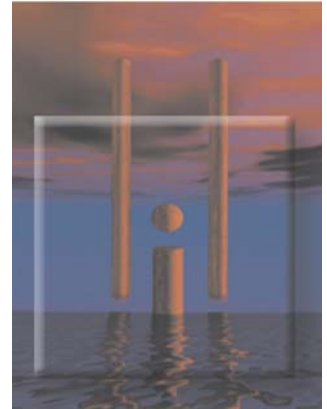




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# The Canadian productivity accounts - Data

2003 - Revised data



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# The Canadian productivity accounts - Data

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#### **Note of appreciation**

*Canada owes the success of its statistical system to a long standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.*

## Symbols

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The following standard symbols are used in Statistics Canada publications:

- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0<sup>s</sup> value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- p preliminary
- r revised
- x suppressed to meet the confidentiality requirements of the *Statistics Act*
- E use with caution
- F too unreliable to be published

### Acknowledgements

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- Faouzi Tarkhani
- Marc Tanguay
- Sëan Burrows
- Nicole Richer
- Valerie Thibault and her staff

## Foreword

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This new electronic publication, The Canadian Productivity Accounts-Data, is designed to provide information to analysts, researchers, students and the general public who wish to monitor, analyse and interpret annual trends in productivity and related measures in Canada.

The Canadian Productivity Accounts produce a variety of productivity measures and related variables for the business sector and its constituent sub-sectors and industries.

The Canadian Productivity Accounts were initiated in late 1940's. They were the result of recommendations from an interdepartmental committee on productivity analysis, who reviewed the conceptual, and measurement problems involved and the available data sources in Canada.

Except for exchange rate series stored in Table 176-0064, the remaining series of this publication are available in CANSIM tables 383-0008, 383-0013, 383-0014 and 383-0015. Industry data available in the last three tables begin in 1997; they will be made available back to 1961 later this year. U.S. data are from the Bureau of Labor Statistics, Productivity and Costs, published in NEWS.

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## Highlights

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- Despite a difficult economic environment since 2000, labour productivity growth from 2000 to 2003 was similar on average to its performance over the last business cycle (1988 to 2000) and it represented the main source of growth of real GDP per capita. Services industries have generated the bulk of these productivity gains.



# Introduction

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*Canadian Productivity Accounts* is an electronic publication that contains a series of tables on productivity growth and related variables for the business sector and its 15 major sectors based on the North American Classification System. These tables allow users to have a broader perspective on the Canadian economic performance. They complement the information available on CANSIM which offers more details, particularly, at the industry level.<sup>1</sup>

*Canadian Productivity Accounts* covers four series of statistical tables:

1. The annual trend of value-added, capital cost and labour cost in current dollars,
2. Annual indexes and growth rates of productivity and related measures,
3. Annual indexes and growth rates of prices and unit costs, and
4. Comparison of labour productivity growth and related measures in the business sector between Canada and the United States.

Productivity measures the efficiency with which inputs (labour and capital in particular) are utilized in production. Productivity measures can be applied to a single input, such as output per hour (labour productivity), as well as to combined labour and capital inputs (multifactor productivity). Statistics Canada produces these two main measures of productivity, but other productivity ratios can also be measured (e.g. output per unit of capital services).

For the overall business sector, productivity measures exclude all non-business production activities as well as the rents of owner-occupied dwellings.

For the business sector productivity measures, output is measured as real GDP—deliveries in constant chained dollars of final goods and services by the business sector to domestic households, government and non-profit institutions, as well as public and private investments and net exports to other countries. At the industry level, output is defined in terms of constant chained dollars of value added. Real value added series reflect both the real contribution of both capital and labour that transforms intermediate inputs into finished products for each industry. The estimates of output reflect the capitalization of software expenditures.

Annual estimates of productivity provided in these tables are consistent with the concepts of the System of National Accounts. They are derived from a Fisher chained index of GDP, or of value added.

The reader will find a glossary in Appendix I of this publication. It provides basic definitions of the terms used in the statistical tables and it constitutes a useful tool to understand productivity measures and related statistics.

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1. Data based on the 1980 Standard Industrial Classification for the period 1961-1997 are available on CANSIM.

## Analysis — 1997 to 2003

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### Productivity growth by industry

Despite a slowdown in economic activity since 2000, productivity growth of Canadian businesses grew 1.5% annually during the 2000 to 2003 period. Although less rapid than the 2.8% advance during the 1997 to 2000 period, this performance is comparable with the 1.6% average posted during the last business cycle from 1988 to 2000.

From 2000 to 2003, a period that was characterized by an economic slowdown, several industries such as manufacturing, agriculture and mining extraction and oil and gas experienced a productivity slowdown compared with their performance during 1997 to 2000, a period marked by rapid economic growth. In contrast, service industries such as wholesale, retail, transportation, information and financial services and real estate have generated the bulk of the business sector productivity gains during the 2000 to 2003 period.

### Productivity has generated economic growth of Canadian industries

Productivity is a notion that is more meaningful when measured over the long run. Changes from one year to another often reflect the effect of unexpected random macroeconomic shocks, such as the burst of the technological bubble and the dollar rally, rather than only the efficient use of resources.

Over the entire 1997 to 2003 period, information, professional services, wholesale and retail, all of which are services, have posted the most rapid economic growth of the business sector. Other important sectors, such as manufacturing, mining and transportation, have experienced relatively more moderate economic growth.

Economic growth is driven by increased hours at work and labour productivity gains. It is important to quantify which of these two factors has contributed the most to economic growth.

During this period, industries that have experienced the most rapid economic growth are also those with the highest productivity gains. These industries are in the services sector and account for a large part of the Canadian business sector. This result holds true not only for the 1997 to 2000 period of rapid economic growth but also during the economic slowdown environment that took place between 2000 and 2003. Not only have these industries in the services sector generated the bulk of economic and labour productivity growth, their economic performance was least affected by the change in the economic climate from 1997 to 2003.

Labour productivity gains result from several factors: the increase in capital available for every hour worked (capital intensity), the increase in skilled workers (change in labour composition, reflecting a larger share of workers with more education and more experience) and a number of other factors captured by multifactor productivity, the overall efficiency with which resources are employed.

In general, changes in labour composition make a positive, albeit small, contribution to labour productivity growth. The 1997 to 2003 period are no exception. During this time, labour composition made a 0.2 percentage point contribution to the 2.1% annual growth of the business sector labour productivity. Capital intensity made only a 0.4 percentage point contribution, a reflection of the collapse of investment in machinery and equipment and the relatively rapid growth in hours at work. Multifactor productivity has added 1.5 percentage points, accounting for the bulk of labour productivity growth. Multifactor productivity was the main source of labour productivity not only during the rapid economic growth period of 1997 to 2000 but also during the economic slowdown period of 2000 to 2003.

