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# Prosperity and productivity: A Canada-Australia comparison

by Tarek M. Harchaoui, Jimmy Jean and Faouzi Tarkhani

Micro-economic Analysis Division  
18-F, R.H. Coats Building, Ottawa, K1A 0T6

Telephone: 1 800 263-1136

*This paper represents the views of the authors and does not necessarily reflect the opinions of Statistics Canada.*



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Micro-Economic Analysis Division  
18-F R.H. Coats Building  
Ottawa, K1A 0T6  
Statistics Canada

**How to obtain more information :**

National inquiries line: 1 800 263-1136

E-Mail inquiries: [infostats@statcan.ca](mailto:infostats@statcan.ca)

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The authors' names are listed alphabetically.

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## *Abstract*

This study compares Canada's economic performance to Australia. The comparison is performed in terms of: a) living standards and its proximate sources of growth—labour productivity and labour utilization (or hours worked per person) and b) the underlying sources of labour productivity growth. There are marked differences in the structures of the labour market between the two countries, reflected by a more rapid growth in hours at work and labour utilization rate in Canada. However, this rapid growth in hours at work has muted Canada's labour productivity growth, which increased less rapidly than its Australian counterpart.

Keywords: productivity, labour market, standards of living

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## *Executive Summary*

The OECD (OECD 2000) has identified a small group of countries for which economic growth in the 1990s was more rapid compared to both other countries and their own previous performance in the 1980s. This group includes Australia, Denmark, Ireland, the Netherlands, Norway and the United States. Australia constitutes an interesting case in point. The growth of its economy has been exceptionally high, averaging almost 4% in the 1990s. The ability to grow so strongly and to show rapid productivity gains, even in the midst of economic challenges such as the Asian financial crisis, has led some to label Australia as the ‘miracle’ economy.

How does Canada’s economic performance compare to the Australian miracle? In many respects, this question is important as these two economies are relatively small, they display similar economic structures and they have similar statistical systems—all of which are ingredients that make a cross-country comparison both a meaningful and interesting exercise.

This study examines the following set of questions:

1. How does Canada’s prosperity compare to Australia’s?

Prosperity is measured here as gross domestic product per capita—a measure subject to a number of well-known criticisms as a welfare indicator, but a meaningful indicator nonetheless. The growth of GDP per capita can be decomposed into labour productivity growth and labour utilization growth (hours worked per capita).

Over the 1983-2000 period, Canada’s prosperity grew at a rate of 1.9% on average, compared to 2.4% for Australia. This gap is largely attributable to the labour productivity gap in favour of Australia (1.2% vs. 1.7%). Nonetheless, labour productivity growth accounted for the bulk of the improvement in prosperity in both countries—63% for Canada compared to 71% for Australia.

Canada’s performance fell increasingly behind that of Australia over the period. During the 1980s, Canada’s GDP per capita growth was about the same as that of Australia, but it fell behind in the 1990s primarily as a result of the deep recession in the early part of this period and major restructuring in the Canadian economy following the implementation of the North American Free Trade Agreement. During these two periods, Australia enjoyed a half a percentage point advantage in labour productivity growth (1.3% for Australia vs. 0.9% for Canada during 1983-88 and 1.8% for Australia vs. 1.3% for Canada in 1988-2000). In contrast, Canada’s labour utilization growth outperformed Australia’s during the 1980s (2.1% for Canada vs. 1.7% for Australia), but fell behind in the 1990s (0.1% for Canada vs. 0.4% for Australia), when Canada’s unemployment rate stood 9.3% on average.

Between 1995 and 2000, a period when information technology began to affect economic growth in a significant way, prosperity growth in both countries vaulted to about 3% per year. When real income grows at this pace, the standard of living doubles every 24 years. As in the previous periods, Canada's labour productivity growth again lagged behind Australia's, but the gap widened from 0.5 to 1 percentage point. In contrast, Canada did much better than Australia (1.5% vs. 0.3%) in terms of the growth in labour utilization, indicating that the Canadian economy increasingly put more people to work than did its Australian counterpart.

2. What drives labour productivity growth in the two countries?

After focusing on the economy as a whole, the paper examines the business sector. Three factors contribute to labour productivity growth: first, capital deepening (capital-labour ratio) makes workers more productive by providing more capital for each hour of work; second, improvements in the composition of the labour force associated with an increasing proportion of total employment that consists of highly experienced and well trained workers; and, third, multifactor productivity growth reflects the efficiency with which labour and capital inputs are used to produce output.

Over the last two decades, labour productivity advanced at an average annual rate of 1.8% for Canada, compared to 2.1% for Australia. Most of the gap emerged during the 1995-2000 period, when Australia's productivity gains averaged 3.2%, about one percentage point higher than Canada's. This gap in favour of Australia during the post-1995 period is primarily attributable to differences in the growth of capital deepening (capital-labour ratio) and, to a lesser extent, multifactor productivity growth (1.6% for Canada compared to 1.9% for Australia). During the same period, capital formation grew more rapidly in Australia than in Canada and vice versa for hours at work.

3. What are the sectoral sources of labour productivity growth, and are industry productivity gains related to capital deepening?

The paper also examines the productivity performance of the individual sectors that make up the Canadian and Australian business sectors. It investigates how productivity growth in different sectors has varied over time and how the observed variation relates to capital deepening.

Two issues are addressed. The first is whether productivity growth was widespread. If it was, then the productivity revival experienced by both countries during the post-1995 period is likely to be more persistent. In contrast, if the gains have been concentrated in a single sector, then the revival may be vulnerable to a slowdown in that one sector.

The second question asked whether there was empirical evidence of a link between capital deepening and productivity gains in the two countries.

The 1980s and the 1990s witnessed marked differences between Canada and Australia in terms of their performance by industry. In the 1980s, Canada outperformed Australia in about half of the sectors—in transportation, trade, manufacturing and mining. Australia's performance was better in the remaining sectors—communications, public utilities, agriculture, construction and finance.

In the 1990s, Canada's advantage over Australia was confined to agriculture and retail trade, even though the productivity growth in other Canadian sectors was high by historical standards. Nevertheless, during the late 1990s, all of the Australian sectors outperformed their Canadian counterparts, primarily as a result of greater capital deepening.

There are several possible explanations for the finding that Canada's capital deepening lagged that of Australia. Canada was either less effective in the substitution of capital for labour, or the upward adjustment of capital formation to the dramatic increase in hours at work is occurring with a longer lag in Canada than in Australia.

## ***I. Introduction***

With an enviable economic performance, South Korea, Taiwan and Singapore were long considered as the miracle economies during the 1970s and the 1980s. These countries were somewhat overshadowed in the 1990s by Finland, Ireland and Australia, considered by many as the new miracle economies.

In a series of studies, Statistics Canada has highlighted that the late 1990s were exceptional in comparison with the growth experienced by the Canadian economy over the past two decades as a whole. While growth rates in the late 1990s have not yet returned to those of the golden age of the Canadian economy in the 1960s, the data nonetheless clearly reveal a remarkable transformation of economic activity:<sup>1</sup> a surge in economic growth, fuelled by a rapid capital formation; a major rebound in the labour market, reflected by a decline in the unemployment rate; an increase in labour force participation; and a substitution towards higher-wage workers. The changing labour market has contributed to economic growth, but muted the effects of capital deepening (the contribution of capital-labour ratio growth). Canada's multifactor productivity growth—a measure of the overall efficiency with which capital and labour are transformed into output—has experienced a major revival and compared favourably to its U.S. counterpart.

