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### **New Estimates of Manufacturing Productivity Growth for Canada and the United States**

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## **New Estimates of Productivity for Manufacturing in Canada and the United States**

In recent months, the issue of productivity has risen to the top of the federal government's economic policy agenda. The motivation for this development has been the perception that Canada's aggregate productivity performance has been dismal in the 1990s, particularly relative to the United States. This perception is indeed true when productivity is measured on a per worker or person employed basis. Total economy GDP per worker advanced at a 1.1 per cent average annual rate in the United States over the 1989-98 period compared to 0.8 per cent in Canada (see Table 1).

However, when productivity is measured on the more appropriate hours worked basis, Canada actually outperformed the United States (1.2 per cent versus 1.1 per cent). This difference between aggregate measures of labour productivity is due to the 0.4 per cent average annual decline in the average weekly hours in Canada in the 1990s (from 35.1 in 1989 to 34.0 in 1998), compared to no trend in hours in the United States (Tables 2, A1).

Total factor or multifactor productivity measures the increase in output per unit of the combined inputs of labour and capital, where the two inputs are weighted by their shares of national income. For the total economy, Canada also outperformed the United States in the 1990s on this productivity measure because of our slower capital stock growth (Table 2). In other words, we have made more efficient use of our capital stock than the Americans. Statistics Canada has recently released productivity estimates that show that multifactor productivity in Canada's business sector also outperformed that of the United States in the 1990s.

It is in manufacturing where the official data do show a significant divergence in productivity growth rates between Canada and the United States in the 1990s. BLS data show that output per hour advanced more than 1 percentage point faster per year in the U.S. over the 1989-97 period. Consequently, the productivity debate has focussed on the manufacturing sector, especially since structural reforms affecting manufacturing (e.g. replacement of the Manufacturing Sales Tax by the GST, reduction in trade barriers through the FTA and NAFTA, deregulation, etc.) have led to expectations that Canada's manufacturing productivity growth should exceed that of the United States.

The objective of this note is to contribute to the manufacturing productivity debate by presenting new detailed estimates for labour, capital, and total factor productivity for two-digit SIC manufacturing industries in Canada and the United States for the 1980s and 1990s. The estimates have been developed by the Centre for the Study of Living Standards (CSLS) from official estimates of real output, labour input, and capital stock data produced by Statistics Canada and the U.S. Department of Commerce.

### Official data on general trends in manufacturing

Since 1981, according to BLS data, output per hour in manufacturing has advanced an

average 0.9 percentage points faster in the United States than in Canada- 3.1 per cent versus 2.2 per cent (Table 3). According to a recent benchmark estimate (de Jong, Gjalt 1996<sup>1</sup>), the level of output per hour in Canadian manufacturing in the 1987 was 79.4 per cent of the U.S. level. Combining this level and the relative productivity growth rates produces a fall in Canada's productivity relative for manufacturing from 83.9 per cent in 1981 to 73.7 per cent in 1997, a precipitous decline (Table 4).

In both the 1980s and the 1990s, Canada's output per hour growth in manufacturing has lagged that in the U.S. In the peak-to-peak 1981-89 period, output per hour increased at a 2.3 per cent rate in Canada versus 3.2 per cent in the U.S. From the 1989 peak to 1997, (not a business cycle peak, but the most recent year for which data are currently available), output per hour in Canadian manufacturing advanced at a 2.2 per cent average annual rate, compared to 2.9 per cent in the U.S.

The pace of output growth, and the relationship between output and productivity growth changed markedly in Canada between the 1980s and the 1990s, more so than in the U.S. In the 1980s, output growth advanced at a 3.0 per cent average annual rate (not much below the 3.2 per cent registered in the U.S.) and both productivity growth and labour input growth contributed to output, with growth rates of 2.3 per cent and 0.7 per cent respectively. But in the 1990s output has increased at only a 1.7 per cent average annual rate (compared to 2.7 per cent in the U.S.), with all the gains coming from productivity growth (2.2 per cent per year) and total hours falling at a 0.4 per cent annual rate. The key development in the 1990s in Canadian manufacturing was not any significant deterioration of productivity growth, but the almost halving of output growth.

#### Manufacturing Productivity Trends based on CSLS Data Base

The Centre for the Study of Living Standards (CSLS) has constructed a productivity data base based on Statistics Canada and U.S. Department of Commerce data that allows analysis of Canadian and U.S. labour, capital, and total factor productivity trends on an industry basis. The complete data base is posted on the CSLS website ([www.csls.ca](http://www.csls.ca)) under projects. For the total manufacturing sector the output per hour growth rates were almost identical with the BLS series for the 1981-97 period (Table 5). However, this is not quite the case when the 1990s and 1980s are examined separately.

According to the CSLS series, growth in output per hour was only 0.5 percentage points less than in U.S. manufacturing in the 1990s, compared to 0.7 points in the BLS series. Moreover, growth in output per hour in Canadian manufacturing accelerated by 0.3 points in Canada in the 1990s relative to the 1980s, compared to a fall of 0.5 points for U.S. manufacturing. Consequently, this data series puts Canada's manufacturing productivity performance in a somewhat better light than the BLS series.

A detailed analysis of US manufacturing in the 1990s reveals that productivity growth is largely concentrated in two industries- industrial machinery and equipment and electronic and

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<sup>1</sup> de Jong, Gjalt (1996) "Canada's Post-war Manufacturing Performance: A Comparison with the United States," Research Memorandum GD-32, Groningen Growth and Development Centre, University of Groningen, December.

other electronic equipment. When these two industries are removed, US manufacturing productivity growth evaporates, falling from 2.9 per cent to 0.2 per cent per year (Table 5). In contrast, in Canada, removal of these two industries from the data has little effect on manufacturing productivity.

In the United States, output per hour in industrial machinery and equipment rose at a 7.9 per cent annual rate in the 1990s and electronic and other electric equipment at 13.9 per cent. These two sectors accounted for an astonishing 102.9 per cent of all the output (expressed in 1992 dollars) increase in U.S. manufacturing in the 1990s, with their share of total manufacturing output nearly doubling from 18.5 per cent to 34.8 per cent between 1989 and 1997 (Table 6). Indeed, real output in the rest of manufacturing fell in absolute terms in the 1990s.

In terms of the 19 two-digit SIC manufacturing industries, Canada enjoyed faster output per hour increases or smaller declines in growth in the 1990s in 11 industries (wood industries, furniture and fixture industries, primary metal industries, transportation equipment industries, food and kindred products, tobacco product industries, textile industries, paper and allied products industries, chemical and allied products industries, refined petroleum and coal products industries, and rubber and plastic industries). The United States outperformed Canada in only 8 sectors (non-metallic mineral products industries, fabricated metal products industries, machinery industries, electrical and electronic products industries, other manufacturing industries, clothing industries, printing and publishing industries, and leather and leather products industries).

An analysis of capital productivity trends in Canadian and U.S. manufacturing (Table 7) reveals that for the total manufacturing sector, Canada outperform the United States in the 1990s, with output per unit of net capital stock rising at a 2.3 per cent annual rate in this country compared to 0.6 per cent in the United States. This trend reflects the fact that the constant dollar net capital stock (geometric depreciation) in manufacturing in Canada fell at an average annual rate of 0.5 per cent over the 1989-97 period, compared to a 1.8 per cent average annual rate of increase in the United States.

Canada's superior performance was broadly based, occurring in 15 out of 19 industries. When the industrial machinery and equipment and electronic and other electric equipment sectors are excluded, capital productivity plummets in the United States (-2.3 per cent per year), but is relatively unchanged in Canada.

Caution should be exercised in the interpretation of capital productivity trends (and hence total factor productivity trends) between Canada and the United States because of use of different methodologies in the construction of the time series (e.g. different service lives, depreciation functions and deflators). Statistics Canada is currently developing capital stock estimates for Canada based on U.S. definitions, and these new series may produce results which differ significantly from capital productivity trends reported above.

