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## **Three Policies to Improve Productivity Growth in Canada**

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## **Abstract**

This paper makes the case that productivity is Canada's economic destiny and that Canada's dismal productivity performance, both from a historical and international perspective, therefore represents our biggest economic challenge. It then puts forward three specific policies to improve Canada's productivity performance: foster the diffusion of best-practice technologies; remove the provincial sales tax on purchases of machinery and equipment; and promote interprovincial movement of workers by improving labour market information, removing professional barriers to labour mobility, and establishing a tax credit for interprovincial job search. It finds that the short-term costs of these policies would be greatly outweighed by the long-term benefits associated with their implementation.

## **Résumé**

Ce rapport défend l'idée selon laquelle la destinée économique du Canada repose sur la croissance de son niveau de productivité et qu'étant donnée sa piètre performance à ce niveau au plan historique et international, une croissance accrue de la productivité représente le plus grand défi économique de la nation. Le rapport propose trois politiques spécifiques pour améliorer la performance du Canada sur le plan de la productivité : stimuler la diffusion de technologies plus avancées; éliminer les taxes de ventes provinciales sur les achats de machines et de matériels; et promouvoir le déplacement des travailleurs entre les provinces en améliorant l'information sur le marché de travail, en éliminant les barrières au mouvement de la main d'œuvre liées aux certifications et en introduisant un crédit d'impôt pour la recherche d'emploi dans les autres provinces. Le rapport conclut que les bénéfices à long terme associées à ces politiques surpasseraient facilement les coûts à court-terme liées à leur implantation.

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## **Executive Summary**

Since 2000, labour productivity growth in the Canadian economy has been weak. Yet increased productivity growth is by far the most important determinant or driver of increased material living standards for Canadians. It is also the most important means by which any fiscal pressures arising from the demographic challenges associated with an aging population can be met. The objective of this paper is to put forward three concrete policy proposals to improve the productivity performance of the Canadian economy.

### **Context for the Productivity Debate in Canada**

Economic growth can be decomposed into labour input growth, measured by hours worked, and labour productivity growth, defined as output per worker. With the ageing of the baby boom cohorts and their retirement from the workforce, labour force growth in Canada will fall significantly. This means that the importance of hours worked as a source of economic growth will fall in the future. Productivity growth will hence assume a greater relative importance as a source of economic growth. In the future, if Canada wants to increase GDP, it will have to increase labour productivity.

Since 2000, Canada's labour productivity performance has deteriorated relative to our performance during the second half of the 1990s. Canada's productivity growth has also been very weak relative to that experienced in the United States and in other OECD countries. In fact, Canada's productivity growth rate is sub-par and we are falling further and further behind other OECD countries. In this context, reviving productivity growth is indeed the biggest and most important economic challenge facing this country.

Capital investment, human capital, and technological change can be considered the proximate sources of labour productivity growth, but they themselves cannot explain why productivity growth actually takes place. Rather, it is the decisions of business to invest and innovate and of workers to acquire human capital which are the driving force behind business sector productivity advance. These decisions are affected by many factors such as the state of business confidence, the entrepreneurial spirit of the business class, and government policies. The latter are the focus of this paper.

### **Why Productivity is a Tough Sell**

There is an elite consensus in Canada that productivity is very important, but few governments or political parties directly address or talk about the productivity issue. This behaviour in a way is understandable because politicians know that productivity does not poll well or resonate as an issue for Canadians.

People associate productivity increases with working longer hours. Many also fear that higher productivity at the industry or firm level translates into layoffs. This can be true in an industry or firm characterized by strong productivity gains and limited potential for increases in demand for output. But at the total economy level, there is no long-run negative relationship between productivity and employment. Productivity

growth increases potential real income, which in turn increases demand, resulting in employment opportunities in new industries. There is therefore no reason why productivity growth should have negative long-run consequences for total employment.

Given that Canadians have already achieved a high standard of living relative to other countries, some feel that productivity gains may be less important than they once were. Yet, productivity does lead to greater income which can in principle be used to raise economic well-being. More importantly, many measures that can be taken to foster productivity are related to changes in policy regimes and the government costs associated with such policies are minimal. Any free lunches that can be obtained through more intelligent public policy should be sought.

Productivity growth is of course associated with economic growth and economic growth is often associated with environmental degradation and climate change. Yet, rich countries are better positioned to take the steps needed to preserve the environment than poor countries. Productivity growth, which transforms poor countries into rich countries, can therefore potentially be more a part of the solution to environmental degradation than a cause of this degradation.

Strong productivity growth is key to the financing of higher health and pension costs associated with the growing proportion of the population 65 and over. The message that Canadians must hear is that productivity growth is vital to their economic destiny.

## **Policies to Improve Productivity in Canada**

### 1. More Rapid Diffusion and Adoption of Best Practice Technologies

Technological progress is the most important determinant of productivity advance. At any given time, only a small number of firms or countries are on the technological frontier, defined as the set of technologies that are the most advanced, efficient, and cost effective. Other firms or countries can experience very rapid productivity growth by adopting these best practice technologies and moving toward the technological frontier.

The federal government and provincial governments in Canada devote significant resources to subsidizing the research and development (R&D) activities of the private sector. Indeed, the federal scientific research and experimental development tax credit in 2007 is projected to cost \$2,675 million. To be sure, R&D is important for innovation, particular in certain high tech sectors such as communications equipment and aeronautics, and governments must contribute to support R&D activities. But in 2002, less than 1 per cent of firms performed R&D in Canada. If the term “innovation” were reserved for these, very few Canadian firms would be considered innovative.

However, an innovative firm is more appropriately defined as one which introduces new production processes and products. By this criterion, 81 per cent of manufacturing firms in Canada can be considered innovative according to the 1999

Survey of Innovation. From the point of view of fostering productivity growth, what is relevant is the adoption of best practice technologies. Yet this path to productivity improvement receives much less attention than R&D.

A case can thus be made that there should be a rebalancing of the relative efforts that governments in Canada devote to support for private sector R&D activities versus the support given for the adoption of best practice technologies. To foster technological innovation and productivity growth, it is proposed that additional resources be allocated to programs that assist SMEs in the identification and adoption/adaptation of new technologies. The National Research Council's Industrial Research Assistance Program (NRC-IRAP) is an example of a successful technology transfer program. Productivity advance in Canada can be fostered in a cost effective manner through expansion of existing technology transfer programs such as IRAP, and the creation of new programs with similar objectives. Specific initiatives to develop these types of program merit serious attention as a means to improve productivity.

#### Removal of the Provincial Sales Tax on Purchases of Machinery and Equipment

It has long been recognized that investment in machinery and equipment (M&E) is a key driver of productivity growth. M&E investment has historically been weak in Canada relative to other OECD countries. One reason for lower M&E investment in Canada may be the higher cost of capital in Canada, as proxied by the marginal effective tax rate (METR) on capital. In 2006, the METR was 36.6 per cent in Canada, sixth out of 45 countries.

A key reason why our METR is so high is because five provinces (Ontario, British Columbia, Prince Edward Island, Saskatchewan, and Manitoba) apply their retail or provincial sales tax (PST) to the purchase of capital goods such as machinery and equipment, including ICT goods. Tax policy experts across the political spectrum are unanimous that the current PST regime which taxes the purchase of new capital equipment is extremely bad policy, perhaps unique in its incompetence among developed countries.

The federal government has long recognized the problems associated with the PST on capital goods. A possible resolution to this situation lies in the federal government providing financial assistance to the PST provinces to harmonize their PST with the GST. Such assistance was offered to the three Atlantic provinces in the early 1990s to encourage harmonization. This is the ideal time for such an initiative given the sound fiscal situation of the federal government.

#### Promotion of the Geographical Migration of Workers

In addition to the three fundamental drivers, the reallocation of factors of production from low productivity level uses to high productivity level uses contributes significantly to aggregate productivity growth. This reallocation can take place between firms, across industries, across occupations, and across space.

Using two very crude methodologies, this paper presents two estimates of the output and productivity gains arising from interprovincial migration in Canada. The first methodology uses the impact of interprovincial migration on earnings to estimate the gains from migration. The gains in 2006 are estimated at about \$413 million in labour income and \$779 million in GDP, the latter equivalent to 0.05 per cent of GDP. The second methodology uses inter-provincial labour productivity differences. In 2006, the estimated total change in nominal output as a result of interprovincial migration was \$1,966.4 million, equivalent to 0.137 per cent of GDP. About 70 per cent of the gains were from the reallocation of workers and 30 per cent from employment increases.

The gains to aggregate productivity from interprovincial migration based on the methodologies discussed above are not huge, although they are likely underestimated for a number of reasons. Importantly, however, the estimated annual output gains from migration are positive and cumulate over time. Migration should be recognized as a contributor to aggregate productivity growth.

One concrete suggestion to increase labour mobility would be the creation of an independent agency for the development and dissemination of LMI along the lines of the Canadian Institute for Health Information (CIHI). Both federal and provincial government play a role in the LMI area, but their efforts are often uncoordinated and duplicative. A non-governmental agency funded by both levels of government could potentially invigorate the LMI field and make Canadians more aware of employment opportunities throughout the country.

In terms of new policies to foster interprovincial mobility, this paper also proposes that the federal government establish a tax credit for expenses associated with job search in other provinces. Moving expenses are currently deductible from income. But the expenses associated with initial job search, such as travel and accommodation expenses, are currently not covered. Their coverage would reduce the after-tax cost of interprovincial job search and hence provide an additional fiscal incentive for workers to seek better employment opportunities in other provinces. The actual costs of such a program would be small. A ballpark estimate of the cost of the initiative might be in the range of \$15 to \$25 million.

## **Conclusion**

This paper has made the case that productivity is our economic destiny and that Canada's dismal productivity performance, both from a historical and international perspective, therefore represents our biggest economic challenge. It then put forward three specific policies to improve Canada's productivity performance: foster the diffusion of best-practice technologies; remove the provincial sales tax on purchases of machinery and equipment; and promote interprovincial movement of workers by improving labour market information, removing professional barriers to labour mobility, and establishing a tax credit for interprovincial job search. The short-term costs of these policies would be greatly outweighed by the long-term benefits.

# Three Policies to Increase Productivity Growth in Canada<sup>1</sup>

## Introduction

Since 2000, labour productivity growth in the Canadian economy has been weak. Yet increased productivity growth is by far the most important determinant or driver of increased material living standards for Canadians. It is also the most important means by which any fiscal pressures arising from the demographic challenges associated with an aging population can be met. From this perspective, lagging productivity growth represents a serious economic problem facing the country that must be addressed if future living standards of Canadians are to be maintained and continue to progress (Lynch, 2006).

The objective of this paper is to put forward three concrete policy proposals to improve the productivity performance of the Canadian economy. The paper is divided into three main sections. The first part discusses the context of the productivity debate. The second section examines the optics of productivity policy in this country. The third section, the most important, puts forward three policy proposals to improve productivity, namely: foster the diffusion of best-practice technologies; remove provincial sales taxes on purchases of machinery and equipment; and promote interprovincial movement of workers by improving labour market information, removing professional barriers to labour mobility, and establishing a tax credit for interprovincial job search.

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<sup>1</sup> This report is an unabridged version of a paper published in J. Leonard, C. Ragan and F. St-Hilaire (eds.), *A Canadian Priorities Agenda: Policy Choices to Improve Economic and Social Well-Being*, (Montreal: Institute for Research on Public Policy), November 2007, pp. 353-388. The author would like to thank Chris Ragan for the invitation to prepare this paper for the *Canadian Priorities Agenda* project. The author would also like to thank project organizers Chris Ragan, France St-Hilaire and Jeremy Leonard and discussants Don Drummond and Rick Harris for their very useful comments. Finally, the author would like to thank John Lester from Finance Canada, Robert Reichert from the National Research Council and Jean-François Arseneault and Sharon Qiao from the Centre for the Study of Living Standards for assistance.

## I. The Context for the Productivity Debate in Canada

In order to engage in productive and meaningful debate on what policies would be most effective in raising productivity levels in Canada, it is necessary to have at least a rudimentary understanding of the productivity issue. This part of the paper provides context for the productivity policy debate by briefly discussing definitions of productivity measures and concepts; the relationship between productivity, material living standards, and well-being; productivity measurement problems; the main drivers of productivity growth, and Canada's recent productivity performance.

### A. Basic Productivity Definitions and Concepts

This paper focuses on policies to improve productivity performance, not technical productivity issues. Nevertheless, it is important that the reader have a basic understanding of the concept of productivity.<sup>2</sup> Productivity of course is the ratio of output to an input or inputs. A partial productivity measure is when output (either value added or gross output) is divided by a single input. The best known partial productivity measure, and the focus of this paper, is the ratio of output to labour input or labour productivity. Other partial productivity measures are capital productivity, energy productivity (or intensity), and materials productivity. A total factor or multifactor productivity measure (TFP or MFP) is the ratio of output to two or more inputs which are combined into a composite input index. TFP measures are most often based on capital and labour as inputs, but also include energy, materials and services (KLEMS estimates).