Canada and U.S. comparisons have long been an important research staple of the Canadian Productivity Accounts. This study expands the scope of our research program to include Australia, a country that has many similarities to Canada.

First, Canada and Australia are both small countries. Australia has a population of 20 million, compared to approximately 30 million in Canada.<sup>2</sup> Moreover, in 2001, GDP per capita expressed in terms of purchasing-power parity was approximately \$28,900 in Canada, compared to \$27,300 in Australia, reflecting comparable standards of living.

Second, the two countries have similar economic structures. Australia, like Canada, is a net importer of production technology. Machinery and transportation equipment represent approximately half of total imports of both countries. The bulk of high tech equipment used in both countries is imported from the United States.

Third, both Canada and Australia are blessed with abundant natural resources and the structures of both economies are dominated by the primary sector: 55% of Australia's exports are in the form of raw materials, compared with 46% for Canada.

Finally, and this is by no means a negligible consideration when conducting international comparisons, both countries have a statistical system that lends itself to cross-country comparisons of productivity performance.<sup>3</sup> Both Canada and Australia's productivity programs are integrated to their system of national accounts and employ best practice concepts and methods as outlined in the OECD productivity handbook (see OECD, 2001).

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<sup>1</sup> See The Daily of July 12 and December 16, 2002. For a detailed study, see Harchaoui and Tarkhani 2004.

<sup>2</sup> See Appendix A for some key figures on both countries.

<sup>3</sup> See Appendix B for the sources and concepts employed by both countries.



This study proceeds as follows. Section 2 briefly describes the nature of the Australian economic miracle. Section 3 presents the major trends in Canadian and Australian standards of living, as well as their sources of growth in terms of labour productivity and labour utilization (hours worked per person). This section then focuses on labour productivity growth and traces its sources to capital deepening (increases in the capital-labour ratio), improvements in labour quality, and multifactor productivity performance. A conclusion summarizes the key findings of this study.

## ***II. The Australian ‘Miracle’: Some stylized facts***

Australia’s economic performance in the 1990s was outstanding. For nine years, growth averaged just under 4%—a performance not seen since the 1960s and early 1970s. The ability to grow so strongly, even in the midst of economic challenges such as the Asian financial crisis, has led some to label Australia as the ‘miracle’ economy (see Krugman 1998).

A surge in productivity growth underpinned the good performance. The 1990s saw:

- a) The longest period of continuous increase in productivity on record (9 years);
- b) The highest rate of growth in productivity. Multifactor productivity grew at 1.8% a year compared with 0.7% a year from the early 1980s; and
- c) Australia’s productivity growth outperformed the OECD average for the first time (Australia had the second highest productivity acceleration in the 1990s).

According to Parham (2002, 6), this was no miracle. The productivity surge was certainly remarkable. But it was more the ‘predictable’ outcome of policy reforms designed to raise Australia’s productivity performance than it was simply the result of good fortune:

*“Policy reforms were introduced progressively from the mid-1980s and continued through the 1990s. Reforms have included: deregulation of access to finance; floating the currency; market reductions in barriers to trade and foreign direct investment; commercialisation (and some privatisation) of government business enterprises; strengthening domestic competition; and changing institutional arrangements to allow greater labour market flexibility. The hallmark of macro policy has become to rein in budget deficits and to vest the central bank with the clear responsibility to adjust monetary policy setting to target inflation.”*

Because of its geographic location, Australia has close trade relations with Asian countries, who accounted for about 40% of its exports in the 1990s. Despite these strong economic ties, the Australian economy has withstood the financial crisis that gripped its Asian export markets by finding new export markets. The weaker Australian dollar relative to the U.S. dollar has contributed to the resilience of the Australian economy.

Australia's growth in GDP per capita was below the OECD average over the post-war period from 1950 to 1990. As a result, its GDP per capita slipped from 5<sup>th</sup> to 15<sup>th</sup> place among OECD countries over the period. This was mainly due to a lower rate of productivity growth (GDP per hour worked).

In the 1990s, Australia's annual average rate of growth in GDP per capita increased to 2.5% (up from a previous rate of 1.7%).<sup>4</sup> At 2.3%, annual productivity growth accounted for around 90% of the 1990s average growth in GDP per capita and 96% of the acceleration from the previous decade's rate.

Australia surpassed the OECD average, in terms of income and productivity growth, in the 1990s—the OECD average being 1.7% for GDP per capita and 1.8% for labour productivity. Australia exceeded even the U.S. in terms of both income (2.0%) and labour productivity (1.6%) growth. As a result of its strong productivity growth in the 1990s, Australia raised its GDP per capita ranking to 7<sup>th</sup> in 2001 (up from 15<sup>th</sup> in 1990).

By these counts, Australia's performance was exceptional during the 1990s. How then does Canada compare to Australia?

### ***III. Canada and Australia compared***

#### ***1. Changes in the standard of living***

Summary statistics on the two countries, appended hereto, indicate that for the year 2000, GDP per capita expressed in terms of purchasing-power parity was \$28,900 for Canada, compared to \$27,300 for Australia.

This section compares the long-term changes in this indicator of the standard of living for Canada and Australia and the extent to which productivity growth and labour utilization have contributed to these changes.

To understand the sources of growth, changes in GDP per capita are broken down as follows:

$$\Delta \frac{GDP}{Pop} \equiv \underbrace{\Delta \frac{GDP}{Hours}}_{\text{labour productivity}} + \underbrace{\Delta \frac{Hours}{Employment^{15+}} + \Delta \frac{Employment^{15+}}{Pop^{15+}} + \Delta \frac{Pop^{15+}}{Pop}}_{\text{labour utilization}}$$

where:

- $\Delta$  = The percentage rate of growth
- GDP = Gross Domestic Product (overall economy)
- Hours = Total hours worked (overall economy)
- Employment<sup>15+</sup> = Number of people aged 15 or over who are employed
- Pop<sup>15+</sup> = Working age population (15 years and over)
- Pop = Total population.

<sup>4</sup> See OECD (2001).

Thus, growth in GDP per capita comes from two sources: labour productivity and labour utilization. This latter will occur when there is growth in any of: a) average hours worked per job, b) the employment rate—the number employed relative to the working age population, and c) the participation rate—the ratio of working age population to the total population.

Table 1 shows the growth of GDP per capita and its breakdown in terms of productivity and labour utilization for the overall economy between 1983 and 2000, the period for which information is available for both countries. The table also includes the 1983-1988 and 1988-2000 sub-periods corresponding to the last two economic cycles and 1995-2000, the period marked by the significant impact of information technology on the performance of the economy.