In general, the industries that posted the largest labour productivity gains were also those with the most rapid multifactor productivity growth rates, indicating that major improvements in overall efficiency have taken place in recent years.

## **The increase in the dollar associated with a slowdown in manufacturing activity in 2003**

Despite the economic slowdown in 2003, services industries were still reporting rapid productivity gains. In contrast, manufacturing showed no labour productivity gain during the same year, a sharp contrast from the 3.9% increase posted in 2002.

The lack of labour productivity gain in 2003 for Canadian manufacturers, combined with the higher Canadian dollar, has led to a large increase in unit labour costs measured in US dollars (+13.4%). As a result, Canadian exports have fallen by 2.2% as the competitiveness of Canadian manufacturers deteriorates compared with their American counterparts.

The 10.8% increase of the Canadian dollar over the US dollar between 2002 and 2003 also helped to lower import prices of machinery and equipment for manufacturing. This contributed to the 6.7% increase of investment in machinery and equipment, compared with two consecutive declines in 2001 and 2002.

## **Growth of real GDP per capita in an economic slowdown**

Productivity is a key economic indicator because it constitutes an important source of change in the growth of real GDP per capita in the long run. During the 1997 to 2003 period, Canada's real GDP per capita advanced at 2.7% annually. Labour productivity contributed for more than two-thirds and the remainder was due to the increase in the number of hours worked per person.

The growth in real GDP per capita during the 2000 to 2003 period occurred during a slowdown in Canadian economic growth. Real GDP increased at a modest 2.4%, a sharp deceleration from the rapid 5.0% annual average economic growth observed during the 1997 to 2000 period.

Despite the difficult economic environment of the 2000 to 2003 period, real GDP per person increased 1.4% annually, a performance comparable with that of the last business cycle from 1988 to 2000. Despite the changes in the economic climate between the 1997 to 2000 and 2000 to 2003 periods, productivity growth remained the main source of real GDP growth per person.

### Note to readers

This release examines data on the annual productivity performance by industry (North American Industrial Classification System) for the 1997 to 2003 period. Data for the 1961 to 1996 period are being prepared and are scheduled for release in 2005.

In this release, revisions have been made back to 1997 to incorporate the adjustments in annual benchmarks on hours worked and revised data of real gross domestic product (GDP) by industry that were published in The Daily of November 9, 2004.

**Industry real output** is measured in terms of real value added at basic prices. **Aggregate output** is measured as final demand gross domestic product at market prices. Both concepts are analogous at the aggregate level.

To provide more insights on the long-run trend of economic growth and economic performance, this release makes use of several decomposition formulas.

**Real output growth** is decomposed into the growth of hours at work and the growth of labour productivity—an indicator of the efficiency with which these hours are employed in the production of goods and services.

**Labour productivity growth** is broken down into the growth in the availability of capital input for every hour worked, the shift towards more skilled workers and the overall efficiency with which resources are employed—multifactor productivity growth.

**Multifactor productivity** is measured as the difference in real output minus the combined growth of capital and labour inputs. The growth of capital input is an aggregate of the different classes of capital stocks (information technology, other machinery and equipment and structures) weighted by their respective rental prices. Similarly, the growth of labour input is an aggregate of the growth of hours worked by different classes of workers, weighted by the hourly wages of each class.

Although the focus is on industry productivity performance of the Canadian business sector, this release also touches on growth of real GDP per capita for the total economy and its two components: labour productivity growth and growth in hours per person, both of which are also at the total economy level. Despite a difference in coverage, labour productivity growth remains virtually identical at both the total economy and the business sector levels.

For more information about the productivity program, see the Overview and description of publications page online.

## Related products

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### Selected publications from Statistics Canada

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15-204-X	Productivity growth in Canada
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### Selected CANSIM tables from Statistics Canada

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383-0001	Fisher indexes of multifactor productivity, by business sector industries
383-0003	Labour productivity and related variables, by industry according to the Canadian System of National Accounts
383-0004	Labour statistics, non-commercial sector industries according to the Canadian System of National Accounts
383-0005	Indexes of labour productivity and related variables, by industry according to the Canadian System of National Accounts
383-0009	Labour statistics consistent with the System of National Accounts, by job category and North American Industry Classification System (NAICS)
383-0010	Labour statistics consistent with the System of National Accounts, by North American Industry Classification System (NAICS)
383-0013	Indexes of productivity and related variables consistent with the System of National Accounts (SNA), business sector, by output type and North American Industry Classification System (NAICS)
383-0014	KLEMS inputs and outputs consistent with the System of National Accounts (SNA), business sector, by North American Industry Classification System (NAICS)
383-0015	Fisher volume indexes consistent with the System of National Accounts (SNA), KLEMS database, business sector, by North American Industry Classification System (NAICS)

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### Selected surveys from Statistics Canada

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1402	Productivity Measures, Inputs and Outputs by Industry in Current and Constant Prices
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## **Selected tables of Canadian statistics from Statistics Canada**

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- *Canadian Statistics - Productivity and related measures, business sector*

# Statistical tables

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Table 1-1

**Value-added, capital cost and labour cost at current dollars — Business sector**

Year	Labour cost	Capital cost	GDP
millions of dollars			
1997	360,961	318,556	679,517
1998	383,063	323,525	706,587
1999	407,231	356,656	763,887
2000	441,921	402,345	844,266
2001	460,083	408,940	869,023
2002	475,383	426,627	902,010
2003	490,252	450,876	941,129

Table 1-2

**Value-added, capital cost and labour cost at current dollars — Agriculture, forestry, fishing and hunting**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	8,309	11,516	19,825
1998	8,420	12,724	21,144
1999	9,249	12,702	21,950
2000	9,332	12,804	22,137
2001	10,139	11,597	22,096
2002	11,467	10,949	22,415
2003	10,499	12,267	22,766

Table 1-3

**Value-added, capital cost and labour cost at current dollars — Mining and oil and gas extraction**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	9,566	24,370	33,936
1998	9,478	17,956	27,434
1999	9,105	25,362	34,468
2000	10,249	50,657	60,906
2001	11,370	47,830	59,200
2002	11,263	43,347	54,610
2003	12,027	58,601	70,628



Table 1-4

## Value-added, capital cost and labour cost at current dollars — Utilities

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	5,744	19,698	25,442
1998	6,039	18,906	24,945
1999	6,002	19,228	25,230
2000	6,168	20,073	26,242
2001	6,326	21,630	27,956
2002	6,602	24,523	31,125
2003	6,638	26,501	33,139

Table 1-5

## Value-added, capital cost and labour cost at current dollars — Construction

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	35,717	7,278	42,995
1998	36,808	7,350	44,158
1999	38,309	7,916	46,225
2000	41,179	8,470	49,648
2001	44,420	10,319	54,739
2002	47,448	10,561	58,008
2003	50,672	10,622	61,294

