
1986	42,787	23.69	0.817	34,950	19.35	40,630	22.45	86.02	86.20
1987	45,367	25.20	0.804	36,490	20.27	42,178	23.31	86.51	86.97
1988	48,236	26.35	0.796	38,393	20.98	44,432	24.62	86.41	85.18
1989	50,647	27.31	0.790	40,032	21.59	46,779	26.00	85.58	83.02
1990	51,966	28.42	0.796	41,359	22.62	48,851	27.23	84.66	83.07
1991	53,333	29.75	0.801	42,729	23.84	50,852	28.51	84.03	83.60
1992	54,897	31.11	0.81	44,466	25.20	53,328	29.81	83.38	84.54
1993	56,557	31.62	0.82	46,377	25.93	55,233	30.79	83.97	84.22
1994	58,793	32.46	0.83	48,798	26.94	57,324	31.77	85.13	84.81
1995	60,675	33.74	0.83	50,360	28.00	59,251	33.03	84.99	84.79
1996	62,162	34.33	0.84	52,216	28.84	61,663	34.47	84.68	83.67
1997	64,085	35.36	0.84	53,831	29.70	64,206	35.69	83.84	83.23
1998	64,706	36.04	0.86	55,647	30.99	66,798	37.13	83.31	83.48
1999	67,477	37.27	0.85	57,356	31.68	69,477	38.73	82.55	81.79
2000	71,430	39.16	0.84	60,001	32.90	72,663	40.50	82.57	81.22
2001	72,445	40.52	0.85	61,579	34.44	74,643	41.97	82.50	82.05

Sources: See Table 2 and Appendix Table 1 of the unabridged version of the paper for data sources for Canada and Table 3 and Appendix Table 4 of the unabridged version of the paper for data sources for the United States. GDP PPPs from Table 1 of the unabridged version of the paper.