From the point of view of the advance of living standards and warranted real wage growth, labour productivity is key. This is because real income can be only increased in the long run if more real output is produced. In contrast, total factor productivity is more a measure of the efficiency in which inputs are used. While an important topic, it is much less related to real income growth than labour productivity. TFP growth will not be discussed in this paper. All references to productivity in the paper hence refer to labour productivity.<sup>3</sup>

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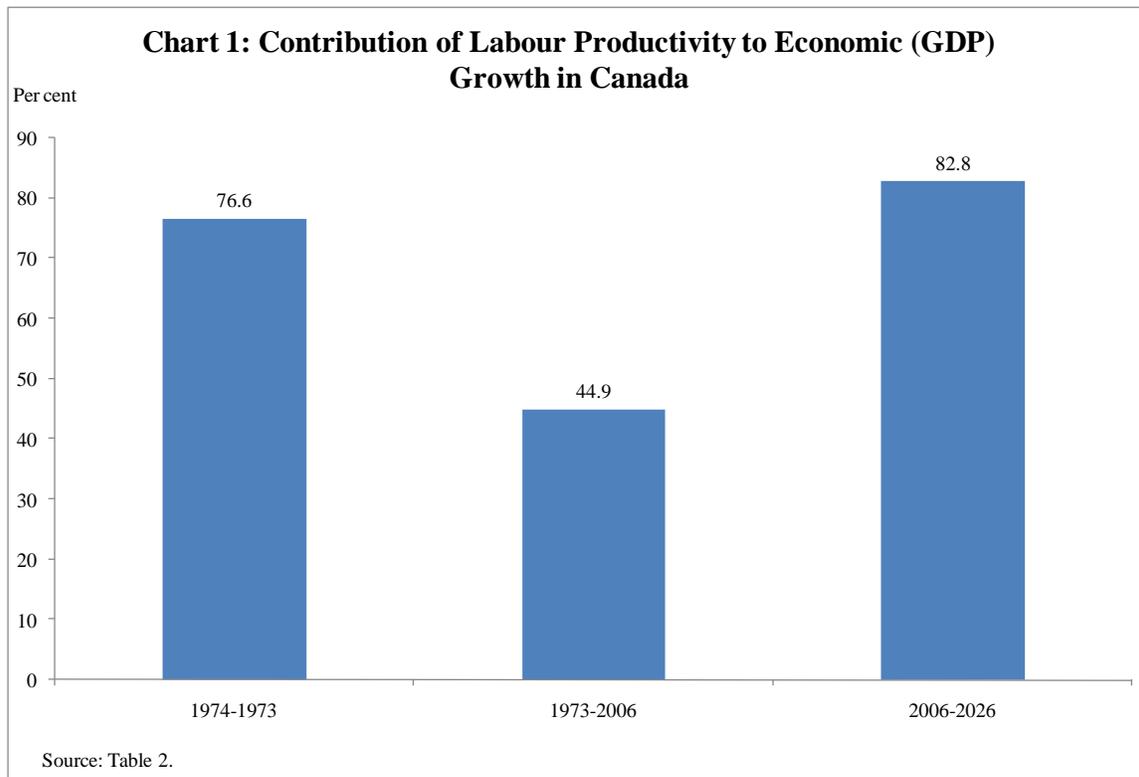
<sup>2</sup> For more extensive discussions of productivity concepts and issues, see Sharpe (1998), Rao and Sharpe (2002), Sharpe (2002), as well as articles published in the *International Productivity Monitor* ([www.csls.ca/ipm](http://www.csls.ca/ipm)).

<sup>3</sup> The two productivity measures can give different signals. For example, on July 15, 2005, Statistics Canada released estimates showing that multifactor productivity growth in Canada since 2000 was twice the rate of the 1990s. This development reflects the fall in the rate of growth of capital input, which is actually positive from the point of view of multifactor productivity. Yet Statistics Canada had earlier reported that labour productivity growth since 2000 was much worse than in the 1990s. The media ignored the report on multifactor productivity. This was fortunate as reporting improved multifactor productivity would have confused the public as to whether Canada is experiencing a productivity problem, which I believe it is.

The term productivity can refer to both the level of productivity and the productivity growth rate, that is the per cent change in levels. Productivity growth rates, which are the focus of attention of economists, must be based in constant price measures of output and productivity that take account of price increases in the value of output in order to capture increases in the physical or real amount of output produced per hour worked. On the other hand, productivity levels, which are of particular interest to business analysts, are expressed in current price terms and reflect the current structure of relative prices.<sup>4</sup> Productivity growth rates and trends in current price productivity levels may in fact move in opposite directions. For example, increased oil prices have raised the current dollar value of output per hour produced by the oil and gas industry, but may actually lower productivity growth as more marginal deposits requiring more labour input per barrel of oil become profitable and are exploited.

## B. Contribution of Productivity to Economic Growth, Living Standards, and Well-being

### 1) Productivity and Economic Growth



<sup>4</sup> It is interesting to note that industries with high productivity growth rates are not necessarily the ones with high productivity levels just as industries with low productivity growth rate do not necessarily have low productivity levels. This is because of changes in relative prices. Ironically, the sector that currently has the lowest current dollar value added per hour worked in the economy is agriculture. Yet this is the industry with the fastest labour productivity growth over the last half century! What has happened is that through competition, the robust productivity gains in agriculture have been passed on to consumers in the form of lower food prices, not to the producers in the form of higher wages and returns to capital.

Economic growth, defined as real GDP growth or real output growth, can be decomposed into labour input growth measured by hours worked and labour productivity growth, defined as output per worker. Summary Table 1 and Chart 1 show that productivity growth accounted for 63 per cent of economic growth over the 1947-2006 period. The contribution from labour productivity was larger in the 1947-73 period than from 1973 to 2006 (77 per cent versus 45 per cent).

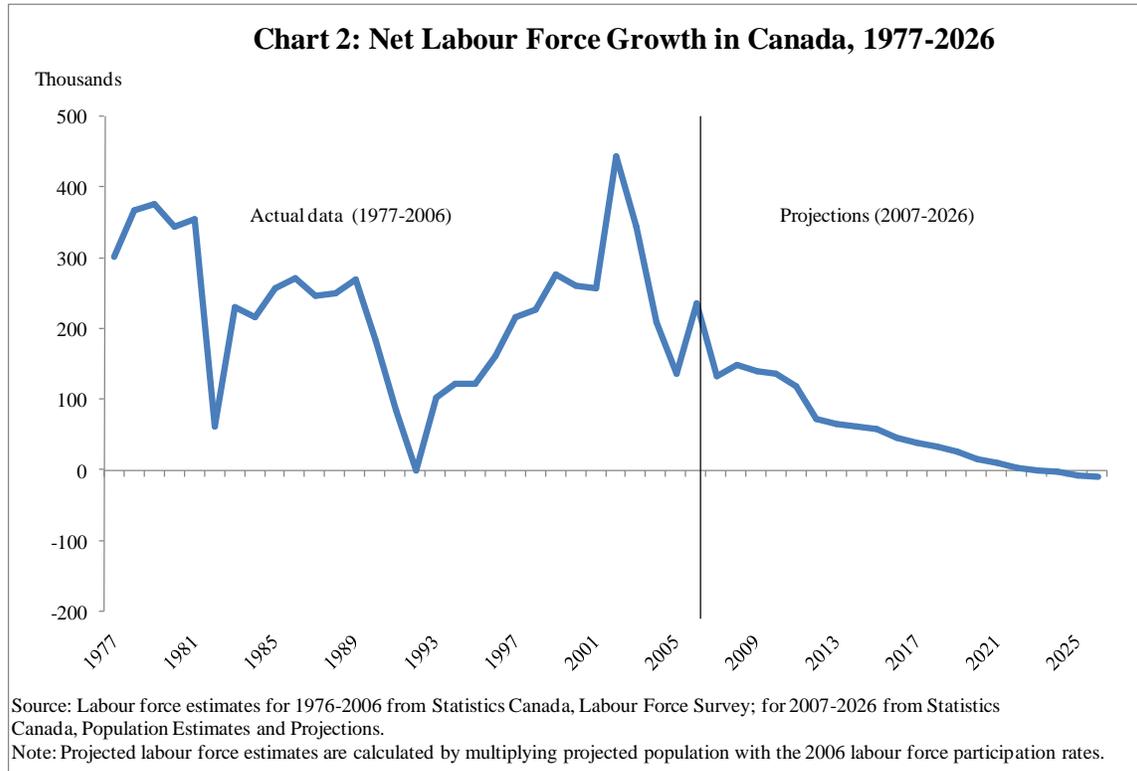
| <b>Summary Table 1: The Relationship Between GDP and Productivity in Canada, 1947-2006</b>   |              |  |   |
|--|--------------|--|---|
|  | <b>GDP</b>   | <b>Total Hours Worked for All Jobs</b> | <b>Labour Productivity (GDP per Hour)</b> |
| <b>Levels <sup>1</sup></b>   | <b>A=B*C</b> | <b>B</b>                               | <b>C</b>                                  |
| <b>1947</b>  | \$132,799    | 13,063                                 | 10.17                                     |
| <b>1973</b>  | 457,766      | 17,349                                 | 26.39                                     |
| <b>2006</b>  | 1,191,073    | 29,054                                 | 41.00                                     |
| <b>2026 *</b>  | 1,705,965    | 30,897                                 | 55.21                                     |
| <b>Compound average annual growth rates</b>  | <b>A≈B+C</b> | <b>B</b>                               | <b>C</b>                                  |
| <b>1947-2006</b>   | 3.79         | 1.36                                   | 2.39                                      |
| <b>1947-1973</b>   | 4.87         | 1.10                                   | 3.74                                      |
| <b>1973-2006</b>   | 2.71         | 1.48                                   | 1.22                                      |
| <b>2006-2026</b>   | 1.81         | 0.31                                   | 1.50                                      |
| <b>Relative contribution to the growth rate of GDP per capital</b>   |              |  |   |
| <b>1947-2006</b>   | 100          | 36.0                                   | 63.1                                      |
| <b>1947-1973</b>   | 100          | 22.5                                   | 76.6                                      |
| <b>1973-2006</b>   | 100          | 54.4                                   | 44.9                                      |
| <b>2006-2026</b>   | 100          | 17.0                                   | 82.8                                      |
| <b>Notes:</b>  |              |  |   |
| 1. From 2006-2026, labour productivity is assumed to grow at 1.5 per cent per year; average hours worked per week are held at the 2006 level; employment is assumed to grow at the same rate as that of the labour force; and labour force growth is based on projected 15-64 years old population growth with 2006 labour force participation rate for the 15-64 age group held constant. |              |  |   |
| 2. Numbers might not add up to 100 due to rounding   |              |  |   |
| Source: Table 1  |              |  |   |

The size of the working age population (15 to 64) is the primary driver of trends in hours of potential labour supply, which is in turn determined by employment trends. In theory, declines in the unemployment rate, higher labour force participation rates, and increases in average annual hours worked could offset the decline in the size of the working age population. But the magnitude of any changes from these sources are too small to offset demographic developments.

Consequently, with the ageing of the baby boom cohorts and their retirement from the workforce, which will start in a few years, labour force growth in Canada will fall significantly (Chart 2). Net labour force growth will turn negative around 2023.<sup>5</sup> This

<sup>5</sup> Immigrants will account for a large proportion of the new entrants into the labour force.

means that the importance of hours worked as a source of economic growth will fall in the future. Productivity growth will hence assume a greater relative importance as a source of economic growth. It is estimated that from 2006 to 2026 productivity growth will account for 83 per cent of economic growth as employment growth is expected to be only 0.3 per cent per year over the period. Once employment growth disappears around 2023, economic growth will in effect become synonymous with labour productivity growth. In the future, if Canada wants to increase GDP, it will have to increase labour productivity.



## 2) Productivity and GDP per capita

Gross Domestic Product per capita, the most widely used measure of living standards, can be decomposed into the product of labour productivity (defined as output per hour worked at the total economy level), the average number of hours each employed person works, and the proportion of the entire population that is employed.<sup>6</sup> Likewise, the growth rate of real income as proxied by the GDP per capita growth rate can be approximately decomposed into the summation of the growth rates of these three variables.

Summary Table 2 demonstrates this decomposition using Canadian data for the 1947-2006 period and sub-periods. It provides estimates of the levels and growth rates of

<sup>6</sup> Changes in terms of trade can also contribute to changes in real income. There were particularly important for Canada in the 2002-2005 period, but their contribution over long periods is small (Kohli, 2006). The decomposition of GDP per capita in the text ignores the role of terms of trade effects.

GDP per capita, labour productivity, average hours worked per week, and the employment /total population ratio as well as the contribution of these latter three factors to GDP per capita growth.

*Summary Table 2: The Relationship Between Real Income and Productivity in Canada, 1947-2006*

|  | GDP per Capita       | Labour Productivity<br>(Output per Hour) | Average Hours<br>Worked per Week | Employment-<br>Population Ratio |
|--|----------------------|--|----------------------------------|---------------------------------|
| <b>Levels <sup>1</sup></b>   |                      |  |                                  |                                 |
|  | $A=B*(C*52)*(D/100)$ | B  | C                                | D                               |
| <b>1947</b>  | \$10,586             | 10.17                                    | 50.50                            | 39.60                           |
| <b>1973</b>  | 20,387               | 26.39                                    | 37.00                            | 40.10                           |
| <b>2006</b>  | 36,557               | 41.00                                    | 33.90                            | 50.60                           |
| <b>2026 <sup>2</sup></b>   | 45,040               | 55.21                                    | 33.90                            | 46.30                           |
| <b>Compound average annual growth rates</b>  |                      |  |                                  |                                 |
|  | $A \approx B+C+D$    | B  | C                                | D                               |
| <b>1947-2006</b>   | 2.12                 | 2.39                                     | -0.68                            | 0.42                            |
| <b>1947-1973</b>   | 2.55                 | 3.74                                     | -1.19                            | 0.05                            |
| <b>1973-2006</b>   | 1.79                 | 1.34                                     | -0.27                            | 0.70                            |
| <b>2006-2026</b>   | 1.05                 | 1.50                                     | 0.00                             | -0.45                           |
| <b>Relative contribution to the growth rate of GDP per capital</b>   |                      |  |                                  |                                 |
| <b>1947-2006</b>   | 100                  | 112.70                                   | -31.80                           | 19.60                           |
| <b>1947-1973</b>   | 100                  | 146.40                                   | -46.60                           | 1.90                            |
| <b>1973-2006</b>   | 100                  | 81.80                                    | -18.00                           | 36.00                           |
| <b>2006-2026</b>   | 100                  | 143.00                                   | 0.00                             | -42.40                          |
| Notes:   |                      |  |                                  |                                 |
| 1. GDP per capita and labour productivity are expressed in 1997 chained dollars. Hours are expressed as hours per week. The employment-population ratio is expressed in per cent.  |                      |  |                                  |                                 |
| 2. From 2006-2026, labour productivity is assumed to grow at 1.5 per cent per year; average hours worked per week are held at the 2006 level; employment is assumed to grow at the same rate as that of the labour force; and labour force growth is based on projected 15-64 years old population growth with 2006 labour force participation rate for the 15-64 age group held constant. |                      |  |                                  |                                 |
| 3. Numbers might not add up to 100 due to rounding   |                      |  |                                  |                                 |
| Source: Table 2  |                      |  |                                  |                                 |

Over the 1947-2006 period, GDP per capita grew by 2.12 per cent per year on average. This was driven entirely by productivity growth, at 2.39 per cent per year. In other words, productivity growth accounted for all the increase in living standards (113 per cent).<sup>7</sup> Over the 1947-73 period very strong productivity growth meant that productivity accounted for 146 per cent of living standards growth. Slower productivity growth after 1973 reduced the contribution of productivity to GDP per capita growth to 82 per cent.