It should also be noted here that the capital stock series used here is the official Statistics Canada constant 1992 dollar capital stock series for manufacturing (CANSIM D993721) based on fixed 1992 weights. Statistics Canada uses a chain-weighted (Fisher) series for calculation of

its multifactor productivity series for manufacturing and this series shows a different trend in the capital, rising at 1.0 per cent per year over the 1989-97 period (see Appendix A8 for comparison of CSLS and Statistics Canada manufacturing productivity estimates).

Total factor productivity is the weighted average of labour and capital productivity growth where the weights are the income shares of labour and capital. Table 8 shows that total factor productivity growth advanced at a 2.3 per cent pace in Canada in the 1990s, compared to 2.1 per cent in the United States. Again, Canada's superior performance was broadly based, with 13 out of 19 industries surpassing U.S. growth rates. When the industrial machinery and equipment and electronic and other electric equipment sectors are excluded, total factor productivity falls in the United States (-0.7 per cent per year), but is relatively unchanged in Canada.

### Implications of the New Data

Three important points arise from these new data. First, in contrast to Canada's inferior labour productivity performance, capital and total factor productivity growth in Canadian manufacturing exceeded that of the United States in the 1990s. This suggests it may be premature to conclude that Canada's overall productivity performance in manufacturing was worse than that experienced in the United States.

Second, the superior U.S. labour productivity performance is based on the massive output gains in the industrial machinery and equipment and electronic and other electric equipment sectors and evaporates when these sectors are excluded. This suggests one should be suspicious of the output estimates for the industrial machinery and equipment and electronic and other electric equipment sectors in the United States. Further investigation of this issue needs to be done.

Third, given the uncertainty associated with the comparable measurement of manufacturing productivity in Canada and the United States, it may be misleading to focus on the causes of faster U.S. productivity growth and a growing Canada-U.S. productivity gap, as such may not be the case. But we do know with a fair degree of certainty based on earlier benchmark level estimates that the level of manufacturing productivity in Canada continues to be below that in the United States, so a focus on the factors behind such a gap (even if it is not growing) remains justified.

Table 1

Total Economy Labour Productivity Growth in Canada and the United States  
(average annual rate of change)

|         | Output per worker |      | Output per hour |      |
|---------|-------------------|------|-----------------|------|
|         | Canada            | U.S. | Canada          | U.S. |
| 1981-89 | 1.33              | 1.11 | 0.99            | 1.38 |
| 1989-98 | 0.84              | 1.13 | 1.23            | 1.10 |
| 1981-98 | 1.07              | 1.12 | 1.11            | 1.23 |

Source: Centre for the Study of Living Standards based on Statistics Canada and Bureau of Economic Analysis data

Table 2

Total Economy Output, Labour Input, and Capital Stock Trends in Canada and the United States  
(average annual rate of change)

|         | Output |      | Employment |      | Ave. Hours |       | Total Hours |      | Capital Stock |       |
|---------|--------|------|------------|------|------------|-------|-------------|------|---------------|-------|
|         | Can.   | U.S. | Can.       | U.S. | Can.       | U.S.  | Can.        | U.S. | Can.          | U.S.  |
| 1981-89 | 3.10   | 3.18 | 1.74       | 2.04 | 0.34       | -0.29 | 2.09        | 1.77 | 1.81          | 2.84  |
| 1989-98 | 1.86   | 2.47 | 1.01       | 1.33 | -0.38      | 0.03  | 0.63        | 1.35 | 1.26          | 2.34* |
| 1981-98 | 2.44   | 2.80 | 1.35       | 1.66 | -0.04      | -0.12 | 1.31        | 1.55 | 1.52          | 2.59* |

Source: Statistics Canada and U.S. Bureau of Economic Analysis

\*End year is 1997, not 1998.

Table 3

**Output, Output Per Hour, and Labour Input in Manufacturing in Canada and the United States**  
(average annual rates of change)

|         | Real Output |      | Output per hour |      | Total hours |      | Employment |      | Output per employed person |      |
|---------|-------------|------|-----------------|------|-------------|------|------------|------|----------------------------|------|
|         | Canada      | U.S. | Canada          | U.S. | Canada      | U.S. | Canada     | U.S. | Canada                     | U.S. |
| 1981-89 | 3.0         | 3.2  | 2.3             | 3.2  | 0.7         | 0.0  | 0.4        | -0.5 | 2.6                        | 3.7  |
| 1989-97 | 1.7         | 2.7  | 2.2             | 2.9  | -0.4        | -0.2 | -0.5       | -0.5 | 2.2                        | 3.2  |
| 1981-97 | 2.3         | 3.0  | 2.2             | 3.1  | 0.1         | -0.1 | -0.1       | -0.5 | 2.4                        | 3.4  |

Source: *International Comparisons of Manufacturing Productivity and Unit Labour Costs, Updated Trends for 1997*, News, Bureau of Labor Statistics, U.S. Department of Labor, March, 1999.

**Table 4: Relative Productivity Levels Canada/US, %**

(US = 100 in all years)

|      | Output per<br>Hour<br>In<br>Manufacturing | Real GDP per<br>employed<br>person |
|------|---|------------------------------------|
| 1977 | 89.9                                      | 81.4                               |
| 1978 | 90.6                                      | 81.4                               |
| 1979 | 89.3                                      | 81.1                               |
| 1980 | 86.0                                      | 80.6                               |
| 1981 | 83.9                                      | 80.3                               |
| 1982 | 79.5                                      | 81.4                               |
| 1983 | 80.6                                      | 81.3                               |
| 1984 | 84.1                                      | 81.9                               |
| 1985 | 84.1                                      | 82.0                               |
| 1986 | 83.1                                      | 81.6                               |
| 1987 | 79.4                                      | 82.5                               |
| 1988 | 76.5                                      | 82.6                               |
| 1989 | 78.3                                      | 81.8                               |
| 1990 | 80.1                                      | 81.1                               |
| 1991 | 79.5                                      | 81.2                               |
| 1992 | 82.2                                      | 80.5                               |
| 1993 | 83.2                                      | 80.5                               |
| 1994 | 80.3                                      | 81.0                               |
| 1995 | 77.6                                      | 81.1                               |
| 1996 | 74.8                                      | 80.2                               |
| 1997 | 73.7                                      | 80.3                               |

*Source:* manufacturing-Based on an estimate of 79.4 for the 1987 benchmark year by Gjalt de Jong "Canada's Post-war Manufacturing Performance: A Comparison with the United States," Research Memorandum GD-32, Groningen Growth and Development Centre, University of Groningen, December 1996, and growth rates from *International Comparisons of Manufacturing Productivity and Unit Labour Costs, trends for 1997*, News, Bureau of Labour Statistics, U.S. Department of Labour, March 1999.

<http://www.bls.gov/news.release/prod4.t01.htm>; total economy - Bureau of Labor Statistics (1998)

"Comparative Real Gross Domestic Product Per Capita and per Employed Person, Fourteen Countries, 1960-1996," (<ftp.bls.gov/pub/special.requests/ForeignLabor/flsgdp.txt>); updated for 1997 up CSLS.