**Table 1: GDP per capita and its sources of growth (average annual growth rate in percentage)**

	GDP per capita		Labour Productivity		Labour Utilization		Average Hours		Employment Rate		Participation Rate	
	Canada	Australia	Canada	Australia	Canada	Australia	Canada	Australia	Canada	Australia	Canada	Australia
1983-2000	1.9	2.4	1.2	1.7	0.6	0.8	0.0	0.2	0.4	0.3	0.2	0.3
1983-1988	3.0	3.0	0.9	1.3	2.1	1.7	0.3	0.7	1.6	0.5	0.2	0.5
1988-2000	1.4	2.1	1.3	1.8	0.1	0.4	-0.1	0.0	0.0	0.2	0.2	0.2
1988-1995	0.4	1.6	1.2	1.2	-0.9	0.5	-0.3	0.0	-0.7	0.3	0.1	0.2
1995-2000	3.0	2.9	1.5	2.5	1.5	0.3	0.2	0.0	0.9	0.0	0.4	0.3

During 1983-2000, GDP per capita increased at an annual rate of 1.9% in Canada, compared to 2.4% in Australia. This difference in favour of Australia was largely attributable to faster productivity gains (1.7% for Australia vs. 1.2% for Canada). The 1980s saw GDP per capita advance at the same pace in both countries, though as a result of different driving forces: Canada outperformed Australia in terms of growth in labour utilization (2.1% vs. 1.7%), but Australia posted faster productivity gains (1.3% vs. 0.9%).

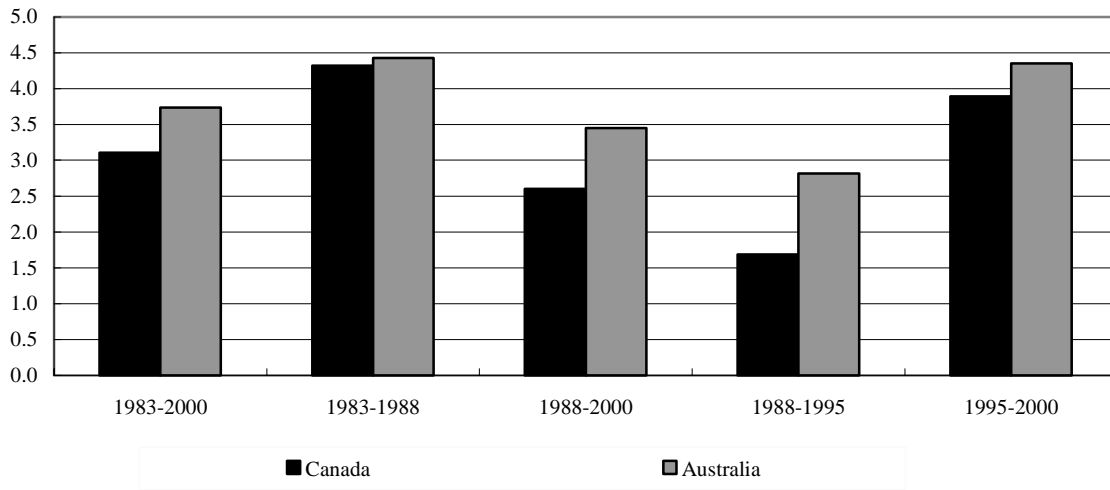
In the 1990s, Australia's standard of living increased more rapidly than its Canadian counterpart (2.1% compared to 1.4% in Canada) as a result of higher productivity gains (1.8% compared to 1.3% in Canada) and improved labour utilization performance (0.4% compared to 0.1% in Canada).

The lacklustre Canadian performance during this period was primarily attributable to the 1988-1995 period. During this period, Canada underwent a major restructuring of its economy, as a result of the implementation of the Free Trade Agreement with the United States and the early 1990s recession, making this period less meaningful in terms of discerning trends in long-term economic performance.<sup>5</sup> In the second half of the 1990s, Canada's performance improved, mainly due to the significant growth in labour utilization (1.5% for Canada compared to 0.3% for Australia), thus offsetting the productivity gap that favoured Australia (2.5% compared to 1.5% for Canada).

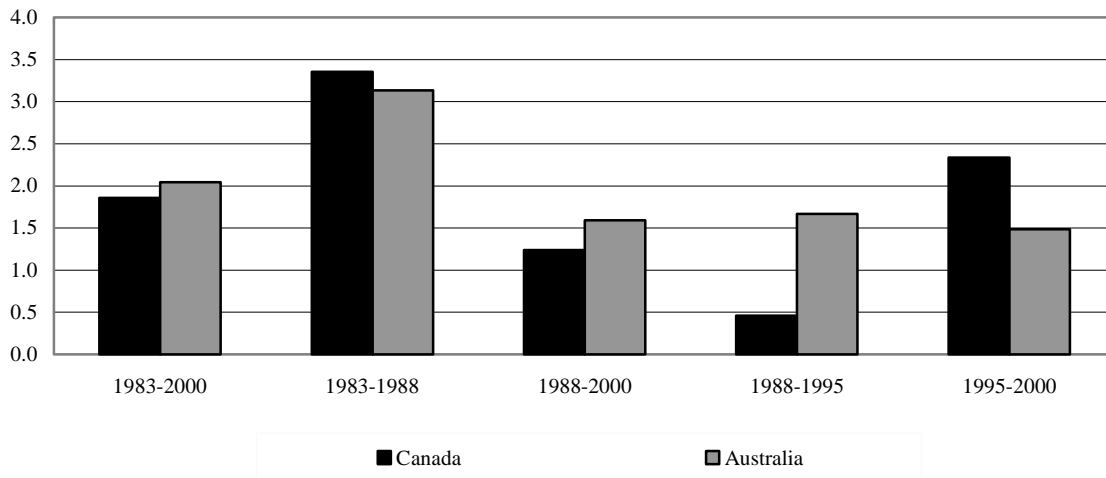
<sup>5</sup> As a result, this paper puts more emphasis on the two expansion periods, 1981-1988 and 1995-2000.

The gap between the two countries in terms of the productivity performance and the growth of standards of living is primarily attributable to differences in the labour market. To see this, consider first the breakdown of labour productivity in terms of growth of real GDP and hours worked (Figures 1a and 1b). During the 1983-1988 and 1995-2000 periods, Australia slightly outperformed Canada in terms of GDP growth (4.3% for Canada compared to 4.4% for Australia between 1983-1988 and 3.9% compared to 4.4% for Australia between 1995-2000). In contrast, Canada consistently experienced a more rapid increase in hours at work (3.4% for Canada compared to 3.1% for Australia between 1983-1988 and 2.3% compared to 1.5% for Australia for 1995-2000).

**Figure 1a. Real GDP, whole economy (average annual growth rate in percentage)**



**Figure 1b. Hours at work, whole economy (average annual growth rate in percentage)**



Consider next labour utilization, the second component of GDP per capita (see Table 1). Labour utilization grew more rapidly in Canada than in Australia, mainly driven by the employment rate. During 1983-1988 and 1995-2000, Canada advanced more rapidly than Australia in terms of the number of people that it put to work (1.6% compared to 0.5% for Australia during 1983-1988; and 0.9% for Canada and no growth at all for Australia during the post-1995 period).

## 2. *The sources of productivity gains in Canada and Australia*

We have just shown that Australia outperformed Canada in terms of productivity growth for the overall economy. This finding also holds true for that portion of the business sector for which the two countries have reliable productivity growth estimates.

The portion of the business sector used in this study does not exactly correspond to the one used in the Canadian productivity accounts. For the sake of comparability with Australia, a portion of the services sector, namely education, health care, professional services to businesses, laundering and dry-cleaning, associations (except religion) and other service industries, has been removed from the Canadian business sector definition. Consequently, the results for productivity growth in the business sector reported in this study are not directly comparable with Statistics Canada's official figures published regularly in *The Daily*.