In absolute terms growth in GDP per capita in Canada fell from a 2.55 average annual rate of increase in the 1947-1973 period to 1.79 per cent in the 1973-2006 period.

<sup>7</sup> The employment-population ratio grew modestly over this period on an annual per cent basis, making a small contribution to GDP per capita growth. Average hours of work, on the other hand, declined from 51 hours per week in 1947 to less than 35 hours per week in 2004, representing a serious drag on GDP per capita growth.

The 2.4 percentage point slowdown in labour productivity growth between these periods more than accounted for the decline in income per capita growth.<sup>8</sup>

Demographic developments will mean that in the future productivity gains will be more important as a source of advances in living standards than they were in the 1973-2006 period. Over the 2006-2026 period, the rapid growth of the population aged 65 and over will cause the employment-population ratio to fall, putting downward pressure on growth in material living standards. With no expected increase in average weekly hours, productivity will be responsible for 143 per cent of future living standards growth.

### 3) Productivity and Economic Well-being

In addition to its positive effect on living standards, productivity growth has a salutary effect on the broader concepts of economic and social well-being. Osberg and Sharpe (2001 and 2002) develop a measure of economic well-being that includes consumption flows, stocks of wealth, equality, and economic security. Sharpe (2002) shows that through various mechanisms, productivity growth can lead to improvements in all these dimensions of economic well-being.<sup>9</sup>

### **C. Productivity Measurement Problems**

The estimation of productivity growth is fraught with measurement problems and it is de rigueur in papers on productivity issues to make reference to this reality. Because of these measurement problems, there can be significant margin of error associated with productivity growth estimates and these estimates can be subject to large revisions. While these issues are not of direct relevance to policies to improve productivity growth, the reader should be aware of them.

The most serious measurement problem in productivity statistics is the lack of direct measures of output for most of the public sector. Inputs such as employment are often used as a proxy for output in these cases, so measures of labour productivity growth are by definition zero. To the degree that there in fact have been productivity gains in the public sector, the output and productivity performance of this sector, and hence of the total economy, will have been underestimated by the official statistics.

The second most important measurement issue facing those who compile productivity statistics is whether the quality changes of existing goods and the introduction of new goods are adequately captured by price indexes. These indexes are of course crucial to deflate nominal output to obtain estimates of real output and hence productivity. To the degree that price indexes have not been adequately capturing quality improvement, real output and hence real productivity growth will have been underestimated.

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<sup>8</sup> The negative impact of the much slower productivity growth on GDP per capita was partly offset by the increased employment rate.

<sup>9</sup> Also see the volume edited by Sharpe, St-Hilaire and Banting (2002) for papers on the two-way relationship between productivity and social variables.

## D. Productivity Drivers

In order to develop policies to improve productivity performance, it is important to first identify the drivers of productivity growth.<sup>10</sup> The standard starting point for the discussion of the dynamics of productivity growth is the simple neo-classical growth accounting model. In this model, there are three key factors determining labour productivity growth. The first is investment in capital goods, which determines the size of the capital stock and hence that amount of machinery and equipment and structures available to each worker. Higher ratios of capital to labour, or capital intensity, boost labour productivity. The second is investment in human resources, which determines the quality of labour input. More human capital makes a worker more productive. The third is the pace of technological progress, which is very roughly proxied by the rate of total factor productivity growth. Technological progress is affected by the development of new knowledge through R&D.

Capital investment, human capital, and technological change can be considered the proximate sources of labour productivity growth, but they themselves cannot explain why productivity growth actually takes place. Rather, it is the decisions of business to invest and innovate and of workers to acquire human capital which are the driving force behind business sector productivity advance. These decisions are affected by many factors such as the state of business confidence, the entrepreneurial spirit of the business class, and government policies. The latter are the focus of this paper.

Government policies affect the environment in which business operates in myriad ways. The existence or absence of the rule of law is an obvious example, although of more relevance to developing countries than developed countries. Macroeconomic policies that affect the business environment include monetary policy, fiscal policy, tax policy, trade policy, among others. Policies of a more micro-economic nature that affect the business environment include competition policy, regulatory policies, and intellectual property protection.

The magnitude of the impact of government policies on business sector productivity growth is very difficult to gauge. There is no doubt that through bad policy government can have a very detrimental effect on economic and productivity growth. Stagnant countries rife with corruption and lacking appropriate governance structures testify to the ability of government to kill the economy. Developments in Zimbabwe drive home this point. Thankfully, such a situation is not relevant to a developed country such as Canada with its democratic traditions, strong rule of law, and professional public service.

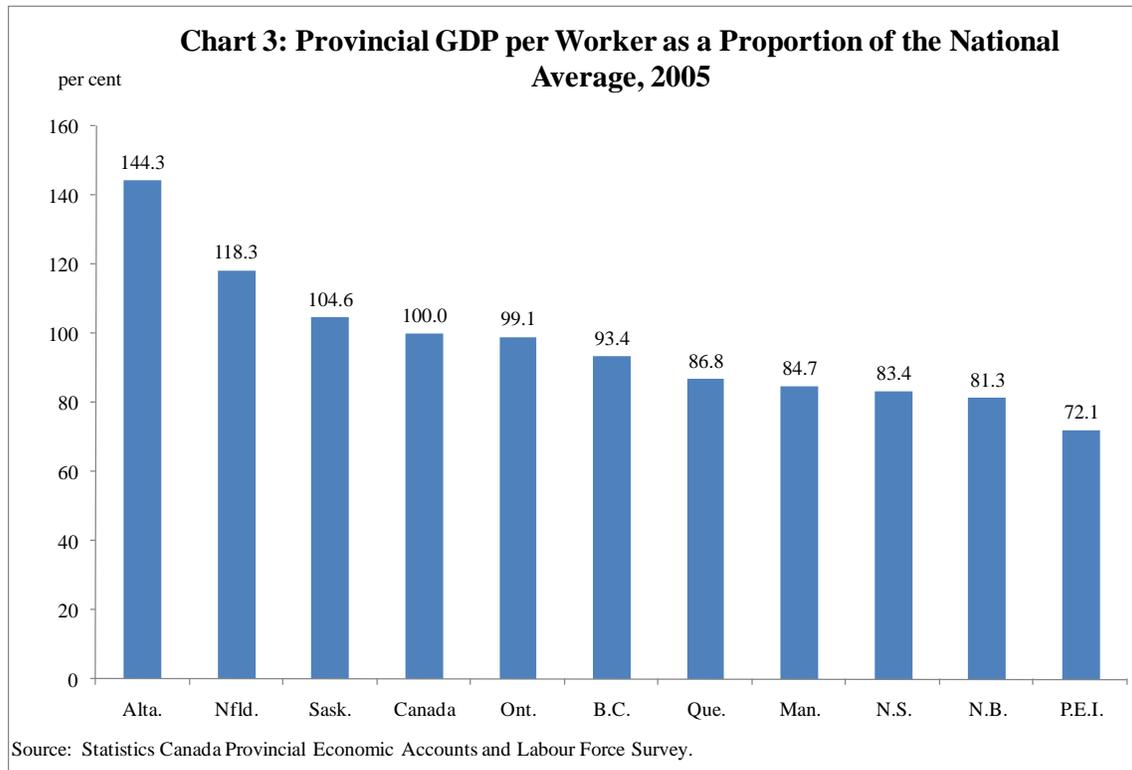
Long-run business sector productivity growth in Canada is primarily driven by the pace of technological change, supported by human resource development. Technological change may be either embodied, what is embedded and hence put into use through new capital equipment, or disembodied, that is not embodied in new equipment, such as

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<sup>10</sup> See Harris (2002) for a more comprehensive discussion of the drivers of productivity growth.

organizational change. Government policies in this country currently do not represent a major impediment to or constraint on business investment, innovation and human capital formation, and hence on productivity growth. It is extremely unlikely that Canada's potential labour productivity growth is double its current trend productivity growth (estimated to be around 1.5 per cent per year by the Bank of Canada (2006)). In other words, in a world where Canadian governments institute the policies most conducive to productivity growth, it is very unlikely that long-run productivity growth could double.

This does not mean that there is no potential for productivity improvement through better public policies. Indeed, this is the premise of the paper. But one must be realistic about the potential for improvement. In my view, a reasonable ballpark upper bound estimate of the impact of better public policy on labour productivity growth in the medium term might be 0.5 percentage points increase per year. Of course, trend labour productivity growth could potentially pick up by much more than 0.5 points due to non-public policy related factors such as more rapid technological progress and faster capital accumulation. Indeed, few if any economists argue that the large acceleration of labour productivity growth in the United States since 1995 has been primarily driven by improved public policy.



This impact of better public policy on productivity may seem small, but given the size of the economy, in absolute terms it is huge. In 2006, the nominal value of GDP in Canada was around \$1.4 trillion or \$1,400 billion. An increase in productivity and hence nominal GDP of 0.5 per cent would amount to \$7 billion per year. This is massive. Public

policy that could effectuate such an increase in wealth should be strongly encouraged and funded.

Two additional factors also influence productivity growth and levels. The first is the reallocation of labour and capital across the sectors of the economy. As a general rule, workers leave firms, industries, sectors, and regions characterized by below average productivity levels and enter those characterized by above average levels. This produces a bonus to aggregate productivity growth above the contribution from within sector productivity gains. The best known historical example of this source of aggregate productivity growth was the movement of workers out of low productivity agriculture in the decades following WWII.

The other factor affecting productivity relates to the natural resource sector. The discovery and exploitation of new natural resources deposits can spur productivity growth through composition effects as average productivity of natural resources industries is generally much above the industrial aggregate. Since 2000, the development of diamond mines in the Northwest Territories and the offshore oil deposits in Newfoundland has resulted in these two jurisdictions having the two fastest rates of productivity growth of any jurisdictions in the country. Higher natural resource prices also increase the relative productivity levels, expressed in current dollars, of resource rich provinces. Higher energy prices raised Alberta's nominal GDP per worker from 111 per cent in 1999 to 144 per cent of the national average in 2005 (Chart 3)

## **E. Productivity Trends**

The Canadian economy has performed well on almost all indicators in recent years. Output and employment growth have been strong, inflation and unemployment are low, the federal government deficit has long been eliminated, public debt is falling in both absolute terms and relative to GDP, and the Canadian dollar has appreciated. As the OECD remarks in its 2006 country report on Canada (OECD, 2006:9) "The Canadian economy has continued to deliver excellent results in nearly all respects." A recent IMF report on Canada (IMF, 2007) reached a similar conclusion.

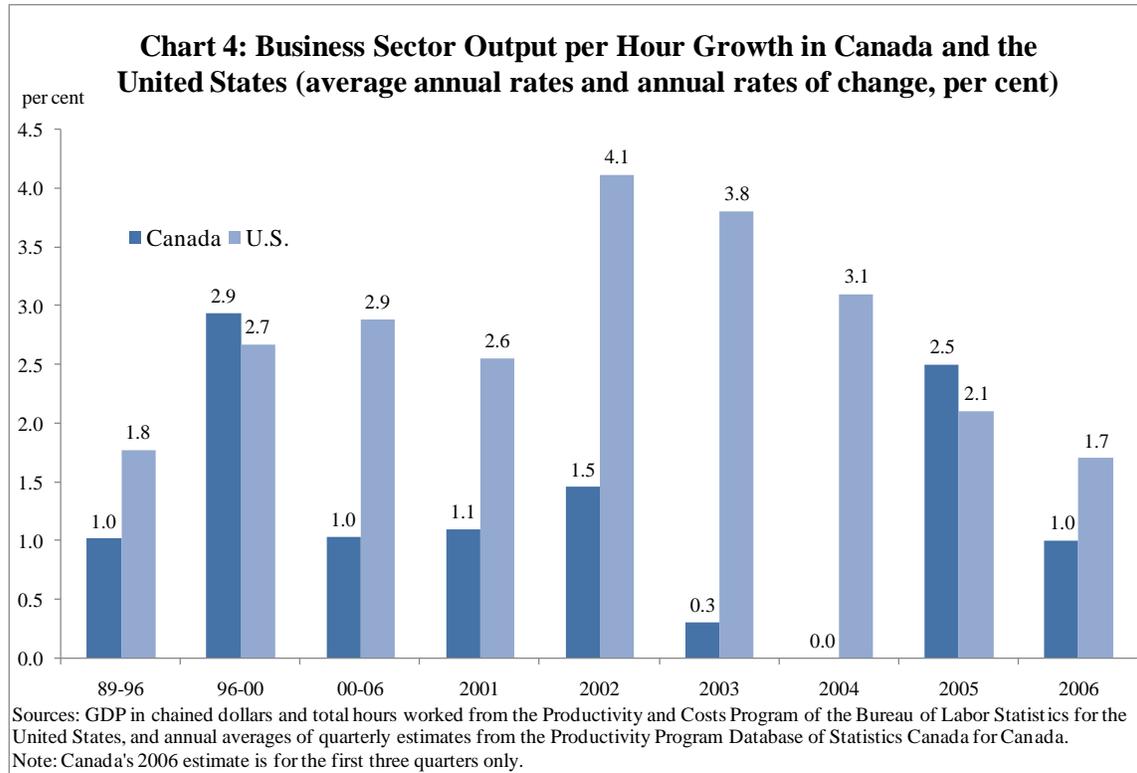
The one area where Canada has performed poorly, from both an historical and international perspective, is productivity growth. Ironically, as discussed above, productivity growth is of paramount importance to future living standards. Not surprisingly, both the OECD and IMF reports highlight this area of weakness and recommend policies to rectify it.<sup>11</sup>

Since 2000, Canada's labour productivity performance has deteriorated relative to our performance during the second half of the 1990s. Business sector output per hour advanced at only a 1.0 per cent average annual rate in Canada between 2000 and 2006, only about one third the annual rate of advance of 2.9 per cent recorded in Canada

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<sup>11</sup> The OECD country report (2006:10) says that a challenge for all levels of government is to raise productivity and that boosting productivity growth depends on improving the overall business environment. For an OECD perspective on Canada, also see Cotis (2006).