Table 1-6

## Value-added, capital cost and labour cost at current dollars — Manufacturing

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	80,827	61,438	142,264
1998	84,848	65,228	150,076
1999	90,060	80,246	170,306
2000	96,535	90,927	187,462
2001	97,469	81,100	178,569
2002	98,968	84,154	183,121
2003	100,341	81,133	181,474

Table 1-7

**Value-added, capital cost and labour cost at current dollars — Wholesale trade**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	30,158	13,532	43,690
1998	31,566	13,882	45,447
1999	33,443	14,814	48,257
2000	35,713	15,218	50,931
2001	37,457	15,651	53,108
2002	38,093	17,898	55,991
2003	39,500	17,837	57,337

Table 1-8

**Value-added, capital cost and labour cost at current dollars — Retail trade**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	33,873	8,348	42,221
1998	36,734	8,827	45,561
1999	38,064	9,751	47,815
2000	40,279	11,032	51,311
2001	42,370	12,058	54,428
2002	44,522	13,183	57,705
2003	46,965	13,339	60,304

Table 1-9

**Value-added, capital cost and labour cost at current dollars — Transportation and warehousing**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	25,069	13,055	38,123
1998	26,709	13,034	39,743
1999	28,252	13,527	41,778
2000	29,810	14,086	43,896
2001	31,237	15,333	46,570
2002	31,842	16,450	48,292
2003	32,324	16,552	48,876

Table 1-10

## Value-added, capital cost and labour cost at current dollars — Information and cultural industries

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	11,821	14,265	26,086
1998	13,507	14,760	28,268
1999	15,274	15,046	30,320
2000	17,012	15,138	32,150
2001	17,761	16,326	34,087
2002	17,930	17,422	35,352
2003	18,262	17,913	36,175

Table 1-11

## Value-added, capital cost and labour cost at current dollars — Finance, real estate and company management

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	40,541	118,691	159,231
1998	42,086	123,630	165,716
1999	44,402	128,994	173,396
2000	49,965	132,891	182,856
2001	52,394	140,339	192,732
2002	53,652	150,076	203,728
2003	55,570	157,309	212,879

Table 1-12

## Value-added, capital cost and labour cost at current dollars — Professional, scientific and technical services

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	24,281	5,831	30,112
1998	28,162	6,309	34,471
1999	31,234	6,491	37,725
2000	36,302	7,265	43,566
2001	37,980	8,010	45,989
2002	38,450	8,084	46,534
2003	38,209	10,080	48,289

Table 1-13

**Value-added, capital cost and labour cost at current dollars — Administrative and support, waste management and remediation services**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	11,575	3,750	15,325
1998	12,890	3,779	16,669
1999	14,723	3,994	18,717
2000	16,104	4,263	20,367
2001	17,284	4,909	22,193
2002	18,702	4,540	23,242
2003	19,476	4,623	24,099

Table 1-14

**Value-added, capital cost and labour cost at current dollars — Arts, entertainment and recreation**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	3,942	1,736	5,678
1998	4,310	1,435	5,745
1999	4,720	1,552	6,272
2000	5,160	1,849	7,009
2001	5,458	1,953	7,411
2002	5,868	2,357	8,224
2003	6,949	1,555	8,504

Table 1-15

**Value-added, capital cost and labour cost at current dollars — Accommodation and food services**

Year	Labour cost	Capital cost	Value added
millions of dollars			
1997	15,104	4,367	19,471
1998	15,956	4,597	20,553
1999	16,907	5,021	21,928
2000	18,271	4,993	23,263
2001	19,148	5,341	24,489
2002	20,083	5,260	25,343
2003	20,868	4,240	25,108

Table 1-16

**Value-added, capital cost and labour cost at current dollars — Other services (except public administration)**

Year	Labour cost	Capital cost	Value added
	millions of dollars		
1997	11,086	2,320	13,405
1998	11,627	2,386	14,013
1999	12,563	2,794	15,357
2000	13,445	3,071	16,516
2001	13,595	3,984	17,580
2002	14,063	4,317	18,380
2003	14,268	4,590	18,858

Table 2-1

## Productivity and related measures — Business sector

Year	Real GDP	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	105.1	101.0	102.1	100.3	102.9	104.8	103.5	104.1	101.8
1999	111.9	103.2	105.0	101.7	106.6	110.0	107.4	108.6	103.2
2000	118.7	105.9	108.6	103.6	109.3	114.6	110.5	112.4	104.9
2001	120.7	106.3	110.4	103.6	109.4	116.5	111.6	113.8	106.5
2002	125.2	108.9	113.2	106.7	110.6	117.3	113.5	115.2	106.1
2003	127.3	109.5	113.4	107.7	112.3	118.2	115.1	116.5	105.3
Percentage change									
1998	5.1	1.0	2.1	0.3	2.9	4.8	3.5	4.1	1.8
1999	6.5	2.2	2.8	1.4	3.6	5.0	3.8	4.3	1.4
2000	6.1	2.6	3.4	1.8	2.5	4.2	2.9	3.5	1.6
2001	1.7	0.4	1.7	0.0	0.1	1.7	1.0	1.2	1.5
2002	3.7	2.4	2.5	3.0	1.1	0.7	1.7	1.2	-0.4
2003	1.7	0.6	0.2	0.9	1.5	0.8	1.4	1.1	-0.8

Table 2-2

## Productivity and related measures — Agriculture, forestry, fishing and hunting

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	106.5	106.1	107.2	105.8	99.5	100.7	99.9	100.4	100.9
1999	114.3	113.8	116.0	113.1	97.4	101.1	102.3	101.6	102.3
2000	114.0	116.1	123.4	112.9	91.8	101.0	97.5	99.6	109.3
2001	108.7	114.8	129.4	107.7	83.0	100.9	90.3	96.2	120.3
2002	104.8	111.4	128.0	104.0	84.4	100.8	86.5	94.2	124.8
2003	115.6	..	139.2	114.7	84.3	100.8	86.9	94.4	..
Percentage change									
1998	6.5	6.1	7.2	5.8	-0.5	0.7	-0.1	0.4	0.9
1999	7.3	7.3	8.2	6.9	-2.1	0.4	2.4	1.2	1.4
2000	-0.3	2.0	6.4	-0.2	-5.7	-0.1	-4.7	-2.0	6.8
2001	-4.6	-1.1	4.9	-4.6	-9.6	-0.1	-7.4	-3.4	10.1
2002	-3.6	-3.0	-1.1	-3.5	1.7	-0.1	-4.2	-2.1	3.7
2003	10.3	..	8.8	10.3	-0.1	0.0	0.5	0.2	..