The following formula gives the familiar allocation of labour productivity growth  $\left(\frac{Y_t}{H_t}\right)$  among three factors:

$$\Delta \ln \left( \frac{Y_t}{H_t} \right) = \bar{s}_{K_t} \Delta \ln \left( \frac{\tilde{K}_t}{H_t} \right) + \bar{s}_{L_t} \Delta \ln \left( \frac{\tilde{L}_t}{H_t} \right) + \Delta \ln (MFP)_t$$

The first is *capital deepening*  $\left(\frac{\tilde{K}_t}{H_t}\right)$ , the growth in capital services per hour. Capital deepening (also called *capital intensity*) makes workers more productive by providing more capital for each hour of work and raises the growth of labour productivity in proportion to the share of capital. The second term  $\left(\frac{\tilde{L}_t}{H_t}\right)$ , is the improvement in labour quality, defined as the difference between the growth rates of labour input<sup>6</sup> and hours worked. Reflecting the rising proportion of hours supplied by workers with higher marginal products, labour quality improvement (also called the *labour composition effect*) raises average labour productivity growth in proportion to labour's share. The third term is *multifactor productivity* growth (*MFP*). It increases labour productivity growth on a point-for-point basis.

Figures 2a and 2b show the relative importance of capital deepening, improvements in labour quality and multifactor productivity growth for labour productivity growth in Canada and Australia for the 1984-2000 period.<sup>7</sup> The height of each column depicts the growth in labour productivity. The labour productivity growth gap in favour of Australia for the overall economy holds true for the business sector, albeit by a less significant margin. During this period,

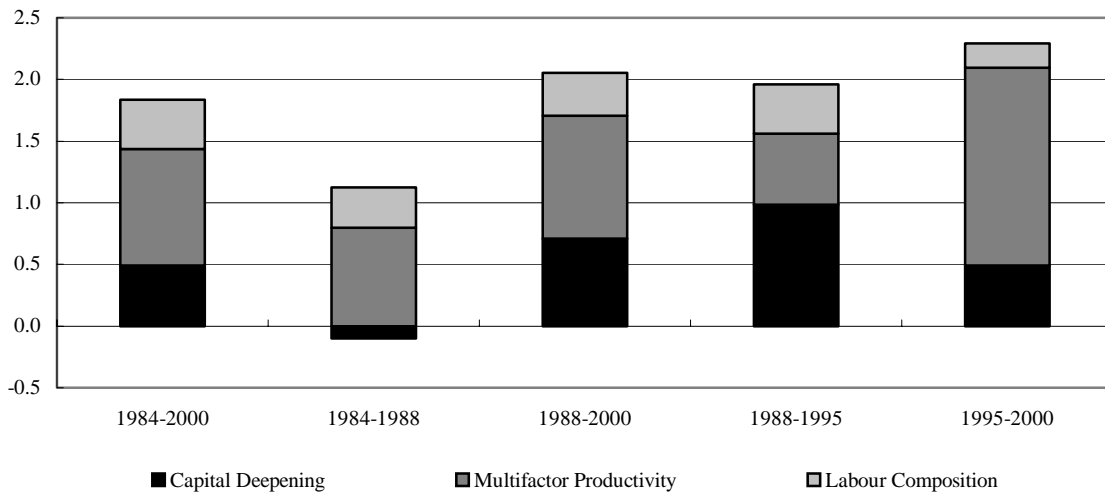
<sup>6</sup> The growth in labour input is a weighted average growth of hours worked of different categories of workers where the weights are defined in terms of relative wage rates. See Gu *et al* (2002).

<sup>7</sup> The data on labour quality for Australia are only available from 1984 onward.

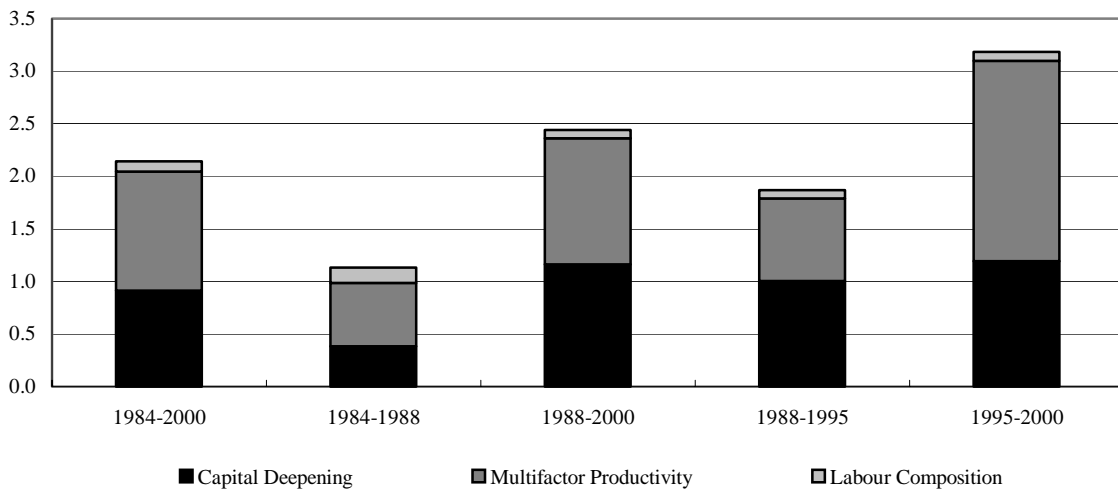
Canada's productivity increased at a rate of 1.8%, compared to 2.1% for Australia. Most of this difference appeared between 1995 and 2000, when Australia's labour productivity advanced at 3.2% per year, compared to 2.3% for Canada.

Australia's more rapid productivity growth during the post-1995 period is mostly due to more capital deepening (1.2% for Australia compared to 0.5% for Canada) and, to a lesser extent, higher multifactor productivity growth (1.9% for Australia compared to 1.6% for Canada). Australia's increase of capital deepening stems from a more rapid growth in capital services outside information technology (i.e. structures and other machinery and equipment).

**Figure 2a. Sources of labour productivity growth, Canadian business sector (average annual growth rate in percentage)**



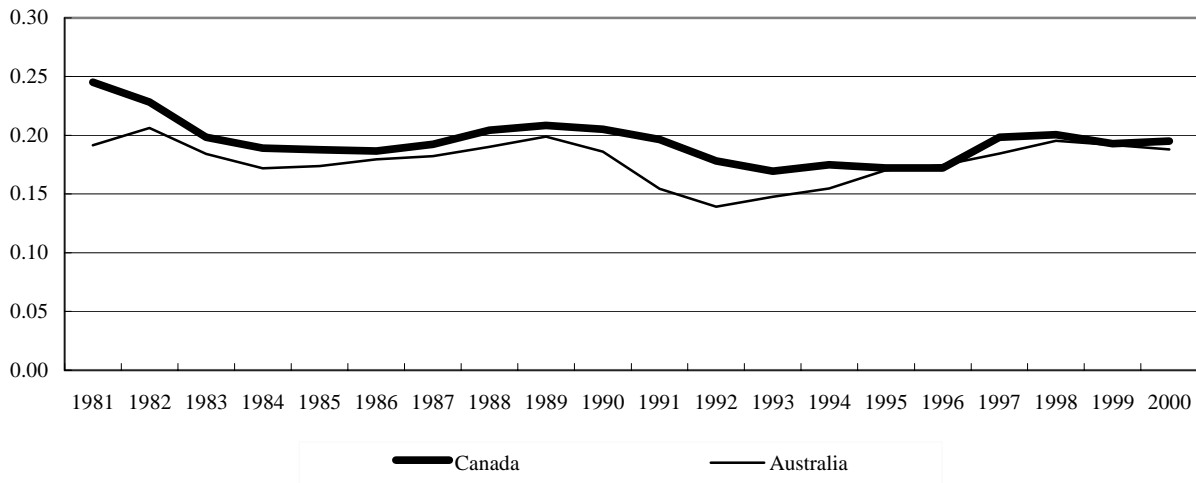
**Figure 2b. Sources of labour productivity growth, Australian business sector (average annual growth rate in percentage)**