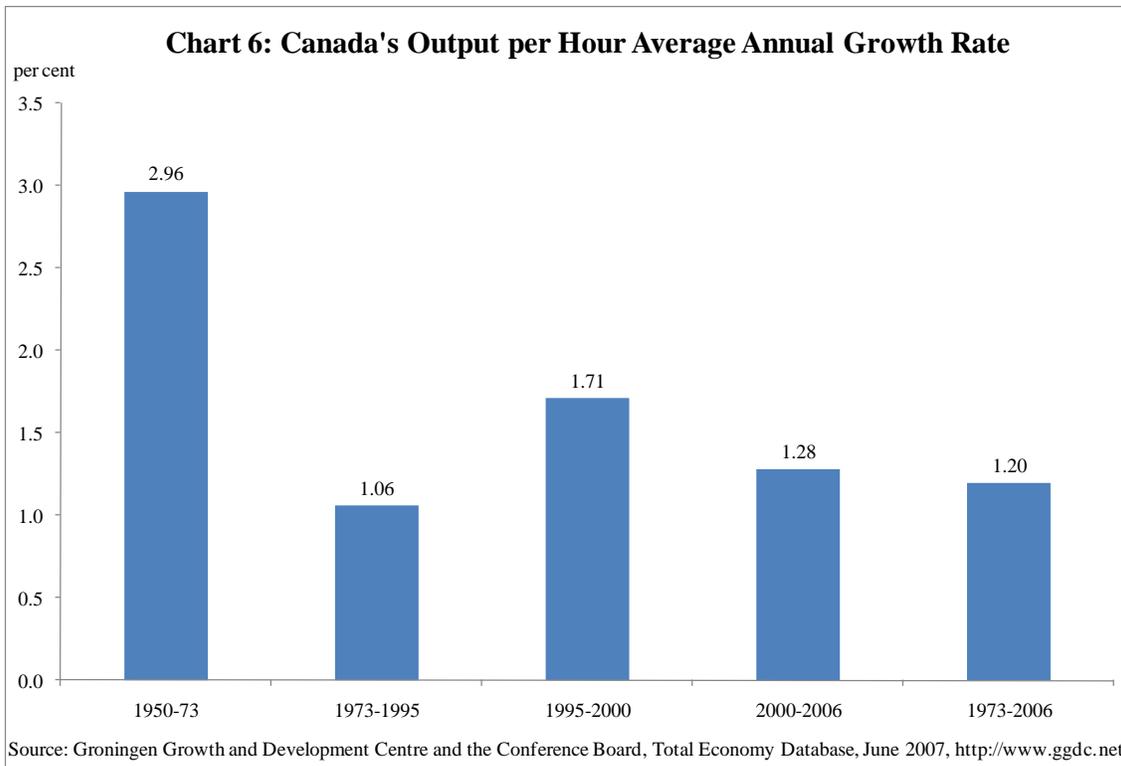
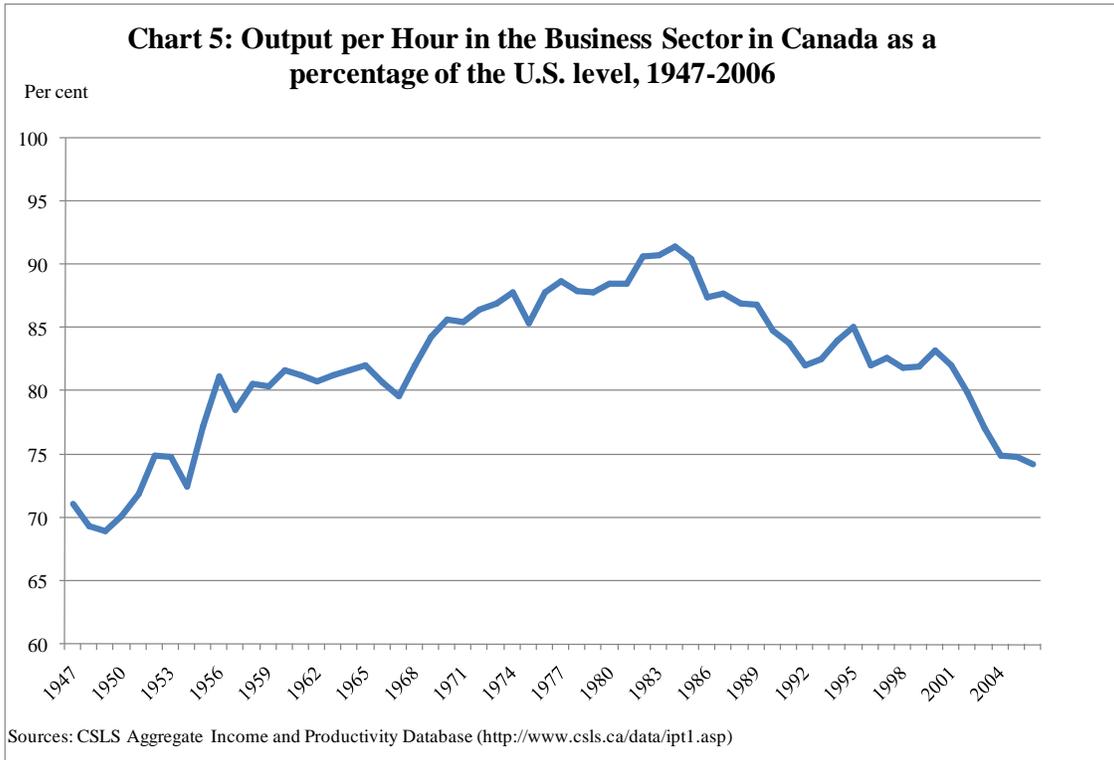
between 1996 and 2000 (Chart 4). Total economy productivity growth exhibited an almost identical pattern.



Canada's productivity growth has also been very weak relative to that experienced in the United States. Since 2000 our business sector output per hour growth rate has been only one third the annual rate of increase of 2.9 per cent recorded south of the border (Chart 4). Based on Industry Canada benchmark labour productivity level estimates (Rao, Tang and Wang, 2004), Canada's lagging labour productivity growth has resulted in the widening of the business sector labour productivity gap from 17 percentage points in 2000 (83 per cent the US level) to 26 points in 2006 (74 per cent the US level) (Chart 5).<sup>12</sup>

From an OECD perspective, Canada's relative productivity performance has been very weak. Over the 1973-2006 period, output per hour in Canada advanced at only a 1.2 per cent average annual rate (Chart 6), down from 3.0 per cent in the 1950-73 period, a drop of nearly two thirds. Since 1973 Canada has had the third lowest rate of growth in output per hour among 23 OECD countries, with only New Zealand and Switzerland doing worse (Summary Table 3 and Chart 7). This resulted in Canada's level of output per hour falling from third highest in the OECD in 1950 and in 1973 to 16<sup>th</sup> in 2006 (Chart 8).

<sup>12</sup> The Canada-US labour productivity gap at the total economy level is less than at the business sector level (Baldwin et al., 2005). On the issue of Canada-US productivity level and hours worked comparisons, also see Maynard (2006) and Isgut, Bialas and Milway (2006).



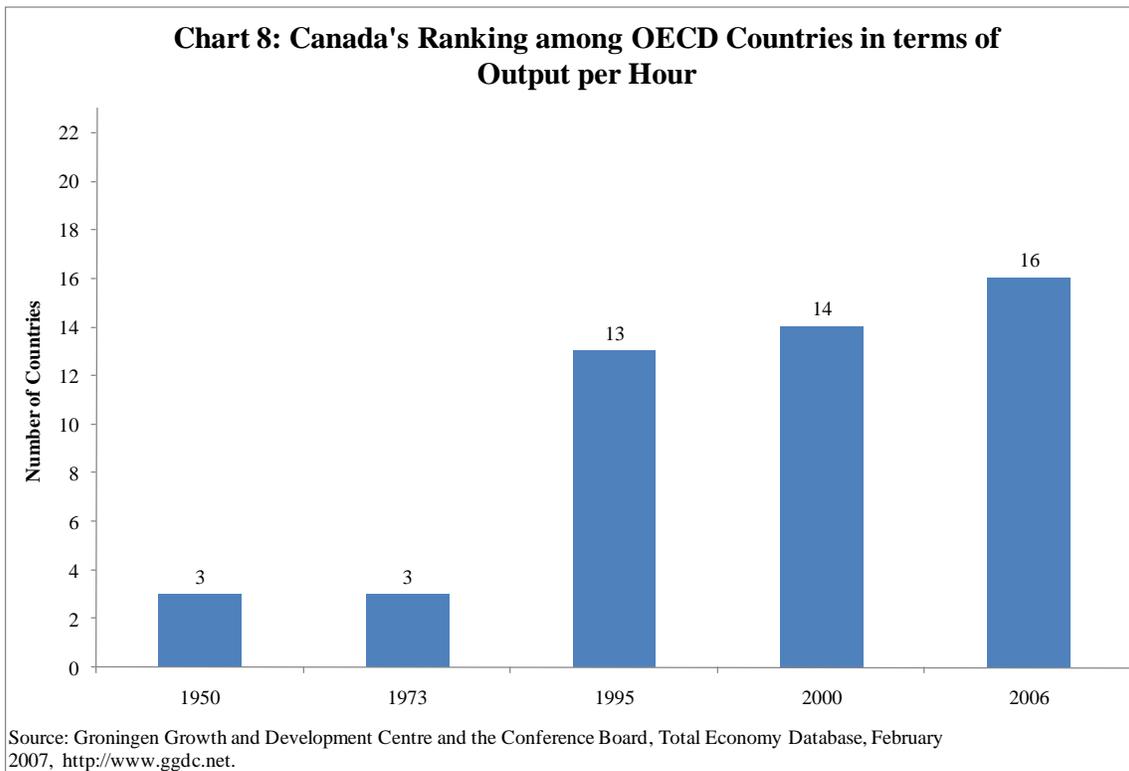
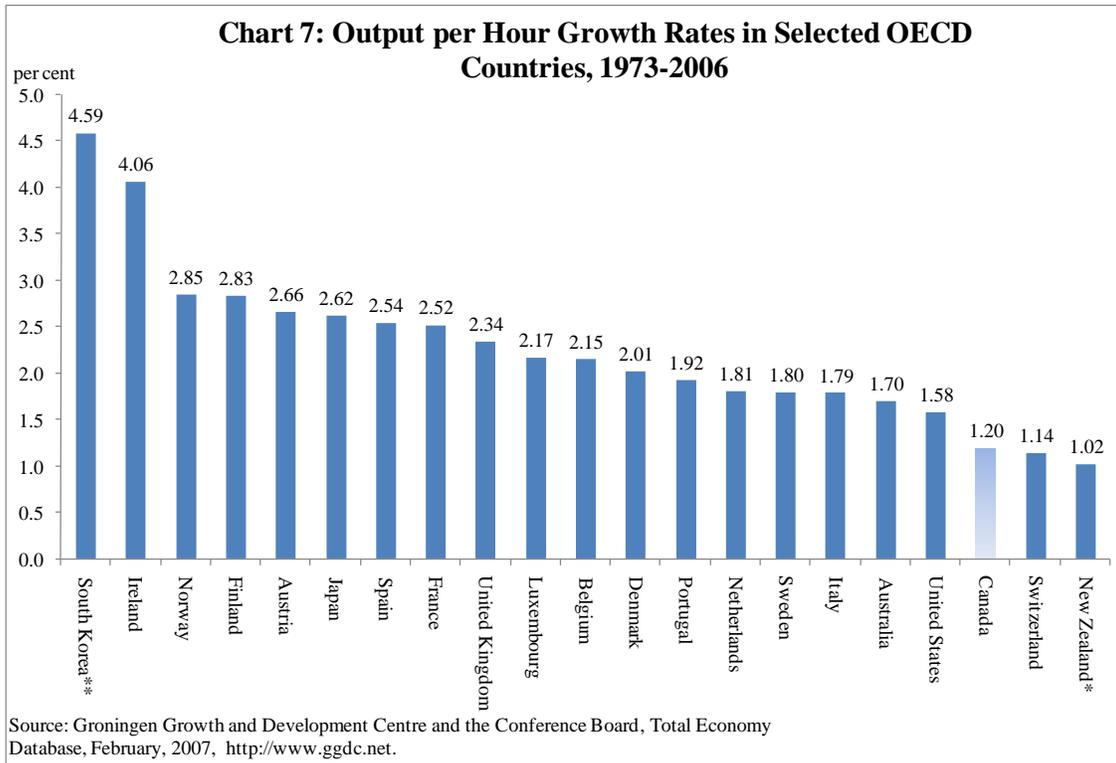
**Summary Table 3: Output per Hour Levels and Growth Rates in Selected OECD Countries, 1950-2006**

|                                       | (United States= 100) |       |       |       |       |       |       |
|---------------------------------------|----------------------|-------|-------|-------|-------|-------|-------|
|                                       | 1950                 | 1973  | 1995  | 2000  | 2004  | 2005  | 2006  |
| <b>Australia</b>                      | 73.4                 | 75.3  | 82.1  | 82.2  | 80.2  | 78.5  | 78.2  |
| <b>Austria</b>                        | 30.0                 | 62.9  | 89.2  | 92.4  | 89.9  | 88.2  | 89.1  |
| <b>Belgium</b>                        | 49.1                 | 79.7  | 105.2 | 102.6 | 97.5  | 95.3  | 95.7  |
| <b>Canada</b>                         | 81.0                 | 88.5  | 85.5  | 83.2  | 78.2  | 78.5  | 78.1  |
| <b>Denmark</b>                        | 56.5                 | 74.6  | 97.3  | 91.8  | 86.0  | 85.6  | 85.9  |
| <b>Finland</b>                        | 33.9                 | 54.5  | 80.0  | 81.8  | 79.7  | 79.9  | 81.7  |
| <b>France</b>                         | 42.1                 | 73.9  | 104.9 | 104.1 | 100.5 | 100.1 | 100.1 |
| <b>All Germany</b>                    | -                    | -     | 88.2  | 87.0  | 82.4  | 82.0  | 82.5  |
| <b>West Germany</b>                   | 36.7                 | 75.4  | 108.3 | -     | -     | -     | -     |
| <b>Ireland</b>                        | 29.0                 | 44.3  | 79.8  | 96.7  | 99.2  | 98.7  | 98.1  |
| <b>Italy</b>                          | 42.9                 | 75.9  | 99.4  | 93.2  | 83.3  | 82.2  | 81.2  |
| <b>Japan</b>                          | 18.3                 | 51.3  | 74.0  | 71.9  | 70.2  | 71.0  | 71.7  |
| <b>Luxembourg</b>                     | 66.7                 | 84.7  | 106.6 | 107.2 | 100.4 | 100.7 | 102.4 |
| <b>Netherlands</b>                    | 56.8                 | 84.6  | 98.9  | 96.4  | 91.5  | 90.5  | 91.1  |
| <b>New Zealand<sup>1</sup></b>        | 92.0                 | 67.6  | 64.5  | 61.8  | 58.4  | 57.4  | 56.3  |
| <b>Norway</b>                         | 51.2                 | 73.8  | 114.0 | 114.2 | 113.4 | 113.0 | 111.1 |
| <b>Portugal</b>                       | 18.1                 | 43.3  | 51.5  | 54.4  | 49.3  | 48.8  | 48.3  |
| <b>South Korea<sup>2</sup></b>        | 17.8                 | 17.0  | 38.4  | 41.2  | 43.3  | 43.6  | 44.6  |
| <b>Spain</b>                          | 21.2                 | 44.5  | 80.1  | 71.1  | 63.4  | 61.9  | 60.7  |
| <b>Sweden</b>                         | 57.4                 | 80.6  | 84.5  | 85.3  | 84.9  | 85.2  | 86.4  |
| <b>Switzerland</b>                    | 73.1                 | 88.7  | 84.0  | 81.0  | 76.2  | 76.2  | 76.9  |
| <b>United Kingdom</b>                 | 61.9                 | 66.0  | 86.6  | 86.4  | 84.8  | 84.2  | 84.4  |
| <b>United States</b>                  | 100.0                | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| <b>Unweighted Average<sup>3</sup></b> | 48.1                 | 67.0  | 86.5  | 85.0  | 81.5  | 81.0  | 81.2  |

Notes:

1. Data for New Zealand are available for 1956 onwards only. The relative level shown for 1950 is actually for 1956, the first year for which data are available for both New Zealand and the United States. The growth rate shown for the 1950-73 period is actually for 1956-73.
2. Data for South Korea are available for 1963 onwards only. The relative level shown for 1950 is actually for 1963, the first year for which data are available for both South Korea and the United States. The growth rate shown for the 1950-1973 period is actually for 1963-73.
3. The average excludes the United States for relative levels but includes it for growth rates. For 1950 and 1973 and the 1950-73 and 1973-1995 periods, West Germany is included and All Germany is not included. For 1995, 2000 and 2006 and the 1995-2000, 2000-2006 and 1973-2006 periods, All Germany is included and West Germany is not included.