Table 2-3

## Productivity and related measures — Manufacturing

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	104.9	100.8	103.6	100.3	101.2	104.6	103.7	104.1	103.3
1999	113.5	105.7	109.3	104.0	103.9	109.1	106.4	107.6	105.1
2000	124.7	112.5	115.7	111.4	107.8	111.9	110.8	111.2	103.7
2001	119.4	108.0	113.7	106.0	105.1	112.6	109.7	111.0	107.1
2002	122.3	110.4	118.4	109.0	103.3	112.2	110.5	111.3	108.6
2003	122.4	111.4	118.4	109.9	103.4	111.4	109.4	110.3	107.7
Percentage change									
1998	4.9	0.8	3.6	0.3	1.2	4.6	3.7	4.1	3.3
1999	8.2	4.9	5.5	3.7	2.7	4.3	2.6	3.4	1.7
2000	9.9	6.4	5.9	7.1	3.8	2.6	4.1	3.3	-1.3
2001	-4.3	-4.0	-1.7	-4.8	-2.5	0.6	-1.0	-0.2	3.3
2002	2.4	2.2	4.1	2.8	-1.7	-0.4	0.7	0.3	1.4
2003	0.1	0.9	0.0	0.8	0.1	-0.7	-1.0	-0.9	-0.8

Table 2-4

## Productivity and related measures — Wholesale trade

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	107.9	106.8	109.4	99.0	98.6	109.0	97.6	101.1	110.5
1999	115.3	109.0	112.0	99.2	103.0	116.2	101.6	106.0	112.8
2000	122.6	110.1	114.5	100.1	107.1	122.5	106.9	111.6	114.4
2001	125.3	109.2	115.0	98.4	109.0	127.4	109.7	115.0	116.8
2002	134.2	114.9	124.3	101.9	108.0	131.7	111.0	117.2	122.0
2003	141.7	118.7	128.2	105.4	110.6	134.5	113.7	119.9	121.6
Percentage change									
1998	7.9	6.8	9.4	-1.0	-1.4	9.0	-2.4	1.1	10.5
1999	6.9	2.1	2.4	0.2	4.5	6.6	4.1	4.8	2.1
2000	6.3	1.0	2.2	0.9	4.0	5.4	5.2	5.3	1.4
2001	2.2	-0.8	0.4	-1.7	1.8	4.0	2.6	3.0	2.1
2002	7.1	5.2	8.1	3.6	-0.9	3.4	1.2	1.9	4.5
2003	5.6	3.3	3.1	3.4	2.4	2.1	2.4	2.3	-0.3

Table 2-5

## Productivity and related measures — Retail trade

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	106.1	104.0	102.4	100.8	103.6	105.3	101.4	102.1	101.6
1999	111.1	107.4	107.4	99.0	103.4	112.2	101.5	103.6	108.5
2000	118.1	111.6	112.3	98.9	105.2	119.4	102.9	106.1	113.5
2001	124.9	114.1	117.9	98.7	106.0	126.5	105.8	109.8	119.4
2002	131.5	117.0	118.9	99.6	110.6	132.0	108.3	112.9	119.4
2003	135.2	118.7	120.1	99.4	112.6	136.0	109.1	114.3	120.8
Percentage change									
1998	6.1	4.0	2.4	0.8	3.6	5.3	1.4	2.1	1.6
1999	4.7	3.3	4.9	-1.7	-0.2	6.6	0.1	1.5	6.8
2000	6.3	3.9	4.6	-0.1	1.7	6.4	1.4	2.4	4.6
2001	5.8	2.2	5.0	-0.2	0.8	5.9	2.8	3.5	5.2
2002	5.3	2.5	0.8	0.9	4.3	4.3	2.4	2.8	0.0
2003	2.8	1.5	1.0	-0.2	1.8	3.0	0.7	1.2	1.2

Table 2-6

## Productivity and related measures — Transportation and warehousing

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	102.1	94.7	98.3	91.1	103.8	112.1	105.0	107.4	107.9
1999	108.3	94.6	100.3	88.5	108.0	122.4	110.1	114.1	113.3
2000	113.9	96.8	106.2	89.5	107.3	127.3	112.5	117.3	118.6
2001	116.5	99.8	107.9	90.9	107.9	128.1	110.7	116.2	118.7
2002	118.4	101.5	110.7	92.2	107.0	128.4	110.5	116.2	120.0
2003	118.8	101.1	111.6	92.7	106.5	128.1	111.9	117.0	120.2
Percentage change									
1998	2.1	-5.3	-1.7	-8.9	3.8	12.1	5.0	7.4	7.9
1999	6.1	-0.1	2.0	-2.9	4.0	9.2	4.9	6.2	5.0
2000	5.2	2.3	5.9	1.1	-0.6	4.0	2.2	2.8	4.7
2001	2.3	3.1	1.6	1.6	0.6	0.6	-1.6	-0.9	0.1
2002	1.6	1.7	2.6	1.4	-0.8	0.2	-0.2	0.0	1.1
2003	0.3	-0.4	0.8	0.6	-0.5	-0.2	1.3	0.7	0.2



Table 2-7

## Productivity and related measures — Information and cultural industries

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	107.8	98.0	97.8	98.5	110.2	109.4	110.3	109.8	99.2
1999	121.4	99.3	98.8	100.4	122.8	120.9	123.6	122.2	98.4
2000	131.4	99.4	103.3	98.5	127.2	133.4	131.2	132.2	104.8
2001	141.7	101.8	108.4	100.3	130.7	141.3	137.7	139.3	108.1
2002	150.6	107.9	120.4	104.6	125.1	144.0	135.8	139.7	115.1
2003	154.1	108.7	119.1	107.2	129.3	143.7	140.4	141.9	111.1
Percentage change									
1998	7.8	-2.0	-2.2	-1.5	10.2	9.4	10.3	9.8	-0.8
1999	12.6	1.3	1.0	1.9	11.4	10.5	12.1	11.3	-0.8
2000	8.2	0.1	4.6	-1.9	3.6	10.3	6.1	8.2	6.5
2001	7.8	2.4	4.9	1.8	2.8	5.9	5.0	5.4	3.1
2002	6.3	6.0	11.1	4.3	-4.3	1.9	-1.4	0.3	6.5
2003	2.3	0.7	-1.1	2.5	3.4	-0.2	3.4	1.6	-3.5

Table 2-8

## Productivity and related measures — Professional, scientific and technical services

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	112.5	98.6	101.4	86.4	111.0	130.2	110.1	113.9	117.3
1999	123.8	93.9	105.1	63.3	117.8	195.6	118.0	130.8	166.0
2000	137.0	97.9	110.1	52.5	124.4	261.1	119.1	139.2	210.0
2001	139.2	95.3	112.5	42.3	123.7	329.0	118.7	145.0	266.0
2002	145.5	96.4	119.4	38.1	121.8	381.9	119.6	149.9	313.4
2003	150.1	97.8	125.3	36.4	119.8	412.8	119.9	152.5	344.6
Percentage change									
1998	12.5	-1.4	1.4	-13.6	11.0	30.2	10.1	13.9	17.3
1999	10.0	-4.8	3.6	-26.7	6.1	50.2	7.2	14.8	41.5
2000	10.7	4.3	4.8	-17.1	5.6	33.5	0.9	6.4	26.5
2001	1.6	-2.7	2.2	-19.4	-0.6	26.0	-0.3	4.2	26.7
2002	4.5	1.2	6.1	-10.0	-1.5	16.1	0.8	3.4	17.8
2003	3.2	1.5	4.9	-4.6	-1.6	8.1	0.3	1.7	10.0