Table 5: VALUE ADDED PER PERSON HOUR  
Estimates of GDP per hour, by Industry

|   | % Average compound growth rates |       |         |       |         |       |
|---|---------------------------------|-------|---------|-------|---------|-------|
|   | 1981-89                         |       | 1989-97 |       | 1981-97 |       |
|   | Canada                          | US    | Canada  | US    | Canada  | US    |
| All industries                                    | 0.80                            | 1.38  | 1.27    | 0.84  | 1.03    | 1.11  |
| Total manufacturing industries                    | 2.06                            | 3.40  | 2.35    | 2.90  | 2.20    | 3.15  |
| Wood industries                                   | 3.89                            | 3.73  | -1.46   | -2.88 | 1.18    | 0.37  |
| Furniture and fixture industries                  | 0.26                            | 0.51  | 4.89    | 2.03  | 2.55    | 1.26  |
| Non-metallic mineral products industries          | 3.34                            | 3.29  | -1.37   | 1.84  | 0.95    | 2.56  |
| Primary metal industries                          | 3.56                            | -0.32 | 4.50    | 2.99  | 4.03    | 1.32  |
| Fabricated metal products industries              | 2.57                            | 2.73  | 0.93    | 2.01  | 1.75    | 2.37  |
| Machinery industries                              | 5.00                            | 8.72  | 1.63    | 7.88  | 3.30    | 8.30  |
| Electrical and electronic products industries     | 4.54                            | n/a   | 4.28    | 13.91 | 4.41    | n/a   |
| Transportation equipment industries               | 2.76                            | 2.49  | 2.29    | -0.70 | 2.52    | 0.88  |
| Other manufacturing industries                    | -0.06                           | 5.83  | -0.32   | 0.27  | -0.19   | 3.01  |
| Food and kindred                                  | 0.22                            | 2.82  | 2.23    | -0.09 | 1.22    | 1.35  |
| Tobacco products industries                       | n/a                             | -5.42 | 12.42   | -0.17 | n/a     | -2.83 |
| Textile industries                                | 3.04                            | 3.31  | 7.08    | 3.95  | 5.04    | 3.63  |
| Clothing industries                               | -0.83                           | 3.91  | 1.32    | 3.83  | 0.24    | 3.87  |
| Paper and allied products industries              | 0.08                            | 2.77  | 4.27    | 1.44  | 2.15    | 2.10  |
| Printing, publishing and allied industries        | -2.01                           | -0.35 | -2.61   | -1.80 | -2.31   | -1.08 |
| Chemical and chemical products industries         | 3.42                            | 4.53  | 3.44    | 3.23  | 3.43    | 3.88  |
| Refined petroleum and coal products industries    | 0.63                            | 8.66  | 7.44    | 1.60  | 3.98    | 5.07  |
| Rubber and plastic industries                     | 1.67                            | 4.12  | 4.45    | 4.03  | 3.05    | 4.07  |
| Leather and allied products industries            | 2.84                            | 4.21  | -0.26   | 4.11  | 1.28    | 4.16  |
| Manufacturing - Machinery and Electric industries | 1.84                            | 2.95  | 2.21    | 0.20  | 2.02    | 1.56  |
| Manufacturing (BLS data)                          | 2.3                             | 3.2   | 2.2     | 3.3   | 2.2     | 3.2   |

Source: CSLS productivity data base

Table 6

**Manufacturing Output by Sector in Canada and the United States, 1989-97**

|   | Output by Industry (1992\$) |         |               |        | Percentage Change |       | Output Shares (%) |        |        |        |
|---|-----------------------------|---------|---------------|--------|-------------------|-------|-------------------|--------|--------|--------|
|   | Canada (mill\$)             |         | U.S. (bill\$) |        | 1989-97           |       | Canada            |        | U.S.   |        |
|   | 1989                        | 1997    | 1989          | 1997   | Canada            | U.S.  | 1989              | 1997   | 1989   | 1997   |
| Total manufacturing industries                    | 106,612                     | 123,155 | 1106.0        | 1369.9 | 15.5              | 23.9  | 100.00            | 100.00 | 100.00 | 100.00 |
| Wood industries                                   | 5,673                       | 5,797   | 38.7          | 33.1   | 2.2               | -14.5 | 5.32              | 4.71   | 3.50   | 2.42   |
| Furniture and fixture industries                  | 2,188                       | 2,579   | 16.9          | 19.7   | 17.9              | 16.6  | 2.05              | 2.09   | 1.53   | 1.44   |
| Non-metallic mineral products industries          | 3,473                       | 2,947   | 25.6          | 29.3   | -15.1             | 14.5  | 3.26              | 2.39   | 2.31   | 2.14   |
| Primary metal industries                          | 5,487                       | 6,180   | 39.4          | 48.0   | 12.6              | 21.8  | 5.15              | 5.02   | 3.56   | 3.50   |
| Fabricated metal products industries              | 8,260                       | 9,005   | 75.2          | 93.0   | 9.0               | 23.7  | 7.75              | 7.31   | 6.80   | 6.79   |
| Machinery industries                              | 5,553                       | 6,869   | 112.1         | 215.2  | 23.7              | 92.0  | 5.21              | 5.58   | 10.14  | 15.71  |
| Electrical and electronic products industries     | 7,147                       | 9,779   | 92.7          | 261.2  | 36.8              | 181.8 | 6.70              | 7.94   | 8.38   | 19.07  |
| Transportation equipment industries               | 15,901                      | 21,443  | 136.7         | 121.9  | 34.9              | -10.8 | 14.91             | 17.41  | 12.36  | 8.90   |
| Other manufacturing industries                    | 3,175                       | 3,619   | 78.7          | 59.4   | 14.0              | -24.5 | 2.98              | 2.94   | 7.12   | 4.34   |
| Food and kindred                                  | 14,955                      | 17,352  | 102.7         | 106.7  | 16.0              | 3.9   | 14.03             | 14.09  | 9.29   | 7.79   |
| Tobacco products industries                       | 1,242                       | 1,048   | 27.2          | 21.3   | -15.6             | -21.7 | 1.16              | 0.85   | 2.46   | 1.55   |
| Textile industries                                | 2,586                       | 2,845   | 21.9          | 25.7   | 10.0              | 17.4  | 2.43              | 2.31   | 1.98   | 1.88   |
| Clothing industries                               | 3,154                       | 2,846   | 27.2          | 28.2   | -9.8              | 3.7   | 2.96              | 2.31   | 2.46   | 2.06   |
| Paper and allied products industries              | 6,028                       | 6,605   | 43.8          | 48.9   | 9.6               | 11.6  | 5.65              | 5.36   | 3.96   | 3.57   |
| Printing, publishing and allied industries        | 8,827                       | 6,996   | 87.9          | 76.7   | -20.7             | -12.7 | 8.28              | 5.68   | 7.95   | 5.60   |
| Chemical and chemical products industries         | 8,617                       | 10,281  | 111.4         | 141.2  | 19.3              | 26.8  | 8.08              | 8.35   | 10.07  | 10.31  |
| Refined petroleum and coal products industries    | 961                         | 1,191   | 33.4          | 32.4   | 23.9              | -3.0  | 0.90              | 0.97   | 3.02   | 2.37   |
| Rubber and plastic industries                     | 3,771                       | 5,402   | 34.5          | 53.7   | 43.3              | 55.7  | 3.54              | 4.39   | 3.12   | 3.92   |
| Leather and allied products industries            | 586                         | 371     | 4.9           | 4.3    | -36.7             | -12.2 | 0.55              | 0.30   | 0.44   | 0.31   |
| Manufacturing - Machinery and Electric industries | 93,912                      | 106,507 | 901           | 894    | 13.4              | -0.9  | 88.09             | 86.48  | 81.48  | 65.22  |

Source: Gross Domestic Product by Industry, CANSIM matrix 4677, Statistics Canada, 1999; Bureau of Economic Analysis, 1999, <http://www.bea.doc.gov/bea/an/1198gpo/maintext.htm>