Source: Table 3



The causes of the fall-off in labour productivity growth in Canada after 2000 are still poorly understood. Possible explanations include measurement problems; weak productivity growth in resources industries exploiting poorer quality resources such as the oil sands; weak ICT investment; a failure to exploit advanced technologies; and weak wage growth leading to a slower rate of substitution of capital for labour (Rao, Sharpe and Smith, 2005).

This inability of productivity analysts to provide a definitive account of the reasons for our poor productivity growth makes the development of policies to reverse this situation more difficult. If we knew what was wrong, we could take action to rectify the problem. But we do know that technological change and investment are fundamental drivers of productivity growth. Thus policies that focus in these two areas can be expected to have a positive impact on productivity growth.

This brief overview of Canada's labour productivity performance from an historical and international perspective speaks for itself.<sup>13</sup> Canada's productivity growth rate is sub-par and we are falling further and further behind other OECD countries. Reviving productivity growth is indeed the biggest and most important economic challenge facing this country. Improved public policy aimed at fostering productivity can contribute to this revival.

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<sup>13</sup> Space limitations prevent a more detailed analysis of Canada's productivity developments, including discussion of capital and total factor productivity trends, productivity trends by industry and productivity trends by province. See the CSLs productivity data base ([www.csls.ca/data](http://www.csls.ca/data)) for total economy estimates of labour, capital, and total factor productivity estimates by province for the 1987-2006 period and estimates for Canada of labour, capital, and total factor productivity by major industry for the 1987-2006 period

## II. Why Productivity is a Tough Sell

There is an elite consensus in Canada that productivity is very important, but few governments or political parties directly address or talk about the productivity issue.<sup>14</sup> Indeed, politicians often avoid the P word in public pronouncements, preferring euphemisms such as prosperity and innovation (Gardiner, 2005). This behaviour in a way is understandable because politicians know that productivity does not poll well or resonate as an issue for Canadians.

This part of the paper will explore why the general public appears allergic to productivity discourse, arguing that this situation largely reflects misconceptions of what productivity is all about.

### A. Productivity myths and misconceptions

In a nutshell, public distrust or ambiguity about productivity stems largely from a number of misconceptions and a lack of knowledge about what productivity is and how it works. These misconceptions are dissected below.

People associate productivity increases with working longer hours. A person who works longer hours may indeed produce more than someone working fewer hours, and hence may be considered more productive on a worker basis. But the relevant metric for productivity measurement is output per hour, not per person. Working longer hours does not represent an advance in productivity in this sense.

Exhortations by employers to improve productivity are sometimes seen by workers as a way to trick them into working faster and harder. It is true that greater worker intensity is a potential source of productivity growth, although its sustainability can be questioned. But few advocate this measure as a means to increase productivity. It is widely recognized that the key for productivity growth is to “work smarter, not harder.”

Many also fear that higher productivity at the industry or firm level translates into layoffs. Striving for productivity advance just means that one is working oneself out of a job. This can be true in an industry or firm characterized by strong productivity gains and limited potential for increases in demand for output. An example is agriculture where productivity has soared and employment plummeted over the last half century. But at the total economy level, there is no long-run negative relationship between productivity and employment. Productivity growth increases potential real income, which in turn increases demand, resulting in employment opportunities in new industries. There is therefore no reason why productivity growth should have negative long-run consequences for total employment. Indeed, there is reason to believe that aggregate productivity growth will

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<sup>14</sup> See Drummond (2006) for a discussion on what explains the lack of influence of economists on the productivity agenda.

actually drive increases in aggregate employment – as long as total hours worked increase with higher real wages (positively sloped labour supply curve).<sup>15</sup> Individual workers are naturally concerned about the effects of productivity on their jobs, but they typically do not think about employment opportunities that are created by rising aggregate productivity growth.

Given that Canadians have already achieved a high standard of living relative to other countries, some feel that productivity gains may be less important than they once were, particularly if they involve any significant short-term sacrifice or opportunity cost. According to this view, higher productivity and income does not lead to greater happiness so why bother extend effort to achieve it when there is so much else in life. It is of course true that productivity growth does not guarantee happiness. But productivity does lead to greater income and this income can in principle be used to raise economic well-being, at least as measured objectively if not subjectively. Increased income arising from higher productivity can be used by households for private consumption or by governments to fund public services, or to provide income support for the disadvantaged. More importantly, the resources needed to effectuate more rapid productivity growth through better public policy need not be great.

Productivity growth is of course associated with economic growth and economic growth is often associated with environmental degradation and climate change. According to certain environmentalists, the consequence of raising productivity and income is more spending, which means, for example, more and bigger cars and hence more greenhouse gas emissions. But it is not inevitable that increased production and consumption must harm the environment. With the appropriate tax and regulatory regimes, any negative environmental effects from productivity and economic growth can be minimized. Indeed, rich countries are better positioned to take the steps needed to preserve the environment than poor countries. Productivity growth, which transforms poor countries into rich countries, can therefore potentially be more a part of the solution to environmental degradation than a cause of this degradation.

These myths and misconceptions about productivity can pose a serious barrier to the development of effective policies to improve productivity. If the public feels that productivity advance is not in its interest or not important, or does not understand what productivity is and why it is important, government will have little incentive from a political perspective to pursue the issue.

In addition to the myths outlined above, there is also a current reality that contributes to making productivity a tough sell. Workers are encouraged to strive for productivity advance on the premise that their real wages will rise in tandem with productivity growth. This has indeed been the historical experience in Canada. But in recent years, median wages have advanced at a pace well below that of productivity gains. This decoupling or bifurcation of productivity and median wage growth reflects the increased share of the non-wage components of national income such as profits in national income, and increased inequality in labour income fuelled by very strong gains

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<sup>15</sup> I thank Chris Ragan for this point.

in labour compensation for those, such as CEOs, in the top income brackets. If average workers benefit little from productivity growth, why should they care about productivity gains? If productivity is to resonate as an issue of importance with the overall population, productivity gains must be equitably distributed. Productivity growth with equity must be clarion call to build broad-based support for a productivity agenda.

In an ideal world, government should strive to educate the public about the importance of productivity, to convince the public to see productivity as an opportunity and not a threat. But this is a long-term project. In the short-to-medium term, government can still do much to improve productivity by highlighting policies to foster innovation, investment, and human capital. These drivers of productivity have much better press than productivity itself and actions to address problems or weaknesses in these areas will be perceived more positively by the public.

### **B. “There is More to Life Than Productivity”**

The bottom line for Canadians should be better quality of life, measured in both objective and subjective terms. The economic dimensions of quality of life are but one aspect of our overall well-being. We should not pursue productivity and wealth creation objectives to the detriment of other aspects of our existence, especially since we are already a very rich country.<sup>16</sup> Fortunately, there appears to be no irreconcilable tradeoffs between the pursuit of higher productivity and hence a higher material standard of living, and the pursuit of other aspects of well-being, such as environmental quality.

Heath (2002) provides a critique of productivity as a social priority, pointing out that the existence of certain types of goods in scarce supply, such as positional and status goods (e.g. houses in desirable locations), means that no amount of productivity growth can make them available for the general population. Many of his criticisms are valid. Indeed, one must closely assess the relative benefits of allocating scarce resources to programs and policies designed to enhance productivity compared to programs and policies to achieve other societal goals. Programs and policies to boost productivity may not have the highest return for society.

But many measures that can be taken to foster productivity are related to changes in policy regimes and the government costs associated with such policies are minimal. It is from this perspective that productivity should be a social priority. Any free lunches that can be obtained through more intelligent public policy should be sought.

As shown earlier in the paper, economic growth and living standards, defined as GDP per capita, are largely driven by productivity growth. To be sure, increases in the employment rate reflecting lower unemployment and higher labour force participation can contribute to growth in living standards, as can improvements in the terms of trade. But increases in these sources of living standards growth are not sustainable. This means

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<sup>16</sup> Graves and Jenkins (2002) find through public opinion surveys on attitudes to productivity that Canadians wish to balance productivity/living standard objectives with quality of life objectives.

that the only sustainable way to increase living standards in the long run is through productivity growth.

With the retirement of the baby boom cohorts in coming years, net labour force and employment growth in Canada will vanish and all economic growth and GDP per capita growth will come from productivity growth (Tables 1 and 2 and Charts 1 and 2). Strong productivity growth is key to the financing of higher health and pension costs associated with the growing proportion of the population 65 and over. Indeed, if labour productivity growth equals or exceeds 2.0 per cent per year over the next 50 years, any financial burden arising from the aging baby boom cohorts becomes much easier to manage. Real incomes will be significantly higher, generating greater tax revenues to pay for additional health and pension costs for seniors.<sup>17</sup> On the other hand, with productivity growth significantly lower than this rate of growth, sustainability problems for social programs may emerge. In short, the message that Canadians must hear is that productivity growth is vital to their economic destiny.

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<sup>17</sup> The long-term labour productivity base case assumption (real-wage differential assumption) used by the Chief Actuary of Canada for the Canada Pension Plan is 1.2 per cent per year, with the pessimistic high-cost case 0.5 per cent and the optimistic low-cost case 2.0 per cent. With the higher productivity growth, the future financial position of the CPP is much improved. In 2050, the ratio of CPP assets to expenditures is 9.4 compared to 6.3 in the base case scenario. In 2075, the ratio is 13.7 compared to 6.9 in the base case. See Office of the Chief Actuary (2004:Table 71) and Sharpe (2006a).

### **III. Policies to Improve Productivity in Canada**

This section of the paper lays out three specific public policies to improve productivity in Canada. As noted earlier, the three policies are: foster the diffusion of best-practice technologies; remove the provincial sales tax on purchases of machinery and equipment; and promote interprovincial movement of workers improving labour market information, removing professional barriers to labour mobility, and establishing a tax credit for interprovincial job search. Before examining these three policies, it is useful to review some general principles for the application of productivity policy.

#### **A. General Principles for Productivity Policy**

As already noted, productivity is determined, either directly or indirectly, by many factors, including the education and health of the workforce, all types of investment, and technological change, among others. This means that many, if not most, public policies have some link to productivity. Interest groups can often use this “productivity hook” to make the case that the particular policies they advocate foster productivity growth and hence serve the overall public interest.

This does not mean that these policies are necessarily bad from the point of view of the overall societal interest. But any argument for a particular policy, such as lower taxes or more spending, made by an interest group that is rationalized or justified by the productivity impact of the policy should be viewed with suspicion and thoroughly evaluated before it is accepted. It can be a very effective strategy for interest groups to cloak their policy objectives in the blanket of the general interest of productivity improvement, even though narrow interests may be largely served. The general interest or benefits principle should be applied in any assessments of policies to improve productivity.

It is the private sector that is directly responsible for the productivity performance of the business sector through its decisions affecting innovation, physical capital investment and human capital investment. As noted earlier, government of course plays a crucial role in setting the framework for these private sector decisions. But in the short to medium run there is little government can do to increase business sector productivity as changes in framework policies take time to have an impact on productivity. In the long run, of course, having the appropriate macro-economic and micro-economic frameworks in place is essential if a country is to have a strong productivity performance. Consequently, one should have low expectations for any impact of policy on productivity, particularly in the short term. One should not expect to see productivity improvements in 2007 or even 2008 or 2009 arising from policies put in place to improve productivity in 2007. A longer term time perspective is needed for public policy to have a significant impact on productivity growth.

As a general principle, the most important framework policy that the government can pursue to foster productivity growth is to ensure a competitive marketplace. There is

much evidence from many countries that competition spurs productivity advance (Sharpe, 2006b). A highly instructive example is the air passenger travel industry in Europe. The deregulation of this industry led to the development of a number of low cost, high productivity airlines such as Ryanair that have revolutionized air travel. An example closer to home is the Canadian wine industry. Because of the lowering of trade barriers survival for this industry required an improvement in the quality of its product, a challenge which the industry met. In a highly competitive environment, firms must invest, innovate, and closely monitor costs to survive, with beneficial effects for productivity. Barriers to competition are the enemies of productivity growth.

Governments in Canada have done much to provide a more conducive economic environment for productivity advance in the areas of monetary, fiscal, and trade policy. But some segments of our economy are still protected from market forces, with negative implications for innovation, investment, and productivity growth. Policies to enhance competition may in fact be more important for productivity than policies directly aimed at improving productivity.