Table 2-9

## Productivity and related measures — Administrative and waste management services

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	106.8	97.8	97.4	98.9	109.6	108.0	109.3	109.0	98.5
1999	119.2	98.6	96.3	105.8	123.7	112.7	123.1	120.8	91.1
2000	124.2	99.3	98.2	104.9	126.5	118.4	126.9	125.0	93.6
2001	128.7	99.6	99.9	105.5	128.9	122.0	131.1	129.1	94.6
2002	134.9	98.7	96.6	110.7	139.6	121.9	140.7	136.6	87.3
2003	140.1	96.2	95.4	116.0	146.8	120.8	152.2	145.3	82.3
Percentage change									
1998	6.8	-2.2	-2.6	-1.1	9.6	8.0	9.3	9.0	-1.5
1999	11.6	0.8	-1.1	7.0	12.9	4.4	12.6	10.8	-7.5
2000	4.2	0.7	2.0	-0.8	2.3	5.1	3.1	3.5	2.7
2001	3.6	0.3	1.7	0.6	1.9	3.0	3.3	3.3	1.1
2002	4.8	-0.9	-3.3	4.9	8.3	-0.1	7.3	5.8	-7.7
2003	3.9	-2.5	-1.2	4.8	5.2	-0.9	8.2	6.4	-5.7

Table 2-10

## Productivity and related measures — Accommodation and food services

Year	Real value-added	Multifactor productivity	Labour productivity	Output per unit of capital services	Hours worked	Capital input	Labour input	Primary inputs	Capital per hour
Indexes 1997=100									
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	105.9	97.8	100.9	104.4	104.9	101.4	110.0	108.1	96.7
1999	110.0	99.5	100.9	107.3	109.0	102.5	112.8	110.5	94.0
2000	113.7	103.3	102.6	111.1	110.8	102.3	112.1	109.9	92.4
2001	116.8	108.6	105.0	115.3	111.2	101.3	109.0	107.3	91.1
2002	119.0	111.5	105.5	118.9	112.7	100.1	108.2	106.4	88.8
2003	116.9	109.8	103.9	118.2	112.6	98.9	108.3	106.2	87.8
Percentage change									
1998	5.9	-2.2	0.9	4.4	4.9	1.4	10.0	8.1	-3.3
1999	3.9	1.7	0.0	2.8	3.9	1.1	2.5	2.2	-2.8
2000	3.4	3.8	1.7	3.6	1.7	-0.2	-0.6	-0.5	-1.7
2001	2.7	5.1	2.3	3.7	0.4	-1.0	-2.8	-2.4	-1.4
2002	1.9	2.7	0.5	3.1	1.3	-1.2	-0.7	-0.8	-2.5
2003	-1.8	-1.5	-1.5	-0.6	-0.1	-1.2	0.1	-0.2	-1.1

Table 3-1

## Prices and unit costs — Business sector

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	103.1	96.6	101.0	102.5	96.9	98.9	1.48
1999	105.8	100.0	100.8	105.0	101.8	100.5	1.49
2000	112.0	106.4	103.1	110.8	110.2	104.7	1.49
2001	116.5	106.3	105.6	114.2	110.2	106.0	1.55
2002	119.1	107.0	105.2	116.0	114.2	106.0	1.57
2003	120.9	111.2	106.7	118.0	119.7	108.8	1.40
Percentage change							
1998	3.1	-3.4	1.0	2.5	-3.1	-1.1	7.1
1999	2.6	3.5	-0.2	2.4	5.0	1.5	0.1
2000	5.8	6.4	2.3	5.5	8.3	4.2	0.0
2001	4.0	-0.1	2.4	3.1	0.0	1.2	4.3
2002	2.2	0.7	-0.4	1.6	3.6	0.1	1.4
2003	1.6	3.9	1.4	1.7	4.9	2.6	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-2

## Prices and unit costs — Agriculture, forestry, fishing and hunting

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	101.8	103.7	95.2	101.4	109.7	100.1	1.48
1999	114.3	96.5	97.4	108.8	109.1	96.9	1.49
2000	122.3	96.9	99.5	115.2	110.1	97.9	1.49
2001	147.0	92.7	113.2	135.1	99.8	102.5	1.55
2002	163.5	92.4	124.1	159.5	94.3	107.9	1.57
2003	149.9	..	103.5	145.4	105.7	99.3	1.40
Percentage change							
1998	1.8	3.7	-4.8	1.4	9.7	0.1	7.1
1999	12.2	-6.9	2.3	7.3	-0.6	-3.3	0.1
2000	7.1	0.4	2.2	5.9	0.9	1.1	0.0
2001	20.2	-4.3	13.8	17.3	-9.3	4.7	4.3
2002	11.2	-0.3	9.6	18.1	-5.5	5.2	1.4
2003	-8.3	..	-16.6	-8.9	12.0	-7.9	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-3

Prices and unit costs — Manufacturing

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	103.7	101.2	100.1	101.2	101.5	100.6	1.48
1999	107.2	115.1	98.2	104.7	119.7	105.5	1.49
2000	110.8	118.7	95.8	107.8	132.3	105.7	1.49
2001	114.7	110.5	101.0	109.9	117.2	105.1	1.55
2002	118.5	112.0	100.1	110.8	122.1	105.2	1.57
2003	120.1	107.9	101.4	113.5	118.5	104.2	1.40
Percentage change							
1998	3.7	1.2	0.1	1.2	1.5	0.6	7.1
1999	3.4	13.7	-1.9	3.4	17.9	4.9	0.1
2000	3.3	3.1	-2.4	2.9	10.5	0.2	0.0
2001	3.6	-6.9	5.4	2.0	-11.4	-0.5	4.3
2002	3.3	1.4	-0.9	0.8	4.1	0.1	1.4
2003	1.3	-3.7	1.3	2.4	-2.9	-1.0	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-4

Prices and unit costs — Wholesale trade

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	106.2	95.1	97.0	107.2	94.1	96.4	1.48
1999	107.7	94.9	96.1	109.1	94.2	95.8	1.49
2000	110.6	91.7	96.6	110.8	91.8	95.1	1.49
2001	113.9	92.3	99.1	113.2	90.8	97.0	1.55
2002	117.0	98.5	94.1	113.8	100.4	95.5	1.57
2003	118.4	93.0	92.4	115.2	98.0	92.6	1.40
Percentage change							
1998	6.2	-4.9	-3.0	7.2	-5.9	-3.6	7.1
1999	1.4	-0.2	-0.9	1.8	0.1	-0.6	0.1
2000	2.7	-3.4	0.5	1.5	-2.6	-0.7	0.0
2001	3.1	0.7	2.6	2.2	-1.1	2.0	4.3
2002	2.6	6.7	-5.0	0.5	10.6	-1.6	1.4
2003	1.3	-5.6	-1.8	1.2	-2.4	-3.0	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-5