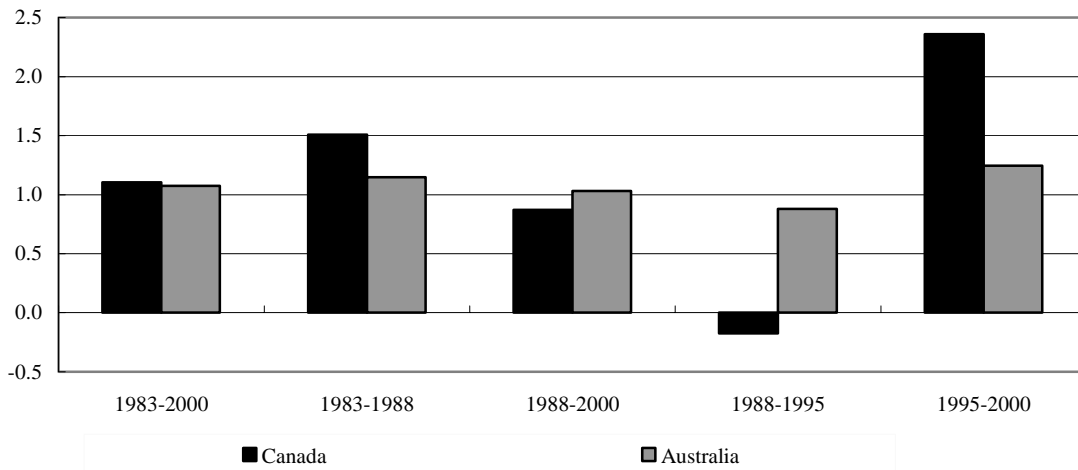
The sources of the differences in the growth of capital deepening and multifactor productivity arise from differences in capital formation or from differences in the rate of growth of labour inputs in the two countries. The Canadian ratio of investment to GDP was higher during the 1980s and early 1990s than its Australian counterpart (Figure 3). This difference was subsequently reduced between 1995 and 2000, when this ratio stood at 19% for both countries.

Since Canada experienced a lower GDP growth compared to Australia during this period (see Figure 1a), Australia experienced a more rapid increase in capital formation than Canada. In contrast, hours worked increased twice as fast in Canada as in Australia over the same period. Thus, Canada's productivity gap arose partly because investment in Canada grew less rapidly than in Australia. In contrast, labour increased more rapidly in Canada than in Australia (Figure 4). As a result, the rate of increase in capital per hours worked—the key factor behind labour productivity growth—increased more slowly in Canada.

**Figure 3. Investment to GDP ratio, business sector (current prices)**



**Figure 4. Hours at work, business sector (average annual growth rate in percentage)**



### 3. The sectoral sources of productivity growth

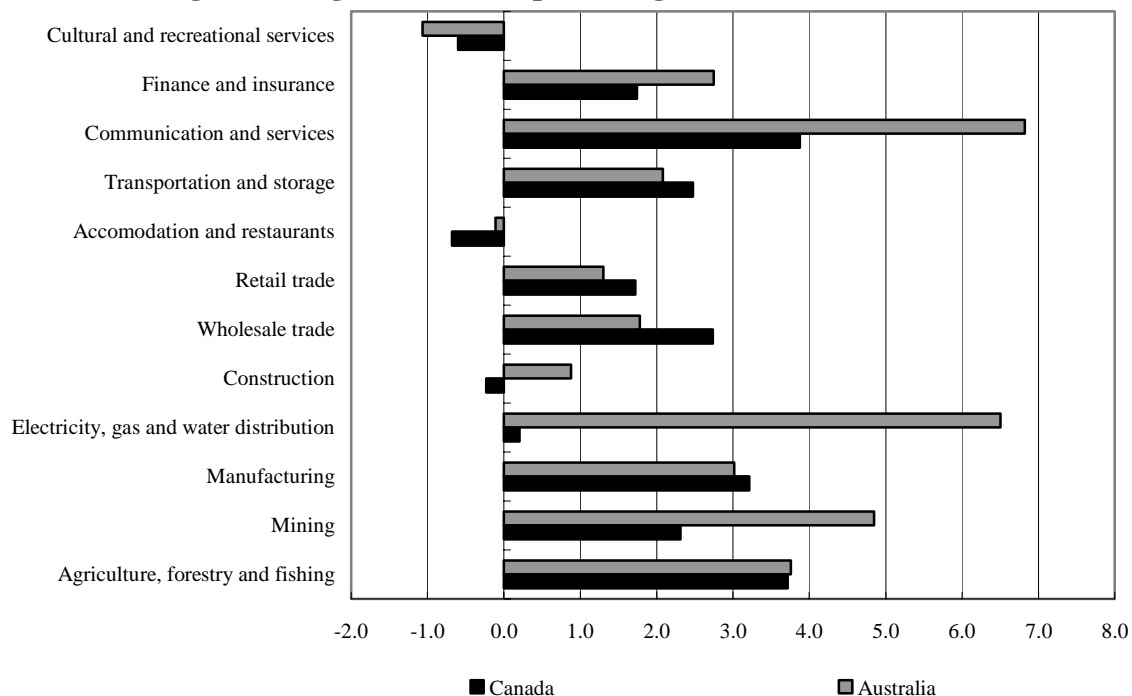
In the previous section, the comparison between Canada and Australia's productivity performance was confined to the overall business sector. This section traces the sectoral sources of aggregate productivity performance in the two countries. More specifically, two questions are investigated. First, are the productivity gains in the business sector a result of rapid productivity growth in a limited number of industries? Second, what are the sources of the sectoral productivity gains?

To address these two questions, labour input is measured in terms of hours at work since Australia does not have data available on labour composition at the sectoral level.

Between 1981 and 2000, Canada outperformed Australia in transportation, wholesale and retail trade sectors (Figure 5a), and vice versa in public utility, communications, finance and insurance, construction and mining, some of which were deregulated starting in the mid-80s in Australia. Both countries experienced comparable performance in the agriculture and manufacturing sectors.