## **B. Policy One: More Rapid Diffusion and Adoption of Best Practice Technologies**

### 1) Moving Toward the Frontier and Closing the Technology Gap

Technological progress is the most important determinant of productivity advance. At any given time, only a small number of firms or countries are on the technological frontier, defined as the set of technologies that are the most advanced, efficient, and cost effective. Other firms or countries can experience very rapid productivity growth by adopting these best practice technologies and moving toward the technological frontier. Indeed, the rapid growth in Europe and Japan in the immediate post-WWII period reflected in large part technological catch-up or convergence to the United States, the world technology leader in most fields (Wolff, 2000).

Canada, too, is playing catch-up relative to the United States. In 2001, Canada's level of labour productivity in the business sector was only 82 per cent of that of the United States in 2001 (Rao, Tang and Wang, 2004: Table 2). Twelve out of 27 industries had labour productivity relatives below this average figure.<sup>18</sup> The reasons for these large industry labour productivity gaps are complex. One factor is that capital intensity (i.e. capital per unit of labour) is lower in Canada than in the United States.

Rao, Tang and Wang (2004: Table 4) indeed report that total capital stock per hour worked in the business sector in 2001 was 85 per cent of the US level. The situation is much worse for machinery and equipment, which is crucial for productivity advance. Sharpe (2004:22) reports that the ratio of machinery and equipment to hours worked in

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<sup>18</sup> These industries (with the productivity relative in brackets) were: textile and clothing (62 per cent); petroleum and coal (61 per cent); plastic and rubber products (77 per cent); fabricated metal (52 per cent); machinery and computers (63 per cent); electronic and electrical equipment (44 per cent); furniture (73 per cent); miscellaneous manufacturing (56 per cent); utilities (75 per cent); wholesale trade (69 per cent); information and cultural industries (60 per cent); and finance, insurance and real estate (55 per cent).

Canada was 55 per cent of that in the United States in 2003. This lower capital intensity reflects lower levels of investment. Indeed, machinery and equipment investment in Canada as a share of GDP has considerably lagged that in the United States over the last half century.

Investment is the vector through which most technological advances are manifested in the workplace. These advances are in effect embodied in new capital goods. This weak investment implies that the vintage of the technology in use in Canada is on average older and therefore less advanced than in the United States. To the degree that Canadian firms in these industries can adopt advanced technologies through increased investment, some of the Canada-US labour productivity gap can be closed. From this perspective, public policies that foster the diffusion and adoption of best practice technologies, largely through investment, have a significant role to play in improving Canada's productivity growth, both in absolute and relative terms.

Canada produces only a very small share of the world stock of new knowledge. In 2004, Canada was responsible for 2.9 per cent of OECD R&D. If the R&D expenditure of non-OECD countries is added, Canada's share of world R&D would be even smaller, likely around 2 per cent. This means that if Canadian firms want to be on the technology frontier they must make use of technologies developed in other countries and hence must be aware of the existence of these technologies.

Some free market economists argue that public policies to foster the adoption of new technologies are not needed because firms already have a huge economic incentive to adopt best practice technologies. Early adopters of new technologies can earn excess profits. If so, why would firms need additional incentives from government to do what is already in their interest?

The counterargument to this is that certain types of firms, particularly small and medium-sized firms (SMEs), may face barriers to the adoption of new technologies and government policy can assist firms in overcoming these barriers. The acquisition of information and adoption of new technologies has a cost, and SMEs may not have the different types of resources needed. They may not have the time to keep abreast of new technological developments at the world level. They may not have the expertise to identify those technological developments that would be potentially appropriate for their production processes and to make effective use of these technologies. They also may not have the financial resources to purchase the capital goods that embody the technology. A case will be made below for government assistance for technology transfer

## 2) R&D Is Important, But There is More to Innovation than R&D

The federal government and provincial governments in Canada devote significant resources to subsidizing the research and development (R&D) activities of the private sector, particularly through tax credits. Indeed, the federal scientific research and experimental development tax credit in 2007 is projected to cost \$2,675 million (Finance Canada, 2005). Mackenzie (2005) finds very large subsidies (negative tax rates) for R&D

in Canadian provinces, ranging in 2004 from a low of 40 per cent in Alberta to a high of 202 per cent in Quebec. Very generous provincial tax credits to R&D explain these large subsidies.

To be sure, R&D is important for innovation, particular in certain high tech sectors such as communications equipment and aeronautics, and governments must contribute to support R&D activities. But in 2002 only 12,272 firms in Canada actually reported performing R&D, with 100 firms accounting for 56 per cent of total R&D (Statistics Canada, 2006:17). Thus less than 1 per cent of firms perform R&D in Canada. If the term “innovation” were reserved for firms that undertook R&D, very few Canadian firms would be considered innovative.

However, an innovative firm is more appropriately defined as one which introduces new production processes and products. By this criterion, 81 per cent of manufacturing firms in Canada can be considered innovative according to the 1999 Survey of Innovation (Arundel and Mohnen, 2003:58). Thus from the point of view of fostering productivity growth, R&D is not relevant for the vast majority of Canadian firms. What is relevant is the adoption of best practice technologies. Yet this path to productivity improvement receives much less attention than R&D.<sup>19</sup> A distinction between innovation in the sense of knowledge creation (invention) and innovation in the sense of the adoption of existing technologies (diffusion) is needed.

Lipsey, Carlaw and Bekar (2005:518) point out that economists have not appreciated the tradeoff between invention and diffusion as they assume diffusion occurs instantaneously or costlessly. Innovators introduce new stand-alone technologies which diffuse through the economy in unchanged form. But invention and diffusion are separate activities. New technologies must be adapted for particular uses and require supporting technologies and facilitating structures.

Lipsey, Carlaw and Bekar (2005:520) point to sunk costs, defined as costs that have already been incurred and which cannot be recovered to any significant degree, as a barrier to diffusion and argue that this situation may justify public policy intervention. According to these authors:

“Sunk costs are important for the development of new products and processes; they are equally important for acquiring codifiable knowledge about new knowledge, as well as tacit knowledge about how to operate given technologies. One major policy implication is that governments can effectively disseminate technological knowledge by operating on a scale that makes the sunk costs bearable, or even trivial, where they would otherwise be prohibitively high for small firms. This is the objective of the Canadian Industrial Research Assistance Program (IRAP), which seeks, among other things, to help firms to identify existing technologies that are of potential value to them and to assist them in adapting these technologies to their specific needs.”

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<sup>19</sup> For an overview of the issue of the diffusion and adoption of advanced technologies, see CSLS (2005).

Based on the arguments outlined above, a case can be made that there should be a rebalancing of the relative efforts that governments in Canada devote to support for private sector R&D activities versus the support given for the adoption of best practice technologies. To foster technological innovation and productivity growth, it is proposed that additional resources be allocated to programs that assist SMEs in the identification and adoption/adaptation of new technologies.

As noted by Richard Lipsey et al., the National Research Council's Industrial Research Assistance Program (NRC-IRAP) is an example of a successful technology transfer program. This program provides a range of both technical and business oriented advisory services along with potential financial support to growth-oriented Canadian small- and medium-sized enterprises. The program is delivered by an extensive integrated network of 260 professionals in 90 communities across the country and serves over 12,000 firms annually. Working directly with these clients, NRC-IRAP supports innovative research and development and commercialization of new products and services. The IRAP portfolio of services has four main components: technology expertise and advisory services; financial assistance for R&D activities; networking; and partnerships.<sup>20</sup> All Canadian small and medium-sized enterprises (SME's) with under 500 employees and industrial associations desiring to enhance their technological capability are eligible for support. In 2005-06, the budget of IRAP was \$216 million, up from \$214 million in 2004-05, and \$208 million in 2003-04 (Treasury Board of Canada, 2006).

In a evaluation of the IRAP in 2002 (NRC, 2002), the NRC's Policy, Planning and Assessment Directorate found that, based on interviews with program participants, sales linked to IRAP-assisted innovations were equivalent to 11 times IRAP's total contributions to clients. It concluded that IRAP had been successful in its mission of stimulating wealth for Canadians through technological innovation. However, it should be noted that no rigorous, independent evaluation of IRAP activities has been undertaken in recent years so definitive evidence on IRAP's cost-benefit ratio is absent.

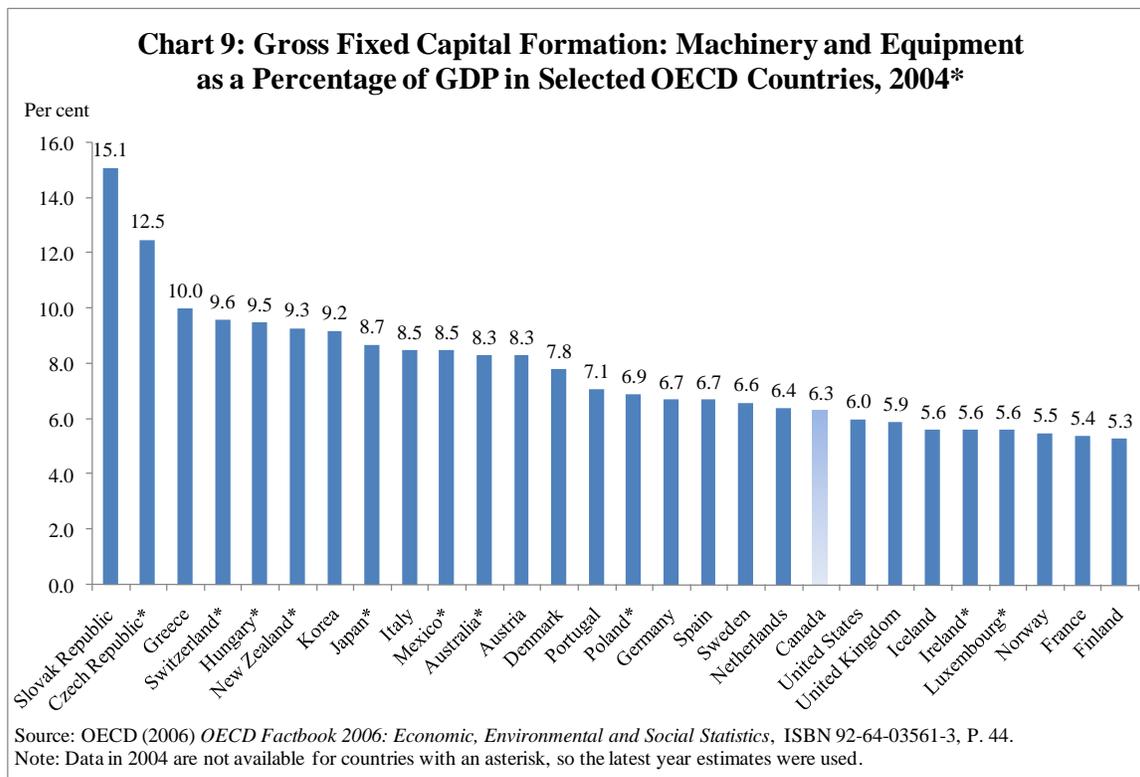
Productivity advance in Canada can be fostered in a cost effective manner through expansion of existing technology transfer programs such as IRAP, and the creation of new programs with similar objectives. Specific initiatives to develop these types of program merit serious attention as a means to improve productivity.

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<sup>20</sup> The key elements of the four components are summarized below, based on information from the IRAP website (<http://irap-pari.nrc-cnrc.gc.ca>). First, the NRC-IRAP Industrial Technology Advisors (ITAs) help to identify and address the technical and research needs of SMEs at each stage of the R&D development process and the innovation cycle. Second, NRC-IRAP provides non-repayable contributions to Canadian SMEs interested in growing by using technology to commercialize services, products and processes in Canadian and international markets. NRC-IRAP also provides mentoring support and invests on a cost-shared basis for research and pre-competitive development technical projects. Third, the NRC-IRAP Network brings together the key players in the Canadian Innovation System for the benefit of SMEs. This extensive network links entrepreneurs, research and development (R&D) institutions, technology brokers and technology transfer centres to those with knowledge and information about local sources of financing. Fourth, NRC-IRAP maintains strong partner relationships with organizations at the regional, national and international level whose capabilities extend and complement NRC's contributions to the Canadian Innovation System.

### C. Policy Two: Removal of the Provincial Sales Tax on Purchases of Machinery and Equipment

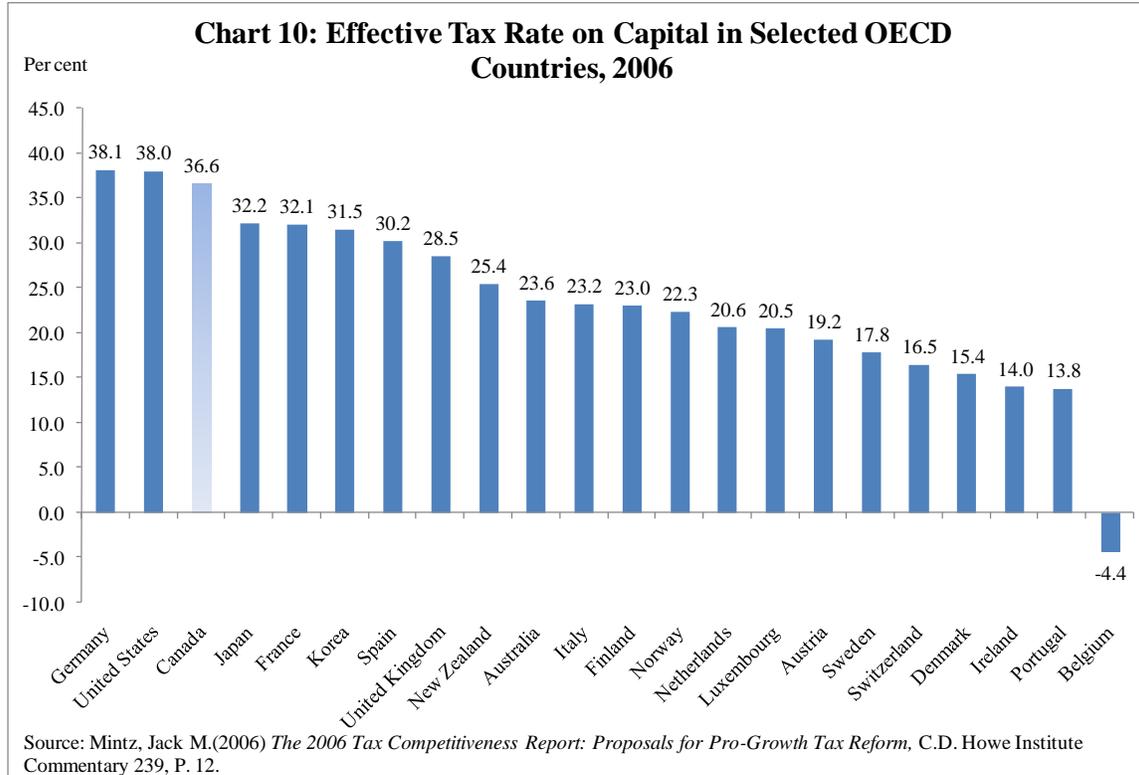
It has long been recognized that investment in machinery and equipment (M&E) is a key driver of productivity growth. M&E investment has historically been weak in Canada relative to other OECD countries. According to the most recent OECD data, Canada in 2004 devoted 6.3 per cent of GDP to M&E, ranking 20<sup>th</sup> out of 28 OECD countries (Chart 9). This situation hurts our productivity performance. Indeed, Industry Canada economists estimate that our lower level of M&E intensity relative to the United States accounted for 30.3 percent of the Canada-US labour productivity gap in the business sector in 2001 (Rao, Tang, and Wang, 2004).