## Prices and unit costs — Retail trade

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	104.7	99.7	102.2	106.9	100.4	101.7	1.48
1999	108.7	105.2	101.2	110.7	104.1	101.9	1.49
2000	113.0	111.9	100.7	115.6	110.7	102.9	1.49
2001	118.0	115.6	100.1	118.2	114.2	103.2	1.55
2002	118.8	120.0	99.9	121.4	119.6	103.9	1.57
2003	123.1	118.2	102.6	127.1	117.5	105.6	1.40
Percentage change							
1998	4.7	-0.3	2.2	6.9	0.4	1.7	7.1
1999	3.8	5.5	-1.0	3.5	3.7	0.2	0.1
2000	4.0	6.4	-0.5	4.4	6.3	1.0	0.0
2001	4.4	3.3	-0.6	2.3	3.2	0.3	4.3
2002	0.7	3.8	-0.2	2.7	4.8	0.7	1.4
2003	3.6	-1.5	2.7	4.7	-1.8	1.6	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-6

## Prices and unit costs — Transportation and warehousing

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	102.6	97.8	104.4	101.5	89.1	102.1	1.48
1999	104.3	95.6	104.0	102.4	84.7	101.2	1.49
2000	110.8	94.7	104.4	105.7	84.8	101.1	1.49
2001	115.5	100.9	107.0	112.6	91.7	104.9	1.55
2002	118.7	106.4	107.3	114.9	98.1	107.0	1.57
2003	121.1	106.7	108.5	115.2	99.0	107.9	1.40
Percentage change							
1998	2.6	-2.2	4.4	1.5	-10.9	2.1	7.1
1999	1.7	-2.2	-0.4	0.9	-5.0	-0.9	0.1
2000	6.2	-0.9	0.4	3.3	0.1	-0.1	0.0
2001	4.2	6.5	2.5	6.5	8.2	3.7	4.3
2002	2.8	5.5	0.3	2.1	7.0	2.0	1.4
2003	2.0	0.3	1.1	0.2	0.9	0.9	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-7

## Prices and unit costs — Information and cultural industries

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	103.7	96.0	106.0	103.6	94.6	100.5	1.48
1999	105.2	86.9	106.5	104.5	87.2	95.7	1.49
2000	113.1	80.8	109.5	109.7	79.6	93.8	1.49
2001	115.0	80.8	106.1	109.1	81.0	92.2	1.55
2002	121.2	81.1	100.7	111.7	84.8	90.0	1.57
2003	119.5	81.5	100.2	110.0	87.4	90.0	1.40
Percentage change							
1998	3.7	-4.0	6.0	3.6	-5.4	0.5	7.1
1999	1.5	-9.5	0.5	0.9	-7.8	-4.8	0.1
2000	7.5	-7.0	2.8	4.9	-8.8	-2.0	0.0
2001	1.6	0.0	-3.1	-0.5	1.8	-1.7	4.3
2002	5.5	0.4	-5.1	2.4	4.7	-2.4	1.4
2003	-1.5	0.5	-0.5	-1.5	3.0	0.0	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-8

## Prices and unit costs — Professional, scientific and technical services

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	104.5	96.2	103.1	105.3	83.1	101.8	1.48
1999	109.2	90.0	103.9	109.0	56.9	101.2	1.49
2000	120.2	90.9	109.1	125.5	47.7	105.6	1.49
2001	126.4	98.7	112.4	131.8	41.8	109.7	1.55
2002	130.0	95.3	108.8	132.4	36.3	106.2	1.57
2003	131.4	115.2	104.9	131.2	41.9	106.8	1.40
Percentage change							
1998	4.5	-3.8	3.1	5.3	-16.9	1.8	7.1
1999	4.5	-6.4	0.8	3.5	-31.5	-0.5	0.1
2000	10.1	1.0	5.0	15.2	-16.2	4.4	0.0
2001	5.2	8.6	3.0	5.0	-12.5	3.9	4.3
2002	2.8	-3.4	-3.2	0.5	-13.1	-3.2	1.4
2003	1.0	20.9	-3.6	-0.9	15.4	0.6	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-9

Prices and unit costs — Administrative and waste management services

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	101.6	94.4	104.3	101.9	93.3	101.8	1.48
1999	102.8	89.4	106.7	103.3	94.5	102.5	1.49
2000	110.0	91.5	112.0	109.6	96.0	107.0	1.49
2001	115.8	101.7	116.0	113.9	107.3	112.5	1.55
2002	115.7	89.7	119.8	114.8	99.3	112.4	1.57
2003	114.6	88.0	120.1	110.6	102.1	112.2	1.40
Percentage change							
1998	1.6	-5.6	4.3	1.9	-6.7	1.8	7.1
1999	1.2	-5.3	2.3	1.4	1.3	0.6	0.1
2000	7.0	2.3	5.0	6.1	1.6	4.4	0.0
2001	5.3	11.1	3.6	3.9	11.8	5.2	4.3
2002	-0.1	-11.8	3.3	0.8	-7.4	-0.1	1.4
2003	-1.0	-1.9	0.3	-3.7	2.8	-0.2	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

Table 3-10

Prices and unit costs — Accommodation and food services

Year	Hourly compensation	Unit capital cost	Unit labour cost	Labour price	Capital price	Output price	Exchange <sup>1</sup> rate
Indexes 1997=100							
1997	100.0	100.0	100.0	100.0	100.0	100.0	1.38
1998	100.7	99.4	99.8	96.0	103.8	99.7	1.48
1999	102.7	104.5	101.7	99.2	112.2	102.4	1.49
2000	109.2	100.6	106.4	107.9	111.8	105.1	1.49
2001	114.0	104.7	108.6	116.3	120.7	107.7	1.55
2002	118.0	101.2	111.8	122.9	120.3	109.4	1.57
2003	122.7	83.0	118.1	127.6	98.2	110.3	1.40
Percentage change							
1998	0.7	-0.6	-0.2	-4.0	3.8	-0.3	7.1
1999	2.0	5.1	1.9	3.3	8.1	2.7	0.1
2000	6.3	-3.7	4.6	8.7	-0.4	2.6	0.0
2001	4.4	4.1	2.1	7.8	8.0	2.5	4.3
2002	3.5	-3.3	2.9	5.7	-0.3	1.6	1.4
2003	4.0	-18.0	5.6	3.8	-18.4	0.9	-10.8

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.