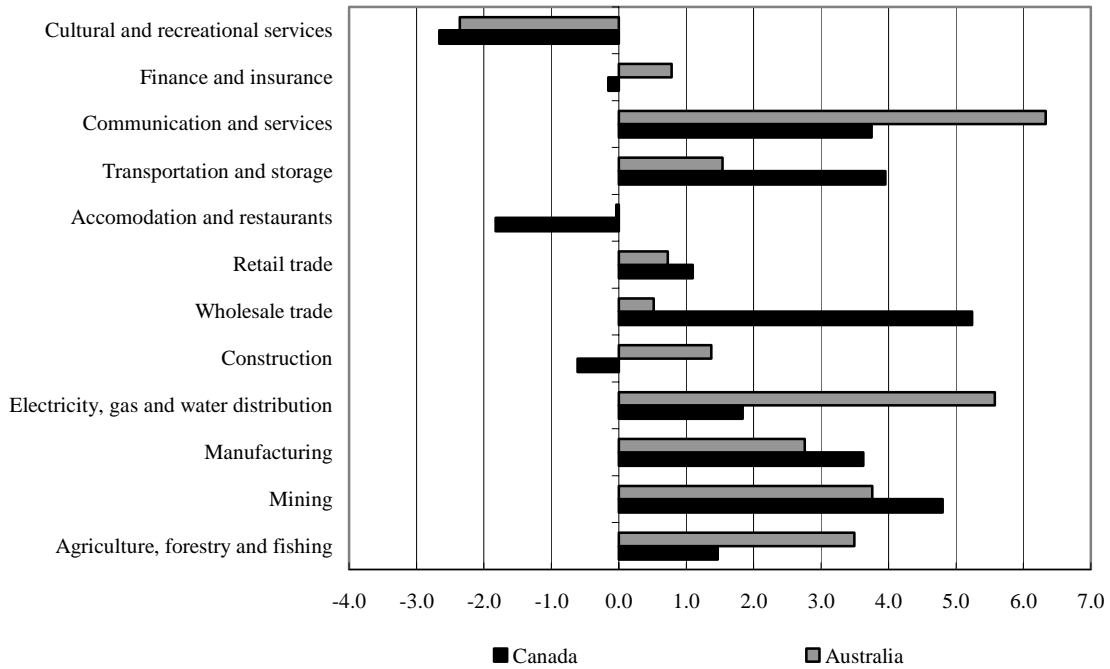
Figures 5b and 5c show marked differences between the two countries in the sectoral labour productivity performance during the 1980s and 1990s, respectively. In the 1980s, Canada outperformed Australia in about half of the sectors—transportation, trade, manufacturing and mining. But Australia performed better in the remaining sectors, in particular communications, public utility, agriculture, construction and finance.

**Figure 5a. Sectoral sources of business sector's labour productivity growth, 1981-2000 (average annual growth rate in percentage)**

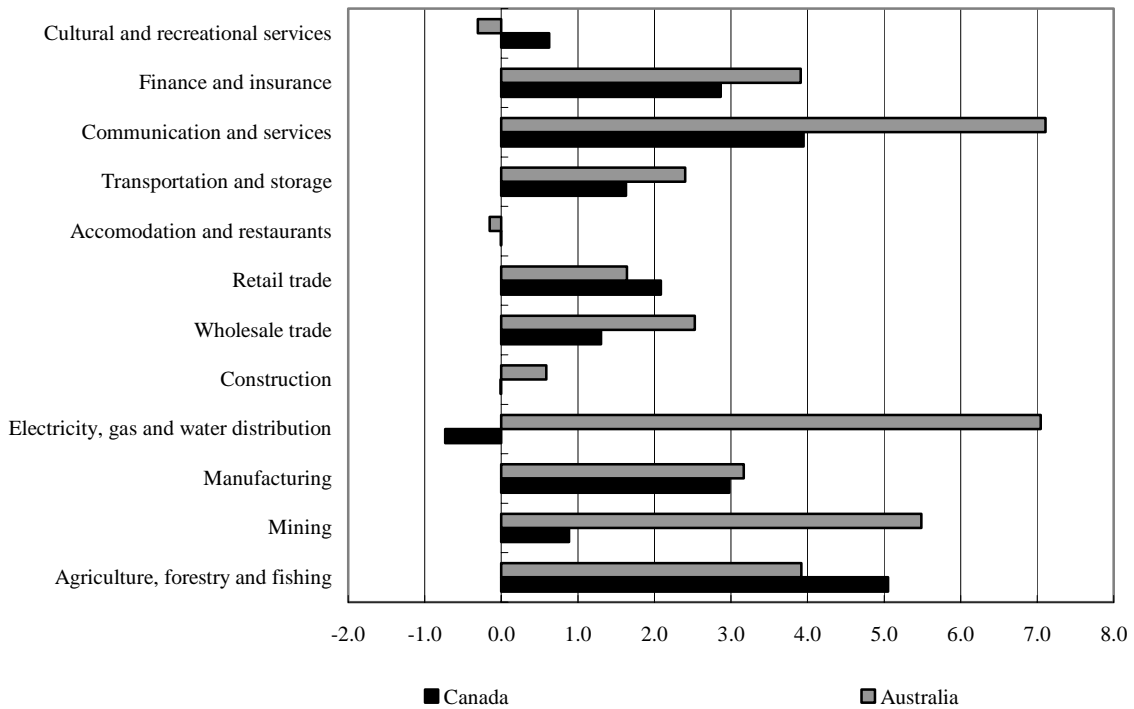




**Figure 5b. Sectoral sources of business sector's labour productivity growth, 1981-1988  
(average annual growth rate in percentage)**



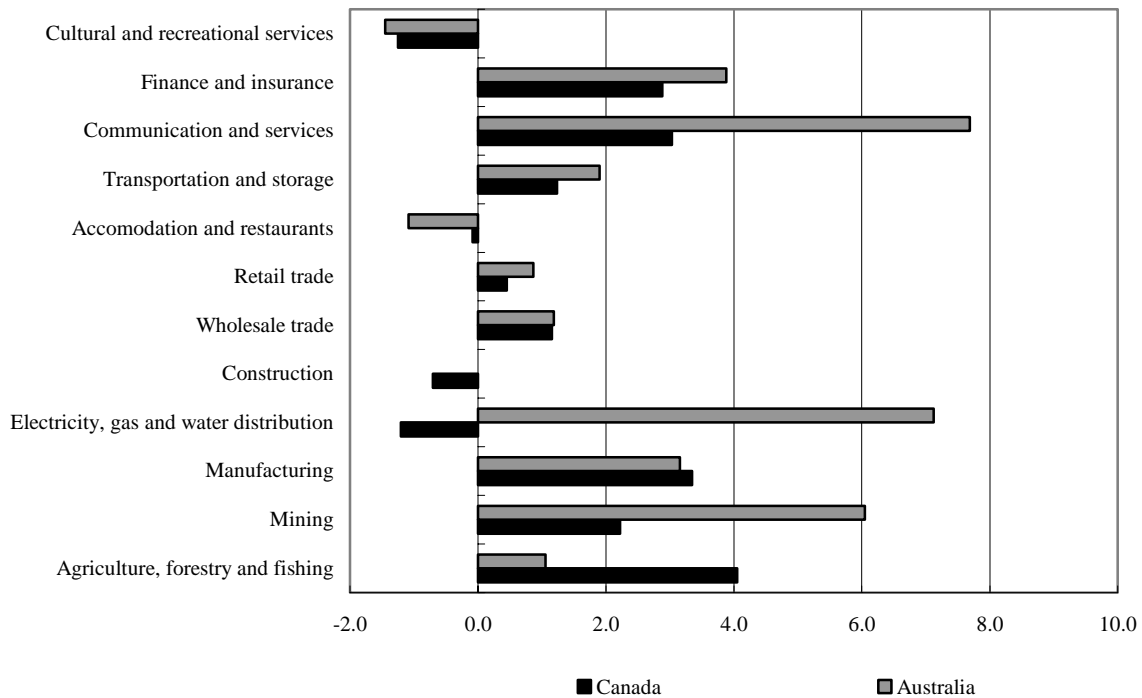
**Figure 5c. Sectoral sources of business sector's labour productivity growth, 1988-2000  
(average annual growth rate in percentage)**