Table 7: VALUE ADDED PER UNIT OF CAPITAL STOCK  
(\$1000's of 1992 constant dollar GDP per \$1000's of 1992 constant dollars of year-end net capital stock)

|   | % Average compound growth rates |        |         |       |         |       |
|---|---------------------------------|--------|---------|-------|---------|-------|
|   | 1981-89                         |        | 1989-97 |       | 1981-97 |       |
|   | Canada                          | US     | Canada  | US    | Canada  | US    |
| All industries                                    | 1.07                            | 0.33   | 0.54    | -0.04 | 0.81    | 0.14  |
| Total manufacturing industries                    | 0.95                            | 0.11   | 2.32    | 0.61  | 1.63    | 0.36  |
| Wood industries                                   | 4.91                            | 2.40   | -2.01   | -4.30 | 1.39    | -1.01 |
| Furniture and fixture industries                  | -1.11                           | -0.91  | 0.42    | -0.34 | -0.35   | -0.62 |
| Non-metallic mineral products industries          | 4.72                            | -0.80  | 1.76    | -0.44 | 3.23    | -0.62 |
| Primary metal industries                          | 1.87                            | -7.25  | 3.23    | 0.17  | 2.55    | -3.61 |
| Fabricated metal products industries              | 0.99                            | -1.33  | 1.34    | 0.36  | 1.17    | -0.49 |
| Machinery industries                              | 1.47                            | 4.37   | -0.94   | 6.80  | 0.25    | 5.58  |
| Electrical and electronic products industries     | 2.16                            | n/a    | 6.27    | 12.12 | 4.19    | n/a   |
| Transportation equipment industries               | 0.78                            | 0.82   | 1.54    | -3.46 | 1.16    | -1.35 |
| Other manufacturing industries                    | -4.49                           | 2.06   | -0.24   | -1.66 | -2.39   | 0.18  |
| Food and kindred                                  | -1.37                           | -0.59  | 2.41    | -1.79 | 0.50    | -1.19 |
| Tobacco products industries                       | -1.43                           | -11.66 | -5.53   | -5.15 | -3.50   | -8.46 |
| Textile industries                                | 1.35                            | -1.61  | 0.98    | -0.43 | 1.16    | -1.02 |
| Clothing industries                               | -0.13                           | -0.87  | -3.11   | -1.79 | -1.63   | -1.33 |
| Paper and allied products industries              | -5.16                           | -0.04  | 1.84    | -0.79 | -1.73   | -0.42 |
| Printing, publishing and allied industries        | -2.49                           | -0.71  | -5.16   | -3.34 | -3.84   | -2.04 |
| Chemical and chemical products industries         | 8.63                            | 1.18   | 3.55    | 0.87  | 6.06    | 1.03  |
| Refined petroleum and coal products industries    | 3.22                            | 1.59   | 9.44    | -2.64 | 6.28    | -0.54 |
| Rubber and plastic industries                     | 0.70                            | 3.36   | 3.82    | 3.24  | 2.25    | 3.30  |
| Leather and allied products industries            | -1.24                           | -5.47  | -2.73   | -3.76 | -1.99   | -4.62 |
| Manufacturing - Machinery and Electric industries | 0.93                            | -1.56  | 2.09    | -2.25 | 1.51    | -1.90 |

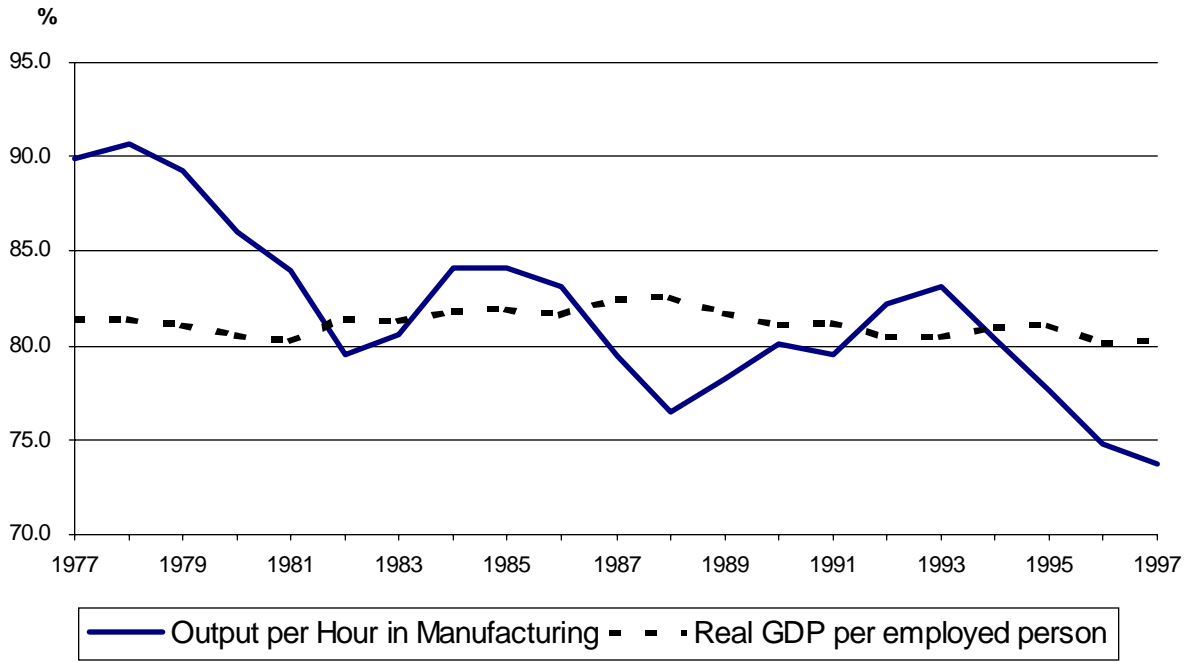
Source: CSLs Productivity data base

Table 8: Total Factor Productivity Indices  
(Using number of hours)

|   | % Average compound growth rates |        |         |       |         |       |
|---|---------------------------------|--------|---------|-------|---------|-------|
|   | 1981-89                         |        | 1989-97 |       | 1981-97 |       |
|   | Canada                          | US     | Canada  | US    | Canada  | US    |
| All industries                                    | 0.90                            | 0.95   | 0.98    | 0.46  | 0.94    | 0.71  |
| Total manufacturing industries                    | 1.70                            | 2.42   | 2.34    | 2.12  | 2.02    | 2.27  |
| Wood industries                                   | 4.11                            | 3.23   | -1.58   | -3.45 | 1.23    | -0.16 |
| Furniture and fixture industries                  | -0.09                           | 0.26   | 3.51    | 1.56  | 1.69    | 0.91  |
| Non-metallic mineral products industries          | 3.76                            | 2.44   | -0.54   | 1.27  | 1.59    | 1.85  |
| Primary metal industries                          | 3.33                            | -1.39  | 4.31    | 2.40  | 3.82    | 0.49  |
| Fabricated metal products industries              | 2.07                            | 1.71   | 1.07    | 1.53  | 1.57    | 1.62  |
| Machinery industries                              | 3.69                            | 7.95   | 0.53    | 7.65  | 2.10    | 7.80  |
| Electrical and electronic products industries     | 4.06                            | n/a    | 4.68    | 13.26 | 4.37    | n/a   |
| Transportation equipment industries               | 2.18                            | 2.31   | 2.05    | -1.05 | 2.12    | 0.61  |
| Other manufacturing industries                    | -0.92                           | 4.36   | -0.31   | -0.58 | -0.62   | 1.86  |
| Food and kindred                                  | -0.53                           | 1.37   | 2.32    | -0.90 | 0.88    | 0.23  |
| Tobacco products industries                       | N/a                             | -10.48 | -1.99   | -4.52 | n/a     | -7.55 |
| Textile industries                                | 2.59                            | 2.03   | 5.03    | 2.48  | 3.80    | 2.26  |
| Clothing industries                               | -0.65                           | 2.92   | 0.06    | 2.23  | -0.30   | 2.58  |
| Paper and allied products industries              | -0.43                           | 1.86   | 3.96    | 0.62  | 1.74    | 1.24  |
| Printing, publishing and allied industries        | -2.14                           | -0.46  | -3.37   | -2.32 | -2.76   | -1.40 |
| Chemical and chemical products industries         | 6.26                            | 2.95   | 3.50    | 1.98  | 4.87    | 2.46  |
| Refined petroleum and coal products industries    | 1.61                            | 4.59   | 8.12    | -1.26 | 4.81    | 1.62  |
| Rubber and plastic industries                     | 1.29                            | 3.96   | 4.19    | 3.85  | 2.73    | 3.90  |
| Leather and allied products industries            | 2.02                            | 1.14   | -0.87   | 0.34  | 0.56    | 0.74  |
| Manufacturing - Machinery and Electric industries | 1.54                            | 1.60   | 2.17    | -0.67 | 1.85    | 0.46  |