**Table 4**

**Labour productivity and related measures for Canada and the United States - Business sector**

	2000	2001	2002	2003	2004
	percentage change				
<b>Canada</b>					
Labour productivity	3.7	1.6	2.6	0.1	0.0
Real Gross Domestic Product (GDP)	6.3	1.7	3.7	1.7	2.9
Hours worked	2.6	0.0	1.1	1.5	2.9
Total number of jobs	2.8	0.8	2.3	1.9	1.8
Total compensation per hour worked	5.8	4.0	2.2	1.4	1.2
Unit labour cost	2.1	2.4	-0.4	1.3	1.2
Exchange rate <sup>1</sup>	0.0	4.3	1.4	-10.8	-7.1
Unit labour cost in US\$	2.1	-1.8	-1.7	13.5	8.9
Unit non-labour payments	7.5	-0.7	1.7	6.4	6.6
Implicit price deflator	4.4	1.1	0.5	3.5	3.6
	percentage change				
<b>United States</b>					
Labour productivity	2.9	2.6	4.3	4.5	3.9
Real Gross Domestic Product (GDP)	3.9	0.3	1.8	3.8	5.1
Hours worked	1.1	-2.2	-2.4	-0.6	1.2
Total number of jobs	1.9	-0.7	-2.1	-0.2	1.2
Total compensation per hour worked	7.0	4.3	3.2	4.0	4.5
Unit labour cost	4.0	1.6	-1.1	-0.4	0.5
Unit non-labour payments	-1.8	2.5	4.6	4.1	3.6
Implicit price deflator	1.9	2.0	0.9	1.2	1.7

1. The exchange rate corresponds to the U.S. dollar value expressed in Canadian dollars.



## Description

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Productivity—the efficiency with which the economy transforms inputs into outputs—is important because it largely determines real income changes. Canadian living standards are high not only because workers have more equipment and resources to work with, but also because Canadian businesses use labour and other resources more efficiently.

The productivity growth rate influences how fast real incomes can rise. If the availability of goods and services were limited entirely by the gradual increase in labour and capital stock, then Canadian living standards today would not be as high as they are. For example, from 1961 through 1999, Canadian agricultural output rose at an average annual rate of 3.7 percent, though overall input use actually declined (-0.02% for capital input and -1.5% for labour input). Rapid productivity gains made the difference. Rapid productivity growth throughout the business sector fueled the boom in real incomes during the 1960's and most of the 1970's. Slow productivity growth since then has been accompanied by lower real wage increases.

Productivity can be measured in different ways: labour productivity measures output per hour worked; multifactor productivity—a broader indicator—measures the productive efficiency of labour, capital, and other inputs in combination. Either way, productivity is a key indicator of technological and organizational efficiency.

The production activity of an industry generates a variety of products and services using a combination of different inputs. The information about this production activity is recorded in great detail in the Productivity Program Database (PPDB). This comprehensive database, which is derived from the input-output tables, provides information by industry over time on the primary inputs (capital and labour), the intermediate inputs (energy, materials and services) and output valued in terms of both current and constant prices.

The primary goal of this database is to allow for the construction of estimates of multifactor productivity, labour productivity and related measures (e.g. unit labour cost and implicit prices of output and inputs). This database can also be used to construct other economic performance measures and to examine the structure and conduct of industries.

The PPDB database has two major characteristics:

1. Most estimates are only available for the business sector and its constituent subsectors and industries. However, estimates for employment and hours are also available for the non-business sector.
2. Estimates are in Fisher chain indexes.

For more discussion on the general concepts of productivity growth and recent trends in productivity performance, see Chapter 1 of *Productivity Growth in Canada*, publication number (15-204-XIE).

# Estimation methodology summary

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## Estimation

Statistics Canada publishes several sets of productivity measures for the Canadian business sector and its major constituent subsectors (subsectors producing goods, subsectors producing services and manufacturing) and industries. Each set of measures involves a comparison of the growth in output and input measures, but each relies on a different methodology. The concept of business sector excludes public administration, non-profit organizations and the Canadian System of National Accounts (CSNA) imputation of the rental value of owner-occupied dwellings. The business sector thereby excludes activities where it is difficult to draw inferences on productivity from the CSNA output measures. Essentially such inferences would be questionable because the CSNA output measures in these areas are based largely on labour inputs in constant prices.

The traditional measure of labour productivity - output per hour worked - constitutes the first measure of productivity introduced by Statistics Canada in the early sixties. Output, measured in constant prices, is compared to labour input, measured as hours worked in the corresponding sector or industry.

The second set of measures covers multifactor productivity. In these measures, output is again measured net of price changes, but the input measure is an aggregate of hours worked and capital service flows. Multifactor productivity estimates have been developed in recognition of the role capital growth plays in output growth.

Statistics Canada's productivity estimates are based on a bottom-up approach. Productivity indices are estimated with the most disaggregated data available. Productivity indices for 147 industries in the case of labour productivity and 123 industries in the case of multifactor productivity are then aggregated step by step to the total business sector. This approach, which takes advantage of homogenous information available at a detailed level, proves to be superior to the aggregated approach as it significantly improves the quality of the measured aggregate productivity indices.

Additional industrial detail (203 industries from 1961 to 1980 and 243 industries from 1981 on) is produced and disseminated for the number of jobs and hours worked series for both the business sector and the non-commercial sector.

In order to produce productivity growth estimates, various data sources from survey areas and the system of national accounts divisions are integrated. In particular, the productivity program requires data from:

1. The Input-Output Division, which provides information on the structure of the economy (in terms of industries, commodities produced and used as intermediate inputs in both current and constant prices and the primary inputs compensation for each calendar year). Please refer to Survey ID 1401.
2. The Labour Statistics Division, which provides employment numbers, labour compensation and hours worked to estimate the labour input; please refer to Survey 3701, 2612.
3. The Investment and Capital Stock Division, which provides estimates of investment series to estimate capital input; please refer to Survey ID 2803, 2820.
4. The Industry Measures and Analysis Division, which produces estimates of GDP in chain volume for current years. Please refer to Survey ID 1303.
5. The Income and Expenditure Accounts Division, which provides final demand GDP in current prices and chain Fisher volume. Please refer to Survey ID 1901.

Data that come from these different sources are conceptually adjusted to the CSNA framework and reconciled for accuracy and consistency in the estimates of inputs and outputs. As such, the production of productivity measures serves as an important source of quality control on the various data series that are used in the productivity program.

## Formula

Labour Productivity is defined as real value-added per hour worked.

Unit Labour Cost equals total compensation for all jobs divided by a chain Fisher index of volume of value-added. It is also equivalent to the ratio of hourly compensation to labour productivity.

Hourly Compensation is the ratio of the total compensation to the total number of hours worked.

For a given industry, value added is equal to its gross output less its intermediate inputs (energy, raw materials and services) produced by other industries. A double-deflation procedure is used to measure real value added: real intermediate inputs are then subtracted from real gross output.