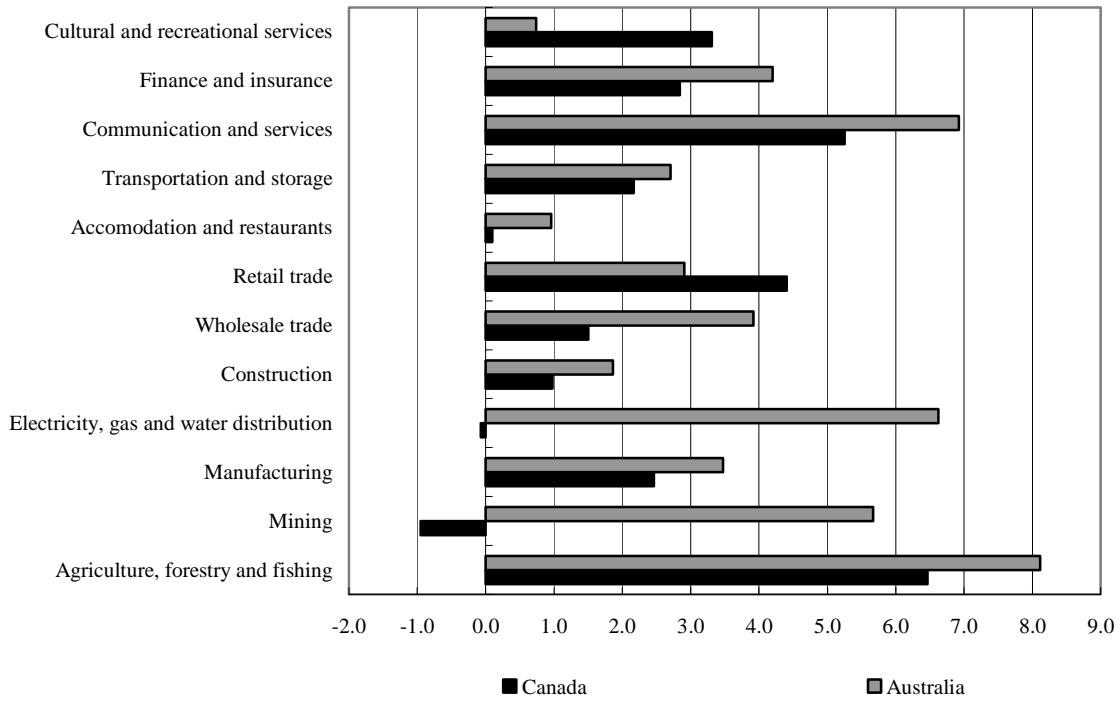
In the 1990s, Canada's higher productivity growth was essentially confined to only two sectors: agriculture and retail trade (Figure 5c). This does not, however, mean that Canada performed poorly in the remaining sectors. Canada experienced rapid productivity gains in the finance and communication sectors (3% and 4%, respectively), compared to a modest 1.5% in transportation and wholesale trade. Although Canada's sectoral labour productivity growth in the 1990s was almost as strong as in the 1980s (the median was 1.5% and 1.7%, respectively), it does not come close to the Australian performance, which grew twice as fast during this period (the median industry growth rate was about 2.8%).

Relatively weaker productivity growth in the Canadian sectors can also be found between 1988 and 1995, a period marked by a severe recession and significant structural changes associated with the implementation of Canada-U.S. free trade agreement (see Figure 5d). But it was mainly in the 1995-2000 period that the Australian sectors outperformed their Canadian counterparts (Figure 5e). Much like the story at the aggregate level, Canada-Australia differences in labour productivity growth at the sectoral level are the result of differences in capital deepening and, to a lesser extent, multifactor productivity growth (Figures 6a and 6b).

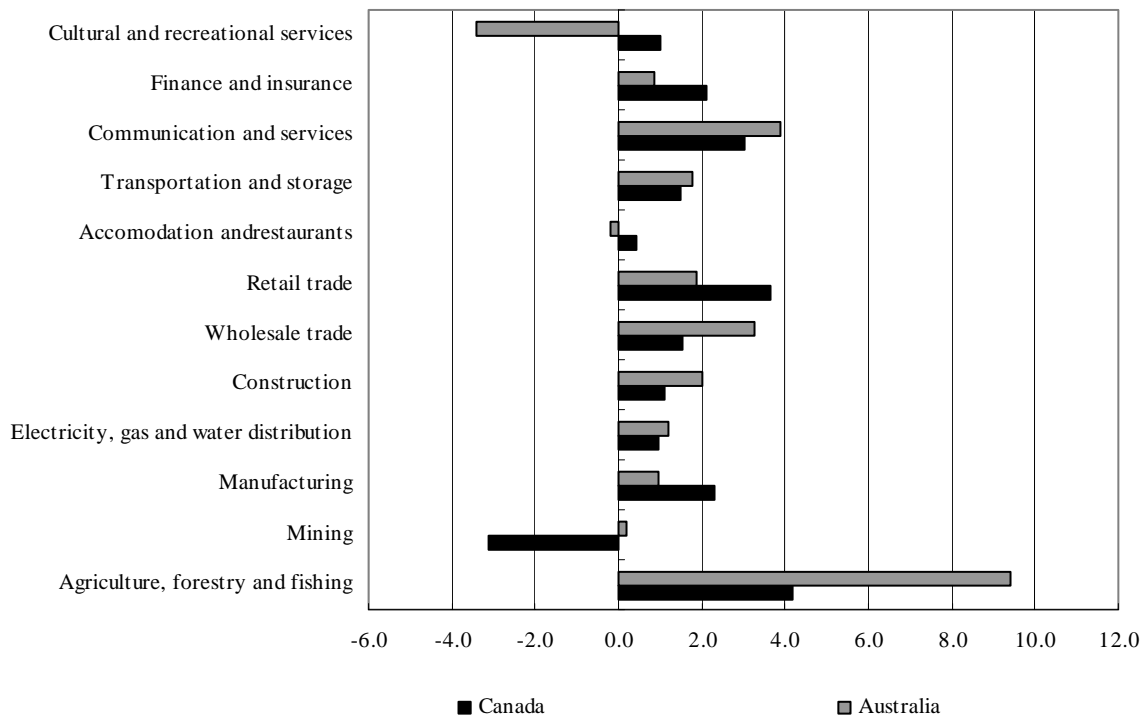
**Figure 5d. Sectoral sources of business sector's labour productivity growth, 1988-1995 (average annual growth rate in percentage)**