Source: CSLS Productivity data base

**Chart 1: Relative Productivity Levels  
(Canada/US)**



**Table A1: Productivity in the Total Economy and Manufacturing, Canada**

| Year | Total Economy                      |                  |                        |                              |                                   | Manufacturing      |                  |                        |                                     |                  |                        |                              |                                   |                    |                  |                        |
|------|------------------------------------|------------------|------------------------|------------------------------|-----------------------------------|--------------------|------------------|------------------------|-------------------------------------|------------------|------------------------|------------------------------|-----------------------------------|--------------------|------------------|------------------------|
|      | GDP at market pr., million 1992 \$ | Workers , thous. | Average hours per week | Total hours per week, thous. | Geom. End-Year Net CS, mil 1992\$ | GDP per worker, \$ | GDP per hour, \$ | GDP per unit of CS, \$ | GDP at factor cost, million 1992 \$ | Workers , thous. | Average hours per week | Total hours per week, thous. | Geom. End-Year Net CS, mil 1992\$ | GDP per worker, \$ | GDP per hour, \$ | GDP per unit of CS, \$ |
|      | A                                  | B                | C/B                    | C                            | D                                 | A/B*1000           | (A*1000)/(C*52)  | A/D                    | E                                   | F                | G/F                    | G                            | H                                 | E/F*1000           | (E*1000)/(G*52)  | E/H                    |
| 1976 | 470,291                            | 9,776            | 35.0                   | 342,550                      | 374,823                           | 48,106             | 26.40            | 1.255                  | 75,917                              | 1,983            | 35.9                   | 71,155                       | 48,660                            | 38,282             | 20.52            | 1.560                  |
| 1977 | 486,562                            | 9,978            | 35.0                   | 349,327                      | 385,574                           | 48,763             | 26.79            | 1.262                  | 78,421                              | 1,951            | 36.3                   | 70,737                       | 49,525                            | 40,193             | 21.32            | 1.583                  |
| 1978 | 506,413                            | 10,320           | 35.4                   | 364,943                      | 395,504                           | 49,070             | 26.69            | 1.280                  | 82,774                              | 2,020            | 36.7                   | 74,148                       | 49,512                            | 40,969             | 21.47            | 1.672                  |
| 1979 | 527,703                            | 10,761           | 35.3                   | 380,363                      | 409,863                           | 49,040             | 26.68            | 1.288                  | 86,109                              | 2,145            | 36.6                   | 78,485                       | 50,171                            | 40,144             | 21.10            | 1.716                  |
| 1980 | 535,007                            | 11,082           | 34.7                   | 385,007                      | 429,104                           | 48,276             | 26.72            | 1.247                  | 82,165                              | 2,187            | 36.1                   | 78,895                       | 52,935                            | 37,565             | 20.03            | 1.552                  |
| 1981 | 551,305                            | 11,398           | 34.2                   | 389,810                      | 454,193                           | 48,369             | 27.20            | 1.214                  | 84,136                              | 2,204            | 35.5                   | 78,224                       | 57,967                            | 38,183             | 20.68            | 1.451                  |
| 1982 | 535,113                            | 11,035           | 34.0                   | 375,681                      | 466,469                           | 48,492             | 27.39            | 1.147                  | 74,743                              | 2,010            | 35.7                   | 71,785                       | 59,567                            | 37,191             | 20.02            | 1.255                  |
| 1983 | 549,843                            | 11,106           | 34.1                   | 378,609                      | 470,641                           | 49,510             | 27.93            | 1.168                  | 78,638                              | 1,961            | 36.3                   | 71,117                       | 57,589                            | 40,107             | 21.26            | 1.366                  |
| 1984 | 581,038                            | 11,402           | 34.1                   | 389,267                      | 474,712                           | 50,958             | 28.70            | 1.224                  | 89,152                              | 2,046            | 36.2                   | 74,086                       | 55,384                            | 43,582             | 23.14            | 1.610                  |
| 1985 | 612,416                            | 11,742           | 34.3                   | 402,921                      | 481,757                           | 52,156             | 29.23            | 1.271                  | 93,799                              | 2,063            | 36.5                   | 75,203                       | 55,609                            | 45,469             | 23.99            | 1.687                  |
| 1986 | 628,575                            | 12,095           | 34.3                   | 414,669                      | 486,441                           | 51,972             | 29.15            | 1.292                  | 94,829                              | 2,098            | 36.4                   | 76,348                       | 57,604                            | 45,202             | 23.89            | 1.646                  |
| 1987 | 654,360                            | 12,422           | 34.1                   | 424,171                      | 493,605                           | 52,676             | 29.67            | 1.326                  | 99,215                              | 2,127            | 36.3                   | 77,125                       | 59,615                            | 46,648             | 24.74            | 1.664                  |
| 1988 | 686,176                            | 12,819           | 34.7                   | 444,806                      | 508,187                           | 53,529             | 29.67            | 1.350                  | 105,126                             | 2,214            | 37.3                   | 82,595                       | 63,046                            | 47,480             | 24.48            | 1.667                  |
| 1989 | 703,577                            | 13,086           | 35.1                   | 459,807                      | 524,377                           | 53,765             | 29.43            | 1.342                  | 106,612                             | 2,236            | 37.7                   | 84,182                       | 68,125                            | 47,684             | 24.35            | 1.565                  |
| 1990 | 705,464                            | 13,165           | 34.6                   | 455,550                      | 536,879                           | 53,586             | 29.78            | 1.314                  | 102,570                             | 2,104            | 36.9                   | 77,737                       | 71,044                            | 48,750             | 25.37            | 1.444                  |
| 1991 | 692,247                            | 12,916           | 33.9                   | 438,199                      | 545,813                           | 53,596             | 30.38            | 1.268                  | 94,999                              | 1,956            | 36.4                   | 71,214                       | 71,550                            | 48,566             | 25.65            | 1.328                  |
| 1992 | 698,544                            | 12,842           | 33.4                   | 428,648                      | 548,252                           | 54,395             | 31.34            | 1.274                  | 96,181                              | 1,878            | 36.1                   | 67,743                       | 68,460                            | 51,223             | 27.30            | 1.405                  |
| 1993 | 714,583                            | 13,015           | 33.8                   | 440,449                      | 548,452                           | 54,906             | 31.20            | 1.303                  | 101,101                             | 1,893            | 37.2                   | 70,509                       | 65,006                            | 53,405             | 27.57            | 1.555                  |
| 1994 | 748,350                            | 13,292           | 34.3                   | 455,746                      | 554,689                           | 56,302             | 31.58            | 1.349                  | 108,859                             | 1,949            | 37.5                   | 73,092                       | 63,783                            | 55,851             | 28.64            | 1.707                  |
| 1995 | 767,913                            | 13,506           | 34.1                   | 460,024                      | 559,789                           | 56,859             | 32.10            | 1.372                  | 114,281                             | 2,060            | 37.2                   | 76,631                       | 63,873                            | 55,465             | 28.68            | 1.789                  |
| 1996 | 777,167                            | 13,676           | 34.3                   | 468,732                      | 566,059                           | 56,827             | 31.88            | 1.373                  | 115,658                             | 2,084            | 37.4                   | 77,891                       | 64,588                            | 55,511             | 28.56            | 1.791                  |
| 1997 | 806,737                            | 13,941           | 34.3                   | 477,767                      | 577,097                           | 57,869             | 32.47            | 1.398                  | 123,155                             | 2,153            | 37.5                   | 80,772                       | 65,492                            | 57,191             | 29.32            | 1.880                  |
| 1998 | 830,828                            | 14,326           | 34.0                   | 486,536                      | 586,791                           | 57,994             | 32.84            | 1.416                  | 128,018                             | 2,246            | 37.1                   | 83,333                       | 65,859                            | 56,996             | 29.54            | 1.944                  |