Multifactor Productivity is the growth rate of real output minus the combined growth rate of the inputs. Four categories of multifactor productivity are available - each is based on a different measure of output and therefore serves a different analytical need:

- multifactor productivity based on gross output;
- multifactor productivity based on gross output net of intra-industry transactions;
- multifactor productivity based on value-added;
- multifactor productivity based on gross output net of all inter-industry transactions.

## Disclosure control

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Statistics Canada is prohibited by law from releasing any data which would divulge information obtained under the Statistics Act that relates to any identifiable person, business or organization without the prior knowledge or the consent in writing of that person, business or organization. The confidentiality provisions of the *Statistics Act* override the provisions of any other Act, including the Access to Information Act, to guarantee the confidentiality of reported data of individual respondents. Various confidentiality rules are applied to all data that are released or published to prevent the publication or disclosure of any information deemed confidential. If necessary, data are suppressed to prevent direct or residual disclosure of identifiable data.

Data are suppressed if they have been assigned an unacceptable quality rating.

## Data accuracy

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All variables in the PPDB have been assigned a quality rating using a three-point scale:

1. acceptable;
2. moderately acceptable;
3. unacceptable.

# Appendix I

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## Glossary

**Business sector goods industries.** Consists of agriculture, fishing, forestry, mining activities, manufacturing, construction and public utilities.

**Business sector services industries.** Consists of transportation and storage, communications, wholesale and retail trade, finance, insurance and real estate, and the group formed by community, business and personal services.

**Business sector.** Productivity measures exclude all non-commercial activities as well as the rental value of owner-occupied dwellings from total activity to define the business sector. Corresponding exclusions are also made to compensation and hours worked. In 1992, business sector GDP accounted for about 71% of the Canadian total. The business sector is further divided into the goods sector and the services sector.

**Capital cost.** It is defined as the gross output less the labour and intermediate expenses. Thus, it represents the surplus — profits, depreciation and net interest — intended as compensation to the owners of capital.

**Capital input.** This measures the services derived from the stock of physical assets and software. The assets included are fixed business equipment, structures, inventories, and land.

**Capital per hour** is the ratio of capital services to hours worked.

**Capital services price** is the capital cost per unit of capital services.

**Capital productivity** is measured as output per unit of capital services.

**Choice of the productivity measures.** In calculating productivity, a variety of measures of production (and thus factors of production) can be used: value added, gross output and gross output less intra-industry sales. The choice of a measure of productivity will naturally depend on the user's analytical needs. For example, a measure based on value added is interesting because it not only allows for international comparisons, but also eliminates double counting when measuring industrial activity.

**Combined inputs.** A weighted sum of inputs, particularly labour and capital. The weighting used to combine labour, capital and sometimes other factors (such as energy, raw materials and services) corresponds to the cost share for each factor with respect to total revenue for the sector.

**Fisher chain index.** The geometric mean of the Laspeyres and Paasche chain indices. The Fisher chain index treats two periods symmetrically. The real GDP indices that are used to determine variations in quantity for the measurement of productivity are based on Fisher chain indices. These offer the advantage of reducing the variation in the values recorded by the various fixed-base indices.

**GDP per hour worked.** See Labour productivity.

**Hourly compensation.** See Total compensation per hour worked.

**Hours worked.** The number of hours worked in all jobs is the annual average for all jobs times the hours worked per job for in all jobs. Hours worked is the total number of hours that a person spends working, whether paid or not. In general, this includes regular and overtime hours, breaks, travel time, training in the workplace and time lost in brief work stoppages where workers remain at their posts. It does not include time lost to strikes, lockouts, annual vacation, public holidays, sick leave, maternity leave or leave for personal needs.

**Implicit price deflator.** See output price.

**Inputs.** The economic resources used in a firm's production process. A distinction is usually drawn between two primary inputs (labour and capital) and intermediate inputs (energy and raw materials).

**Labour cost.** See total labour compensation.

**Labour input.** This measures the services derived from the labour. Labour services are obtained by aggregation of the hours worked by all persons, classified by education and work experience with weights determined by their shares of labour compensation.

**Labour price** is the ratio of labour cost per unit labour services.

**Labour productivity.** The ratio of output to hours worked. Economic performance as measured by labour productivity must be interpreted carefully, as these estimates reflect growth in productivity efficiency and changes in other factors of production (such as capital).

**Multifactor productivity.** A measure of productivity growth, taking into account many of the resources used in the activity of production. Multifactor productivity growth is estimated residually as the difference between the growth rate of output and the growth rate of combined inputs.

**Output price** is equal to current-dollar output, divided by real output.

**Output.** The final product of the activity of production obtained from the combination of resources such as labour, capital, materials, services and energy.

**Primary inputs.** Labour input combined with capital input, using labour's and capital's share of costs as weights to form a Fisher chained index.

**Productivity index.** The ratio of the output index to the combined inputs index; the output and the combined inputs are evaluated at constant prices. Expressing productivity levels using indices facilitates comparison and analysis with respect to a base year.

**Real gross domestic product (GDP).** The total value of goods and services produced during a given period within the country, regardless of the nationality of the factors of production. To make comparisons of GDP from one quarter to another, the effect of price variations must be eliminated. Thus, the variation solely in quantities produced is estimated by real GDP, that is, GDP for the period calculated at the price of another period (usually an earlier period), called the base year, such as 1997. The business sector quarterly estimates of real GDP are a Fisher chained index constructed after removing all non-business production as well as the rental on owner occupied dwellings.

**Total compensation per hour worked** The ratio of the total compensation for all jobs to the number of hours worked.

**Total labour compensation.** All payments in cash or in kind made by domestic producers to workers for services rendered—in other words, total payroll. It includes the salaries and supplementary labour income of paid workers, plus an imputed labour income for self-employed workers.

**Unit capital cost** is the capital cost per unit of output. It is also equal to the ratio of capital use per hour worked and capital productivity. Unit capital cost increases when capital use per hour worked increases more rapidly than capital productivity.

**Unit labour cost in \$US** is the equivalent of the ratio of Canadian unit labour cost to the exchange rate. This latter corresponds to the U.S. dollar value expressed in Canadian dollars.

**Unit labour cost** is the labour cost per unit of output. It is also equal to the ratio of labour compensation per hour worked and labour productivity. Unit labour cost increases when labour compensation per hour worked increases more rapidly than labour productivity. It is widely used to measure inflation pressures arising from wage growth.

**Unit non-labor payments** measure the cost of non-labour items such as depreciation, rent, interest, and indirect business taxes, in addition to corporate profits and profit-type income of proprietorships and partnerships.

**Value added.** A measure of production in the same way as is gross output. However, it has the advantage of eliminating double counting. An industry's value added is equal to its gross output (mainly sales) less its intermediate

consumption (energy, raw materials and services). The double-deflation procedure is used to measure real value added: real intermediate inputs are subtracted from real gross output.