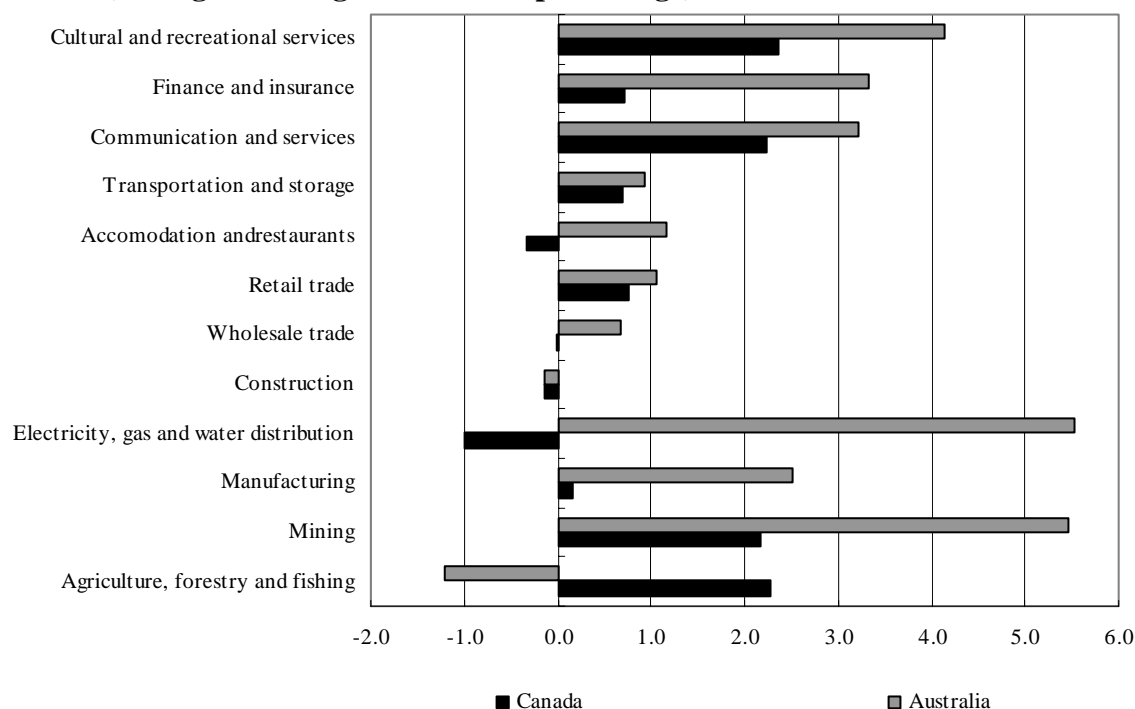
**Figure 5e. Sectoral sources of business sector's labour productivity growth, 1995-2000  
(average annual growth rate in percentage)**



**Figure 6a. Sectoral sources of business sector's multifactor productivity growth, 1995-2000  
(average annual growth rate in percentage)**



**Figure 6b. Sectoral sources of business sector’s multifactor capital-labour ratio, 1995-2000 (average annual growth rate in percentage)**



#### ***IV. Conclusion***

This paper provides a Canada-Australia comparison over the 1980s and 1990s in terms of standard of living growth and its underlying sources—productivity and labour utilisation. The comparison focuses on the 1980s and the late 1990s, two economic expansion periods. During these two periods, the standard of living (GDP per capita) grew at the same pace in the two countries, despite a productivity gap in favour of Australia. This finding then begs the question: How could Canada increase its standard of living as fast as Australia, but not its productivity?

Canada’s performance in terms of growth of real average income comes largely from a significant improvement in the growth of labour utilisation—through a combination of higher average hours worked and a higher rate of employment in the total population. In a sense, Canada was rewarded for putting in relatively more effort in terms of working time per capita, while it lagged in terms of improvements in the return achieved from each hour worked (labour productivity).

Differences in labour productivity growth between Canada and Australia are less the result of the improvement in the overall efficiency with which capital and labour are transformed into output (multifactor productivity growth) than the contribution of capital deepening effects. During the late 1990s, more than three-quarters of a percentage point productivity gap in favour of Australia was attributable to capital deepening, indicating that, in Canada, each unit of additional hour worked had relatively less capital to work with to produce output than Australia. These results are similar to those reported in our Canada-U.S. comparison (see Harchaoui and Tarkhani 2004).

Overall, there is one notable regularity that our studies reveal. Canada increased its capital deepening less rapidly than both Australia and the United States. By international standards, Canada experienced a very rapid growth in output, accompanied by a surge in capital formation. This growth was accompanied by more rapid gains in hours than elsewhere as the large pool of workers who lost their jobs in Canada in the early 1990s, or who had trouble finding their first jobs, were put to work in the expansion of the late 1990s. The peculiarity of Canadian input markets in the 1990s may owe itself more to the severity of the recession and restructuring that Canada faced at the beginning of the decade, than to problems in capital markets that restricted the growth in investment.

## ***Appendix A: Key economic indicators for Canada and Australia***

Variable	Australia	Canada
Population in 2000 (millions of habitants) <sup>8</sup>	19.2	31.8
Participation rate (1999) <sup>9</sup>	72.9%	75.9%
Unemployment rate (1999) <sup>10</sup>	6.8%	7.7%
GDP per capita (2001) <sup>11</sup> , thousands of US dollars	27.3	28.9
Net technology importers vs. exporters <sup>12</sup>	Net technology importer Main supplier: United States	Net technology importer Main supplier: United States
Raw materials part of exports <sup>13</sup>	55.4%	45.7%
Machinery and transportation equipment part of imports	45.9%	55.3%
Main trade partners	Japan and United States	United States

<sup>8</sup> Source: OECD. *Labour Force Statistics*, 1981-2001, Paris, 2002.

<sup>9</sup> Source: OECD. *Labour Force Statistics*, 1978-1999, Paris, 2000.

<sup>10</sup> Source: *OECD Economic Outlook*, no. 68, p. 183, 2000.

<sup>11</sup> Source: *National Accounts of OECD Countries, Main Aggregates, Volume 1*

<sup>12</sup> Sources: Australia, *OECD Economic Studies*, Paris, 1999. Canada, *OECD Economic Studies*, Paris, 2000.

<sup>13</sup> The raw materials in question are the primary inputs to production, food, beverage and tobacco, gas and oil.

## ***Appendix B: Sources and Concepts, Canada and Australia***

<b>Total Economy</b>			
	<b>Canada and Australia</b>	<b>Canada</b>	<b>Australia</b>
Output	Value added at basic price (chained Fisher index)	Canadian Productivity Accounts	ABS Table 5206042
Labour Input	Hours at work	Canadian Productivity Accounts	ABS Table 5206042
<b>Business Sector</b>			
	<b>Canada and Australia</b>	<b>Canada</b>	<b>Australia</b>
Output	Value added at basic price (chained Fisher index)	Canadian Productivity Accounts	ABS Table 5206042
Capital input	Capital services	Canadian Productivity Accounts	ABS Cat. No. 5204.0
Labour Input	Labour services	Canadian Productivity Accounts	ABS Unpublished Data
<b>By Industry</b>			
	<b>Canada and Australia</b>	<b>Canada</b>	<b>Australia</b>
Output	Value added at basic price (chained Fisher index)	Canadian Productivity Accounts	ABS Unpublished Data
Capital input	Capital services	Canadian Productivity Accounts	ABS Unpublished Data
Labour Input	Hours at work	Canadian Productivity Accounts	ABS Unpublished Data

Note: This study employed data available on March 2003.

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