## Average annual rates of growth

|       |      |      |       |      |      |      |      |      |      |       |       |       |       |      |      |      |
|-------|------|------|-------|------|------|------|------|------|------|-------|-------|-------|-------|------|------|------|
| 81-89 | 3.10 | 1.74 | 0.34  | 2.09 | 1.81 | 1.33 | 0.99 | 1.26 | 3.00 | 0.18  | 0.74  | 0.92  | 2.04  | 2.82 | 2.06 | 0.95 |
| 89-98 | 1.86 | 1.01 | -0.38 | 0.63 | 1.26 | 0.84 | 1.23 | 0.60 | 2.05 | 0.05  | -0.16 | -0.11 | -0.38 | 2.00 | 2.17 | 2.44 |
| 81-98 | 2.44 | 1.35 | -0.04 | 1.31 | 1.52 | 1.07 | 1.11 | 0.91 | 2.50 | 0.11  | 0.26  | 0.37  | 0.75  | 2.38 | 2.12 | 1.73 |
| 89-97 | 1.72 | 0.79 | -0.31 | 0.48 | 1.20 | 0.92 | 1.24 | 0.51 | 1.82 | -0.47 | -0.05 | -0.52 | -0.49 | 2.30 | 2.35 | 2.32 |
| 81-97 | 2.41 | 1.27 | 0.01  | 1.28 | 1.51 | 1.13 | 1.11 | 0.89 | 2.41 | -0.14 | 0.34  | 0.20  | 0.77  | 2.56 | 2.20 | 1.63 |

Sources: Columns A, E - Statistics Canada, GDP Data, CANSIM series D15721, I53036, 1999; Columns B, C - Statistics Canada Labour Force Historical Review, 71F0004XCB, 1999; columns F, G - Statistics Canada, unpublished Labour Force Survey Data, 1999; columns D, H - Statistics Canada, Capital Stock Data, CANSIM Series D993325, D993721, 1999.

**Table A2: Productivity in the Total Economy and Manufacturing, US**

| Year | Total Economy                      |                 |                        |                              |                                   | Manufacturing      |                  |                        |                                     |                 |                        |                              |                                   |                    |                  |                        |
|------|------------------------------------|-----------------|------------------------|------------------------------|-----------------------------------|--------------------|------------------|------------------------|-------------------------------------|-----------------|------------------------|------------------------------|-----------------------------------|--------------------|------------------|------------------------|
|      | GDP at market pr., million 1992 \$ | Workers, thous. | Average hours per week | Total hours per week, thous. | Geom. End-Year Net CS, mil 1992\$ | GDP per worker, \$ | GDP per hour, \$ | GDP per unit of CS, \$ | GDP at factor cost, million 1992 \$ | Workers, thous. | Average hours per week | Total hours per week, thous. | Geom. End-Year Net CS, mil 1992\$ | GDP per worker, \$ | GDP per hour, \$ | GDP per unit of CS, \$ |
|      | A                                  | B               | C                      | D=B*C                        | E                                 | A/B*1000           | (A*1000)/(D*52)  | A/E                    | F                                   | G               | H                      | I=G*H                        | J                                 | F/G*1000           | (F*1000)/(I*52)  | F/J                    |
| 1976 | n/a                                | 87,427          | 36.1                   | 3,158,300                    | 6,435,898                         | n/a                | n/a              | n/a                    | n/a                                 | 19,082          | 40.1                   | 765,506                      | 604,977                           | n/a                | n/a              | n/a                    |
| 1977 | 4,273,573                          | 90,444          | 36.0                   | 3,254,477                    | 7,065,608                         | 47,251             | 25.25            | 0.605                  | 796,538                             | 19,801          | 40.3                   | 798,475                      | 653,859                           | 40,227             | 19.18            | 1.218                  |
| 1978 | 4,502,994                          | 94,816          | 35.8                   | 3,395,993                    | 7,775,694                         | 47,492             | 25.50            | 0.579                  | 836,549                             | 20,670          | 40.4                   | 835,585                      | 709,296                           | 40,472             | 19.25            | 1.179                  |
| 1979 | 4,630,631                          | 98,050          | 35.7                   | 3,496,300                    | 8,645,542                         | 47,227             | 25.47            | 0.536                  | 864,841                             | 21,184          | 40.2                   | 851,244                      | 783,293                           | 40,825             | 19.54            | 1.104                  |
| 1980 | 4,614,957                          | 98,408          | 35.3                   | 3,471,342                    | 9,547,080                         | 46,896             | 25.57            | 0.483                  | 822,674                             | 20,437          | 39.7                   | 810,838                      | 868,292                           | 40,254             | 19.51            | 0.947                  |
| 1981 | 4,720,676                          | 99,303          | 35.3                   | 3,502,086                    | 10,219,234                        | 47,538             | 25.92            | 0.462                  | 858,601                             | 20,333          | 39.9                   | 810,439                      | 928,261                           | 42,227             | 20.37            | 0.925                  |
| 1982 | 4,620,265                          | 97,827          | 34.8                   | 3,406,010                    | 10,590,712                        | 47,229             | 26.09            | 0.436                  | 810,101                             | 18,949          | 39.0                   | 739,011                      | 964,666                           | 42,752             | 21.08            | 0.840                  |
| 1983 | 4,803,664                          | 98,599          | 35.0                   | 3,450,143                    | 10,715,768                        | 48,719             | 26.78            | 0.448                  | 856,726                             | 18,560          | 40.1                   | 744,565                      | 981,632                           | 46,160             | 22.13            | 0.873                  |
| 1984 | 5,140,115                          | 103,196         | 35.2                   | 3,627,339                    | 10,977,055                        | 49,809             | 27.25            | 0.468                  | 948,217                             | 19,514          | 40.7                   | 793,569                      | 996,818                           | 48,592             | 22.98            | 0.951                  |
| 1985 | 5,323,514                          | 105,876         | 34.9                   | 3,696,837                    | 11,214,830                        | 50,281             | 27.69            | 0.475                  | 976,446                             | 19,384          | 40.5                   | 785,375                      | 1,026,905                         | 50,374             | 23.91            | 0.951                  |
| 1986 | 5,487,743                          | 107,804         | 34.8                   | 3,748,884                    | 11,563,093                        | 50,905             | 28.15            | 0.475                  | 967,675                             | 19,068          | 40.7                   | 776,227                      | 1,066,687                         | 50,749             | 23.97            | 0.907                  |
| 1987 | 5,649,474                          | 110,817         | 34.8                   | 3,854,585                    | 11,942,540                        | 50,980             | 28.19            | 0.473                  | 1,041,675                           | 19,115          | 41.0                   | 784,034                      | 1,106,360                         | 54,495             | 25.55            | 0.942                  |
| 1988 | 5,865,220                          | 113,981         | 34.6                   | 3,946,592                    | 12,396,580                        | 51,458             | 28.58            | 0.473                  | 1,111,013                           | 19,483          | 41.0                   | 798,478                      | 1,148,144                         | 57,025             | 26.76            | 0.968                  |
| 1989 | 6,061,982                          | 116,725         | 34.5                   | 4,029,931                    | 12,786,162                        | 51,934             | 28.93            | 0.474                  | 1,105,992                           | 19,521          | 40.9                   | 799,060                      | 1,185,448                         | 56,657             | 26.62            | 0.933                  |
| 1990 | 6,136,291                          | 117,639         | 34.4                   | 4,051,683                    | 13,090,289                        | 52,162             | 29.13            | 0.469                  | 1,089,974                           | 19,141          | 40.8                   | 780,474                      | 1,229,839                         | 56,944             | 26.86            | 0.886                  |
| 1991 | 6,079,404                          | 116,712         | 34.3                   | 3,997,386                    | 13,153,799                        | 52,089             | 29.25            | 0.462                  | 1,050,216                           | 18,533          | 40.7                   | 753,675                      | 1,243,749                         | 56,667             | 26.80            | 0.844                  |
| 1992 | 6,244,445                          | 117,204         | 34.4                   | 4,028,888                    | 13,484,088                        | 53,278             | 29.81            | 0.463                  | 1,063,628                           | 18,179          | 41.1                   | 747,005                      | 1,263,491                         | 58,509             | 27.38            | 0.842                  |
| 1993 | 6,389,566                          | 119,247         | 34.5                   | 4,115,015                    | 13,928,552                        | 53,583             | 29.86            | 0.459                  | 1,100,823                           | 18,175          | 41.5                   | 753,657                      | 1,293,765                         | 60,568             | 28.09            | 0.851                  |
| 1994 | 6,610,744                          | 122,258         | 34.6                   | 4,234,202                    | 14,464,191                        | 54,072             | 30.02            | 0.457                  | 1,193,167                           | 18,428          | 41.9                   | 772,747                      | 1,332,854                         | 64,748             | 29.69            | 0.895                  |
| 1995 | 6,761,735                          | 125,146         | 34.4                   | 4,309,194                    | 14,753,499                        | 54,031             | 30.18            | 0.458                  | 1,271,556                           | 18,591          | 41.6                   | 773,541                      | 1,363,872                         | 68,396             | 31.61            | 0.932                  |
| 1996 | 6,994,777                          | 127,567         | 34.4                   | 4,392,557                    | 15,065,479                        | 54,832             | 30.62            | 0.464                  | 1,293,847                           | 18,575          | 41.6                   | 771,946                      | 1,380,938                         | 69,655             | 32.23            | 0.937                  |
| 1997 | 7,269,782                          | 130,567         | 34.6                   | 4,519,794                    | 15,386,760                        | 55,679             | 30.93            | 0.472                  | 1,369,889                           | 18,758          | 42.0                   | 787,367                      | 1,398,304                         | 73,030             | 33.46            | 0.980                  |
| 1998 | 7,551,900                          | 131,463         | 34.6                   | 4,548,620                    | n/a                               | 57,445             | 31.93            | n/a                    | 1,426,054                           | 18,719          | 41.8                   | 781,518                      | n/a                               | 76,182             | 35.09            | n/a                    |