The cost of capital affects investment decisions. Indeed, Ab Iorwerth and Danforth (2004), in a survey of the literature on the elasticity of investment with respect to the use cost of capital, conclude that there is increasing evidence that lowering the user cost of capital would have a significant impact on firm investment and that policy initiatives should be focused on permanent changes in the user cost of capital.

One reason for lower M&E investment in Canada may be the higher cost of capital in Canada, as proxied by the marginal effective tax rate (METR) on capital. The CD Howe Institute reports that Canada has one of the highest METRs in the world (Mintz, 2006). The METR was 36.6 per cent in Canada in 2006, sixth out of 45 countries.

Among OECD countries Canada's METR was third highest, after that of Germany and the United States<sup>21</sup> (Chart 10).



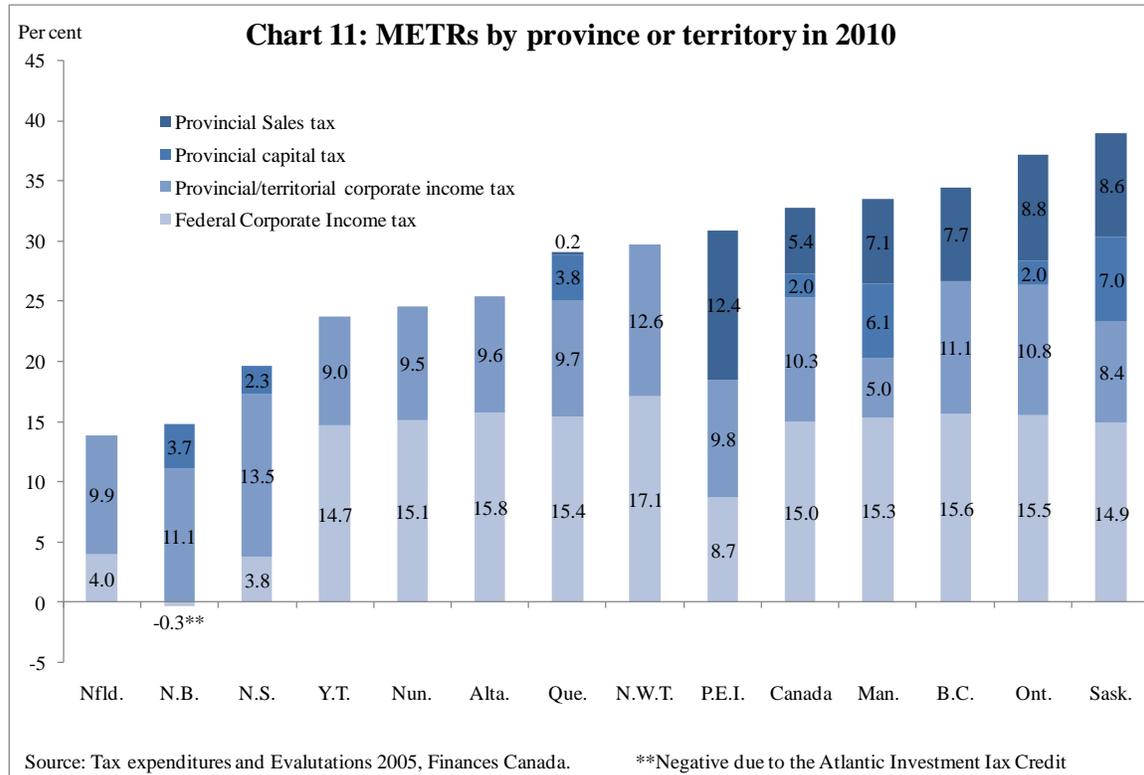
A key reason why our METR is so high is because five provinces (Ontario, British Columbia, Prince Edward Island, Saskatchewan, and Manitoba) apply their retail or provincial sales tax (PST) to the purchase of capital goods such as machinery and equipment, including ICT goods. Because of this tax policy, these five provinces have much higher METRs than the other provinces (Chart 11).<sup>22</sup> The highest METR in Canada is in Saskatchewan at 38.9 per cent (in 2010), followed by Ontario (37.1 per cent), British Columbia (34.4 per cent), Manitoba (33.5 per cent), and Prince Edward Island (30.9 per cent).

<sup>21</sup> It is important to note that the METR has been falling in Canada in recent years, in contrast to an increase in the United States. Consequently, our past poor M&E investment performance relative to the United States likely reflected the METR gap. But the higher US METR in 2006 means that this variable is not a factor that dampens investment in Canada relative to the United States, although it may dampen investment relative to countries with a lower METR.

<sup>22</sup> Finance Canada estimates that in 2010 for all sectors excluding resources, financial services and R&D assets, sales tax net of provincial tax credits will account for 12.4 percentage points of the provincial METR in Prince Edward Island, Ontario 8.8 points, Saskatchewan 8.6 points, British Columbia 7.7 points, Manitoba 7.1 points and Quebec 0.2 points. At the national level, sales tax net of provincial sales tax credits accounted for 5.4 per cent of the estimated METR of 32.5 points, that is one sixth. The sales tax rate is projected to be 7 per cent in Saskatchewan, British Columbia and Manitoba, 8 per cent in Ontario, and 10.0 per cent in Prince Edward Island.

In the other five provinces, the PST has been merged with the GST (i.e. the Harmonized Sales Tax (HST) in New Brunswick, Nova Scotia, and Newfoundland), or replaced with a value added tax (Quebec), or never existed (Alberta). Chart 11 shows that if there were no PST on the purchase of capital goods, the METRs in Canada in 2010 would be approximately 5 percentage points lower.

Tax policy experts across the political spectrum are unanimous that the current PST regime which taxes the purchase of new capital equipment is extremely bad policy, perhaps unique in its incompetence among developed countries.



The effect of such a tax is to increase the price of capital relative to the price of labour, giving firms less incentive to substitute capital for labour and hence leading to slower growth in the capital-labour ratio or capital intensity. Since capital intensity growth is a key driver of labour productivity, the latter suffers. If Canada were a labour surplus country, there might be some justification for such a policy on the basis of fostering employment, at least in the short to medium term.<sup>23</sup> But with the unemployment rate at around 6 per cent, Canada should be encouraging substitution of capital for labour.

Evidence of the positive effect of the removal of the PST on capital investment comes from work by Michael Smart and Richard Bird (2006) and Smart (2007). They find that the growth in investment per capita has been more rapid in the HST provinces that do not tax capital inputs than in PST provinces that impose such a tax. In an

<sup>23</sup> It is however not clear that the long-run health of an economy is promoted by subsidizing employment and taxing capital goods.

econometric analysis, they find that the impact of HST reform on M&E investment is positive and statistically significant.

The inefficiency resulting from the PST on capital goods has been illustrated in a study by Baylor and Beausejour (2004) based on a dynamic computable general equilibrium model of the Canadian economy. The study found that the marginal cost of a dollar of revenue raised by provincial governments<sup>24</sup> through sales taxes on capital is \$2.30, compared to \$1.40 for corporate income taxes and \$1.13 for consumption taxes like the GST/HST.

A case can thus be made that equal cuts to the different components of the METR do not in fact have the same impact on investment and that cuts to the PST have a greater incremental effect than cuts to the corporate income tax. This is because the cuts to the PST reduce the cost of capital goods to firms, directly impacting the price of capital goods. This induces investment by making it more profitable through lowering costs. Cuts to corporate income taxes increase after-tax profits, but have no effect on the price of capital goods. There is also no guarantee that any ex post increase in after-tax profits will be invested. An additional reason to reduce the METR through removal of the PST rather than by corporate income tax (CIT) cuts is that the current CIT rates ensure at least some of resource sector economic rents arising from higher commodity prices flow to governments as corporate taxes.

It should also be noted that the PST affects short-lived assets such as information and communications technology investment goods much more than long-lived assets such as structures since the former turn over, and hence are taxed, more frequently than the latter. ICT investment is particularly important for productivity growth.

The federal government has long recognized the problems associated with the PST on capital goods, particularly in Ontario and British Columbia as these provinces are responsible for the lion's share of the 5 percentage point national gap between the METR with and without the PST.

The federal government would like to see the PST harmonized with the GST, as happened with the establishment of the Harmonized Sales Tax in Newfoundland, Nova Scotia, and New Brunswick. One of the key reason for such a policy is removal of the PST from capital goods. Because of its input tax credit, the GST does not constitute a tax on capital goods like the PST. But provinces are reluctant to drop the PST on capital goods. For such a measure to be revenue neutral, provincial governments would have to increase taxes on consumer goods, a politically unpopular move.

A possible resolution to this situation lies in the federal government providing financial assistance to the PST provinces to harmonize their PST with the GST. Such assistance was offered to the three Atlantic provinces in the early 1990s to encourage

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<sup>24</sup> The marginal cost of a dollar of revenue is the cost of raising an additional dollar of revenue, which includes the direct cost (the dollar of revenue actually raised) plus any additional welfare costs resulting from the change in the tax structure.

harmonization. Such assistance could take different forms. For example, the federal government could offer PST provinces some of the fiscal room that will be created by the planned second 1 percentage point reduction in the GST rate. Kesselman (2006) provides some detailed suggestions along this line. This is the ideal time for such an initiative given the sound fiscal situation of the federal government.

#### **D. Policy Three: Promotion of the Geographical Migration of Workers**

##### 1) Provincial productivity and interprovincial mobility in Canada

In addition to the three fundamental drivers (technological progress, investment and human capital), the reallocation of factors of production from low productivity level uses to high productivity level uses contributes significantly to aggregate productivity growth. This reallocation can take place between firms, across industries, across occupations, and across space.

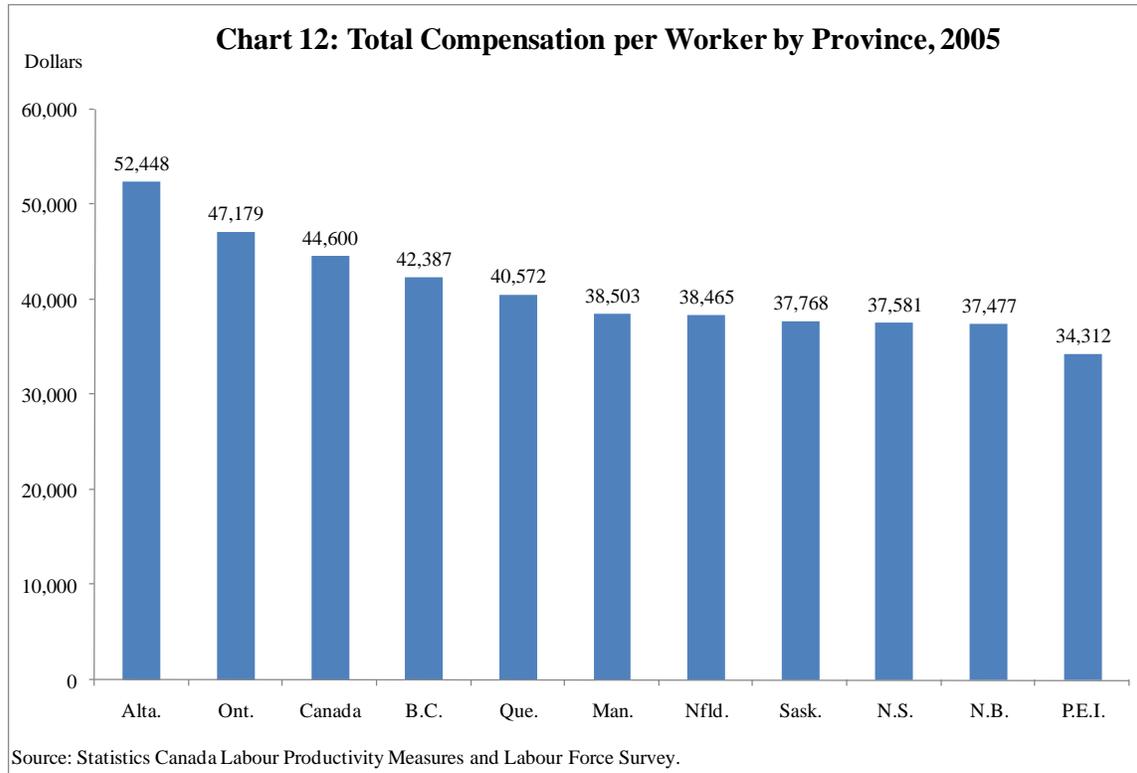
There are significant differences in labour productivity levels among Canadian provinces, reflecting differences in resource endowments, industrial structure, human capital, and demand conditions. In 2006, current dollar GDP per worker ranged from a high of \$125,938 in Alberta to a low of \$63,149 in Prince Edward Island, a difference of 2 to 1 (Summary Table 4). These productivity differences result in large wage differences, although the wage differential is not as drastic (Chart 12).

| <i>Summary Table 4: GDP per Worker in Current Dollars by Province, 1991-2006</i> |        |        |        |         |
|--|--------|--------|--------|---------|
|  | 1991   | 1996   | 2001   | 2006    |
| <b>Canada</b>  | 53,305 | 62,353 | 74,136 | 87,313  |
| <b>Newfoundland</b>  | 46,834 | 55,557 | 69,573 | 115,424 |
| <b>P.E.I.</b>  | 42,228 | 47,929 | 53,947 | 63,149  |
| <b>Nova Scotia</b>   | 46,374 | 51,770 | 62,401 | 72,354  |
| <b>New Brunswick</b>   | 46,230 | 54,422 | 62,660 | 70,965  |
| <b>Quebec</b>  | 50,303 | 57,680 | 67,329 | 75,466  |
| <b>Ontario</b>   | 56,426 | 65,447 | 76,559 | 85,678  |
| <b>Manitoba</b>  | 47,413 | 54,956 | 63,426 | 76,247  |
| <b>Saskatchewan</b>  | 47,194 | 63,363 | 71,968 | 91,642  |
| <b>Alberta</b>   | 56,752 | 70,197 | 92,755 | 125,938 |
| <b>British Columbia</b>  | 51,885 | 59,934 | 69,481 | 81,850  |

Source: Table 4

This means that if a worker moves from a low-productivity province such as Prince Edward Island to a high productivity province such as Alberta, and if the worker leaves behind the average productivity of the out-province and assumes the average productivity of the in-province, through a composition effect, the national productivity level will be boosted. Consequently, interprovincial migration contributes to aggregate

productivity growth and measures that increase interprovincial migration will increase productivity.