## Average annual rates of growth

|       |      |      |       |      |      |      |      |       |      |       |      |       |      |      |      |      |
|-------|------|------|-------|------|------|------|------|-------|------|-------|------|-------|------|------|------|------|
| 81-89 | 3.18 | 2.04 | -0.27 | 1.77 | 2.84 | 1.11 | 1.38 | 0.33  | 3.22 | -0.51 | 0.33 | -0.18 | 3.10 | 3.74 | 3.40 | 0.11 |
| 89-98 | 2.47 | 1.33 | 0.02  | 1.35 | n/a  | 1.13 | 1.10 | n/a   | 2.86 | -0.47 | 0.22 | -0.25 | n/a  | 3.34 | 3.12 | n/a  |
| 81-98 | 2.80 | 1.66 | -0.11 | 1.55 | n/a  | 1.12 | 1.23 | n/a   | 3.03 | -0.49 | 0.27 | -0.21 | n/a  | 3.53 | 3.25 | n/a  |
| 89-97 | 2.30 | 1.41 | 0.03  | 1.44 | 2.34 | 0.87 | 0.84 | -0.04 | 2.71 | -0.50 | 0.31 | -0.18 | 2.09 | 3.22 | 2.90 | 0.61 |
| 81-97 | 2.74 | 1.73 | -0.12 | 1.61 | 2.59 | 0.99 | 1.11 | 0.14  | 2.96 | -0.50 | 0.32 | -0.18 | 2.59 | 3.48 | 3.15 | 0.36 |

Sources: Columns A, B, F, G - BEA ([http://www.bea.doc.gov/bea/uguide.htm#\\_1\\_14](http://www.bea.doc.gov/bea/uguide.htm#_1_14)); columns E, J - BEA (<http://www.bea.doc.gov/bea/dn2/wealth.exe>); Columns C, H - BLS (<http://www.bls.gov/cesb1b6.htm>) Estimates for the US GDP at factor cost for manufacturing for 1998 are based on 1997 data and 1997-98 4.1% annual growth rate estimates for output - BLS (<http://www.bls.gov/news.release/prod2.t03.htm>).

Table A3

## Productivity Performance in Canada and the United States

|               | Levels<br>(% of U.S. level) |      |      | Growth Rates<br>(average annual rate of change) |           |
|---------------|-----------------------------|------|------|---|-----------|
|               | 1981                        | 1989 | 1997 | 1981-89   | 1989-1997 |
| Total Economy |                             |      |      |   |           |
| Canada        | 80.3                        | 81.8 | 80.3 | 1.5   | 0.8       |
| United States | 100                         | 100  | 100  | 1.2   | 1.0       |
| Manufacturing |                             |      |      |   |           |
| Canada        | 83.9                        | 78.3 | 73.7 | 2.3   | 2.2       |
| United States | 100                         | 100  | 100  | 3.2   | 2.9       |

Note: Data for the total economy refer to output per worker, for manufacturing output per hour.

Source: Bureau of Labor Statistics (1998a and 1998b)



**Table A4**

**Output Per Hour Growth in Manufacturing in Industrial Countries**  
(average annual rate of change)

|             | 1981-89 | 1989-97 | 1981-97 |
|-------------|---------|---------|---------|
| Canada      | 2.3     | 2.2     | 2.2     |
| U.S.        | 3.2     | 2.9     | 3.1     |
| Japan       | 3.9     | 3.5     | 3.7     |
| France      | 3.7     | 3.3     | 3.5     |
| U.K.        | 5.3     | 2.7     | 4.0     |
| Italy       | 4.0     | 3.5     | 3.7     |
| Germany     | 2.3     | 3.2     | 2.8     |
| G-7 average | 3.5     | 3.0     | 3.3     |
| Belgium     | 4.3     | 2.4     | 3.3     |
| Denmark     | 1.0     | NA      | NA      |
| Netherlands | 3.9     | 3.7     | 3.8     |
| Norway      | 2.7     | 1.1     | 1.9     |
| Sweden      | 3.1     | 4.5     | 3.8     |

Source: *International Comparisons of Manufacturing Productivity and Unit Labour Costs, Updated Trends for 1997*, News, Bureau of Labor Statistics, U.S. Department of Labor, March, 1999.

Note: NA indicates data are not available.

**Table A5**

**Trends in Compensation, Unit Labour Costs in Manufacturing in Canada and the United States**  
(average annual rate of change)

|         | Hourly labour compensation<br>Domestic currency |      | Hourly labour compensation<br>U.S. dollars |      | ULC in domestic<br>currency |      | ULC in U.S.<br>dollars |      | Exchange<br>Rate |
|---------|---|------|--|------|-----------------------------|------|------------------------|------|------------------|
|         | Canada  | U.S. | Canada                                     | U.S. | Canada                      | U.S. | Canada                 | U.S. | Canada           |
| 1981-89 | 5.6   | 4.5  | 5.8  | 4.5  | 3.2                         | 1.2  | 3.4                    | 1.2  | 0.2              |
| 1989-97 | 3.5   | 3.6  | 1.5  | 3.6  | 1.3                         | 0.7  | -0.6                   | 0.7  | -1.9             |
| 1981-97 | 4.6   | 4.0  | 3.6  | 4.0  | 2.3                         | 0.9  | 1.4                    | 0.9  | -0.9             |

Source: *International Comparisons of Manufacturing Productivity and Unit Labour Costs, Updated Trends for 1997*, News, Bureau of Labor Statistics, U.S. Department of Labor, March, 1999.

Table A6: VALUE ADDED PER WORKER  
Estimates of GDP per employed worker, by Industry

|   | % Average compound growth rates |       |         |       |         |       |
|---|---------------------------------|-------|---------|-------|---------|-------|
|   | 1981-89                         |       | 1989-97 |       | 1981-97 |       |
|   | Canada                          | US    | Canada  | US    | Canada  | US    |
| All industries                                    | 1.14                            | 1.11  | 0.95    | 0.87  | 1.05    | 0.99  |
| Total manufacturing industries                    | 2.82                            | 3.74  | 2.30    | 3.22  | 2.56    | 3.48  |
| Wood industries                                   | 5.33                            | 4.16  | -1.55   | -2.59 | 1.83    | 0.73  |
| Furniture and fixture industries                  | 1.05                            | 0.83  | 4.83    | 2.26  | 2.92    | 1.54  |
| Non-metallic mineral products industries          | 4.37                            | 3.81  | -1.67   | 2.09  | 1.30    | 2.95  |
| Primary metal industries                          | 4.50                            | 0.42  | 4.56    | 3.56  | 4.53    | 1.97  |
| Fabricated metal products industries              | 3.34                            | 3.10  | 1.01    | 2.33  | 2.17    | 2.72  |
| Machinery industries                              | 5.82                            | 9.16  | 1.86    | 8.25  | 3.82    | 8.71  |
| Electrical and electronic products industries     | 5.40                            | n/a   | 4.26    | 14.31 | 4.83    | n/a   |
| Transportation equipment industries               | 3.44                            | 2.97  | 2.43    | -0.10 | 2.93    | 1.43  |
| Other manufacturing industries                    | 0.63                            | 5.98  | -0.72   | 0.57  | -0.05   | 3.24  |
| Food and kindred                                  | 0.88                            | 3.12  | 2.22    | 0.11  | 1.55    | 1.60  |
| Tobacco products industries                       | n/a                             | -5.51 | 13.00   | -0.06 | n/a     | -2.82 |
| Textile industries                                | 3.79                            | 3.67  | 7.24    | 4.12  | 5.50    | 3.89  |
| Clothing industries                               | 0.17                            | 4.30  | 0.98    | 3.96  | 0.57    | 4.13  |
| Paper and allied products industries              | 0.79                            | 2.98  | 3.92    | 1.57  | 2.35    | 2.27  |
| Printing, publishing and allied industries        | -1.48                           | -0.16 | -3.02   | -1.60 | -2.26   | -0.88 |
| Chemical and chemical products industries         | 3.94                            | 4.79  | 3.35    | 3.49  | 3.64    | 4.14  |
| Refined petroleum and coal products industries    | 0.95                            | 8.99  | 7.87    | 1.26  | 4.35    | 5.05  |
| Rubber and plastic industries                     | 2.23                            | 4.41  | 4.44    | 4.18  | 3.33    | 4.29  |
| Leather and allied products industries            | 3.02                            | 4.56  | 0.08    | 4.29  | 1.54    | 4.43  |
| Manufacturing - Machinery and Electric industries | 2.59                            | 1.67  | 2.14    | 0.50  | 2.36    | 1.09  |
| Manufacturing (BLS data)                          | 2.6                             | 3.7   | 2.2     | 3.5   | 2.4     | 3.6   |

Source: CSLS Productivity data base

Table A7: Total Factor Productivity Indices  
(Using number of workers employed)

|   | % Average compound growth rates |        |         |       |         |       |
|---|---------------------------------|--------|---------|-------|---------|-------|
|   | 1981-89                         |        | 1989-97 |       | 1981-97 |       |
|   | Canada                          | US     | Canada  | US    | Canada  | US    |
| All industries                                    | 1.11                            | 0.79   | 0.79    | 0.48  | 0.95    | 0.64  |
| Total manufacturing industries                    | 2.22                            | 2.68   | 2.31    | 2.32  | 2.26    | 2.50  |
| Wood industries                                   | 5.25                            | 3.51   | -1.65   | -3.28 | 1.74    | 0.06  |
| Furniture and fixture industries                  | 0.50                            | 0.53   | 3.47    | 1.74  | 1.98    | 1.13  |
| Non-metallic mineral products industries          | 4.47                            | 2.87   | -0.77   | 1.45  | 1.82    | 2.15  |
| Primary metal industries                          | 4.15                            | -0.75  | 4.36    | 2.83  | 4.25    | 1.03  |
| Fabricated metal products industries              | 2.60                            | 2.00   | 1.12    | 1.75  | 1.86    | 1.88  |
| Machinery industries                              | 4.23                            | 8.32   | 0.65    | 7.95  | 2.43    | 8.14  |
| Electrical and electronic products industries     | 4.76                            | n/a    | 4.67    | 13.51 | 4.71    | n/a   |
| Transportation equipment industries               | 2.68                            | 2.74   | 2.15    | -0.54 | 2.41    | 1.09  |
| Other manufacturing industries                    | -0.35                           | 4.46   | -0.62   | -0.42 | -0.48   | 1.99  |
| Food and kindred                                  | -0.17                           | 1.55   | 2.31    | -0.80 | 1.06    | 0.37  |
| Tobacco products industries                       | n/a                             | -10.51 | -1.94   | -4.51 | n/a     | -7.56 |
| Textile industries                                | 3.15                            | 2.31   | 5.13    | 2.58  | 4.14    | 2.45  |
| Clothing industries                               | 0.10                            | 3.24   | -0.18   | 2.32  | -0.04   | 2.78  |
| Paper and allied products industries              | 0.23                            | 2.01   | 3.66    | 0.70  | 1.93    | 1.35  |
| Printing, publishing and allied industries        | -1.75                           | -0.34  | -3.66   | -2.19 | -2.71   | -1.27 |
| Chemical and chemical products industries         | 6.48                            | 3.09   | 3.45    | 2.10  | 4.95    | 2.59  |
| Refined petroleum and coal products industries    | 1.80                            | 4.75   | 8.41    | -1.36 | 5.05    | 1.65  |
| Rubber and plastic industries                     | 1.63                            | 4.19   | 4.19    | 3.97  | 2.90    | 4.08  |
| Leather and allied products industries            | 2.17                            | 1.41   | -0.62   | 0.41  | 0.77    | 0.91  |
| Manufacturing - Machinery and Electric industries | 2.05                            | 0.68   | 2.12    | -0.49 | 2.09    | 0.09  |

Source: CSLS Productivity Data base

Table A8

Comparison of CSLS and Statistics Canada Productivity Estimates for Manufacturing  
(average annual rate of change)

|                          | 1981-89 |                   | 1989-97 |                   |
|--------------------------|---------|-------------------|---------|-------------------|
|                          | CSLS    | Statistics Canada | CSLS    | Statistics Canada |
| Real value added         | 3.0     | 3.1               | 1.8     | 1.5               |
| Hours                    | 0.9     | 0.4               | -0.5    | -0.4              |
| Capital Input            | 2.0     | 2.2               | -0.5    | 1.0               |
| Multifactor Productivity | 1.7     | 2.2               | 2.3     | 1.4               |

NOTE: Statistics Canada estimates of real value added and capital stock are based on the chain-weighted Fisher indices while CSLS estimates are based on fixed-weighted Laspeyres indices from the National Accounts of Statistics Canada. The Labour Force Survey is the source of hours estimates for both series. CSLS data are unadjusted for labour quality changes while Statistics Canada estimates are adjusted for labour quality changes on the basis of relative wage trends. It should be noted that Statistics Canada uses the fixed-weighted Laspeyres series for output in its labour productivity series (CANSIM I600001).

Source: Statistics Canada: CANSIM I720372-I720375 multifactor productivity data base, March 21, 1999. CSLS: CSLS productivity data base based on Statistics Canada data.