According to Statistics Canada, there were 370,791 persons who moved between provinces in Canada in 2006 (Summary Table 5). This is equivalent to 1.14 per cent of the population. The incidence of interprovincial migration in Canada has increased 46 per cent since 2003 when it was 0.78 per cent (Chart 13). This is not surprisingly given the attention given to interprovincial migration by the media in recent years.

From a long term perspective, however, the rate of interprovincial mobility has been falling as the rate was 1.78 per cent in 1972. Canadian workers now appear to be less willing to seek economic opportunities in other provinces than they were three decades ago. The much greater importance of dual-earner families reflecting increased female labour force participation is one factor that appears to have reduced geographical mobility. The aging of the population has also contributed somewhat.<sup>25</sup>

In addition to a falling incidence of labour mobility, Canada's interprovincial migration rate is well below that of the United States (Chart 14). The incidence of inter-state migration on the United States in 2005 was 2.60 per cent, almost three times the Canadian rate (Sharpe, 2007). The 50 states are organized into nine divisions so the inter-

<sup>25</sup> While older workers have lower mobility rates than younger workers (Table 7), the aging of the labour force accounts for only about one eighth of this downward trend. If the 1972 age structure had prevailed in 2006, the incidence rate would have been only 12 per cent higher.

division migration rate is likely a more relevant comparison between mobility in the two countries because divisions are much closer in size to provinces than states. This rate was 1.41 per cent in 2005, 48 per cent above the Canadian rate. Even the mobility rate between the four US regions, at 1.08 per cent, was 14 per cent above the mobility rate for Canada's ten provinces. It would thus appear that workers in the United States are significantly more mobile than their counterparts in Canada. This geographical mobility can be considered a source of labour market flexibility and dynamism and may contribute somewhat to the lower US unemployment rate.

**Summary Table 5: Total Gross Migration and Total Net Migration, 1987-2005  
(persons)**

|                   | Total Gross Migration | As a % of the Total Population | Total Net Migration to Positive Balance Provinces | As a % of the Total Population |
|-------------------|-----------------------|--------------------------------|---|--------------------------------|
| <b>1987</b>       | 306,410               | 1.16                           | 57,126  | 0.22                           |
| <b>1988</b>       | 311,501               | 1.17                           | 40,639  | 0.15                           |
| <b>1989</b>       | 335,707               | 1.23                           | 40,592  | 0.15                           |
| <b>1990</b>       | 320,900               | 1.16                           | 50,066  | 0.18                           |
| <b>1991</b>       | 304,105               | 1.09                           | 40,831  | 0.15                           |
| <b>1992</b>       | 297,868               | 1.05                           | 40,511  | 0.14                           |
| <b>1993</b>       | 273,145               | 0.96                           | 37,336  | 0.13                           |
| <b>1994</b>       | 276,222               | 0.96                           | 34,532  | 0.12                           |
| <b>1995</b>       | 276,100               | 0.95                           | 27,751  | 0.10                           |
| <b>1996</b>       | 274,115               | 0.93                           | 32,428  | 0.11                           |
| <b>1997</b>       | 280,719               | 0.94                           | 39,770  | 0.13                           |
| <b>1998</b>       | 286,380               | 0.95                           | 49,833  | 0.17                           |
| <b>1999</b>       | 266,690               | 0.88                           | 38,132  | 0.13                           |
| <b>2000</b>       | 280,645               | 0.92                           | 46,619  | 0.15                           |
| <b>2001</b>       | 271,371               | 0.88                           | 34,906  | 0.11                           |
| <b>2002</b>       | 271,738               | 0.87                           | 22,622  | 0.07                           |
| <b>2003</b>       | 247,230               | 0.78                           | 14,835  | 0.05                           |
| <b>2004</b>       | 260,532               | 0.82                           | 26,216  | 0.08                           |
| <b>2005</b>       | 304,991               | 0.95                           | 54,404  | 0.17                           |
| <b>2006</b>       | 370,791               | 1.14                           | 69,740  | 0.21                           |
| <b>1987- 2006</b> | <b>290,858</b>        | <b>0.99</b>                    | <b>39,944</b>                                     | <b>0.14</b>                    |

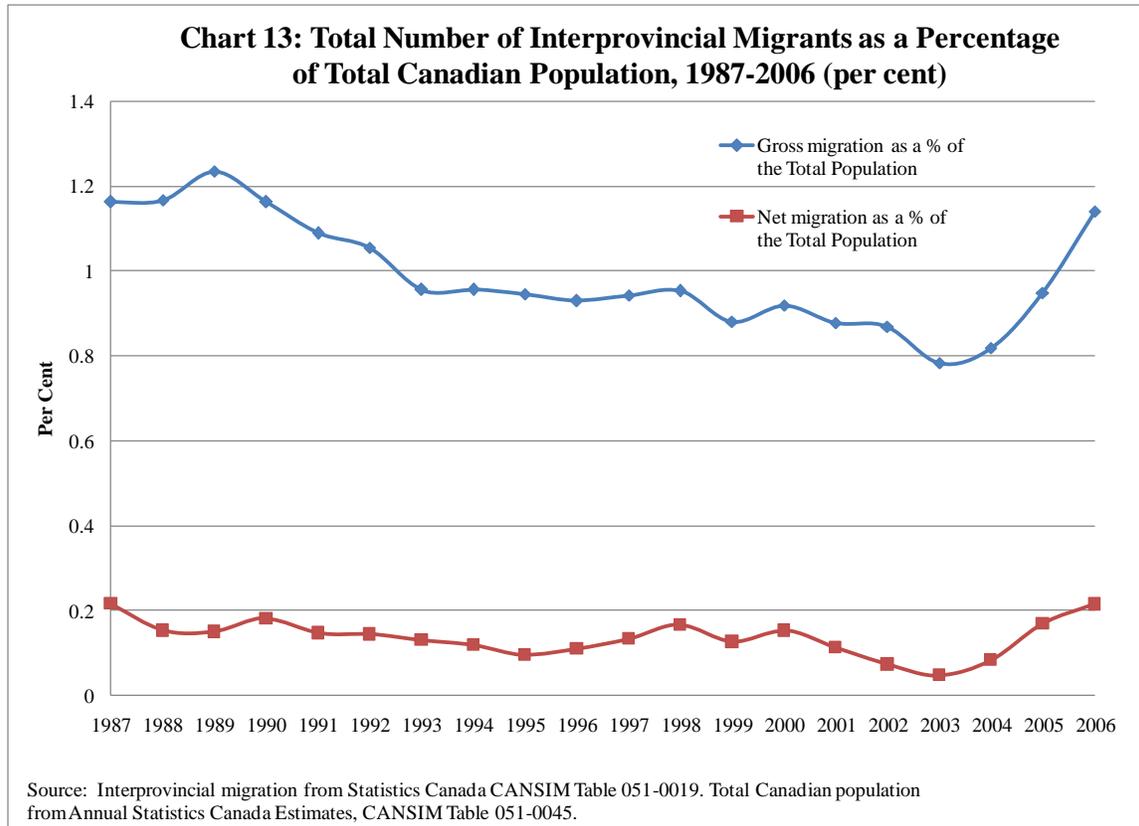
Source: Table 6

## 2) Productivity gains from geographical mobility

For many reasons, estimation of the productivity gains from geographic mobility is extremely complex. A full discussion of the issue is well beyond the scope of this paper. Using two very crude methodologies, this paper does present two estimates of the output and productivity gains arising from interprovincial migration in Canada.<sup>26</sup> The

<sup>26</sup> The gains arising from intraprovincial migration are ignored. Intraprovincial migration in large provinces such as Ontario and Quebec is very significant. The 2001 census estimates that the rate of one-year

purpose of these estimates is to show that migration does contribute to productivity growth. The first methodology uses the impact of interprovincial migration on earnings to estimate the gains from migration. The second methodology uses inter-provincial labour productivity differences.



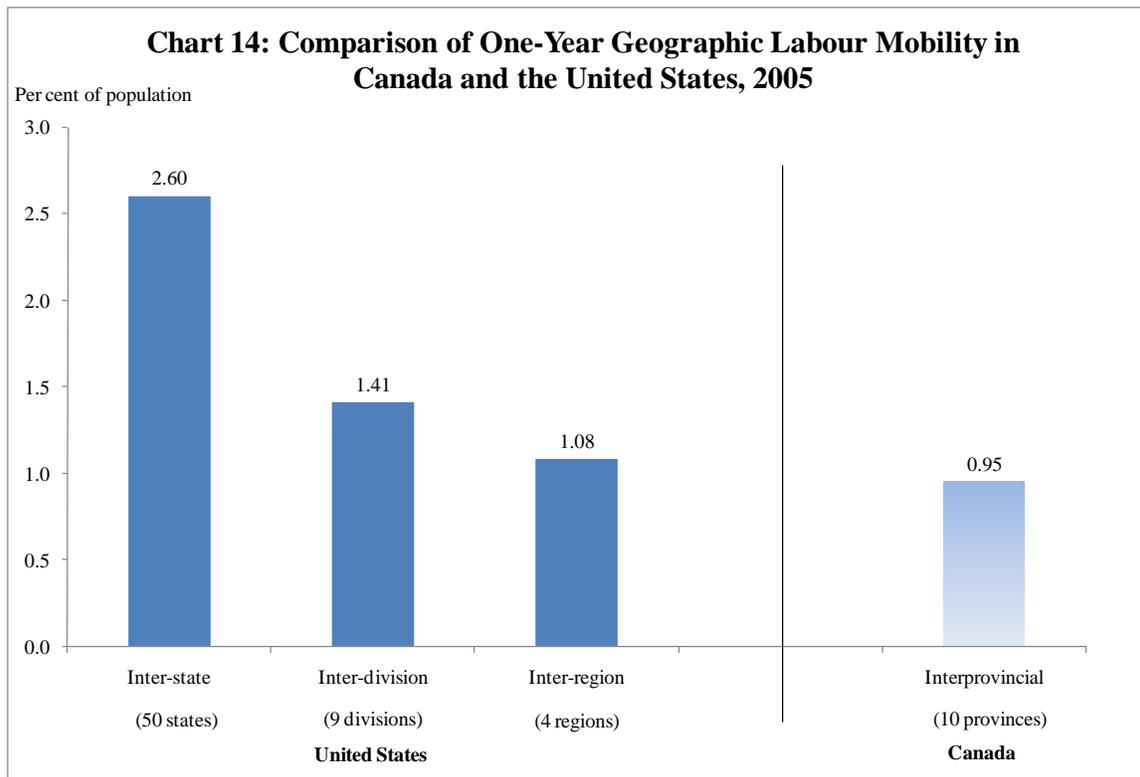
Persons migrate largely for economic reasons, so not surprisingly migrants experience larger gains in earnings than non-migrants. Using the tax data from the Longitudinal Administrative Database (LAD), Ross Finnie found that interprovincial migrants in Canada experienced a 9.4 per cent increase in earnings over a two-year period, compared to 4.8 per cent for stayers and 0.8 per cent for others (Finnie, 2001:Table 1a). In other words, interprovincial migrants enjoyed a 4.6 per cent wage gain relative to stayers.<sup>27</sup>

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intraprovincial migration rate, defined as migration between census divisions (Ontario has 47) in Canada was 2.76 per cent, more than three times the interprovincial migration rate of 0.88 per cent.

<sup>27</sup> An earlier study by Lin (1995) on the economic returns to mobility also found that moving to another province pays off greatly. On average, male migrants' nominal earnings from paid employment increased by \$7,682, while those of non-migrants increased by only \$2,162, a net earnings return to mobility of \$5,520 or nearly 26 percent of male migrants' pre-move earnings. The earnings return to female mobility was a bit smaller than that of males in magnitude, but even higher (nearly 45 percent) when expressed as a percentage of female migrants' pre-move earnings.

According to the 2001 census, 82 per cent of interprovincial migrants were of working age (15 and over) and the employment rate of working age migrants was 66 per cent. This implies that of the 370,791 migrants in 2006, 201 thousands were employed in the destination province. In 2006, total employment in Canada was 16,484 thousand so interprovincial migrants represented 1.22 per cent of this total. Labour income, expressed in current prices, was \$737 billion, 53 per cent of GDP. Assuming that the labour income of migrants is the same as the average worker, labour income for interprovincial migrants was \$9.0 billion. If wages were 4.6 per cent higher for this group due to interprovincial migration, this gain was \$413 million in labour income and \$779 million in GDP, the latter equivalent to 0.05 per cent of GDP.<sup>28</sup>



The second methodology used to estimate the impact of interprovincial migration on productivity gives larger results as it takes a broader approach to the concept of productivity, a social productivity perspective. It includes the benefits for the economy from persons going from non-employment to employment through migration.

Sharpe, Arsenault and Ershov (2007) quantify changes in aggregate output and labour productivity brought about by the interprovincial migration of workers. Total output gains are the result of two separate effects, the effect of employment gains as a result of interprovincial migration and the effect of the re-allocation of workers between

<sup>28</sup> This calculation of course ignores the gains from intraprovincial migration, which as noted is three times as important as interprovincial migration. Therefore the total impact on GDP of both types of migration may be closer to \$240 million

jobs with different productivity levels. The former effect occurs when people move from provinces with lower employment rates to provinces with higher employment rates. This results in some persons who were unemployed or out of the labour force in the origin province gaining employment in the destination province and creating output gains. The latter is caused by already employed workers moving from provinces with low average productivity levels to provinces with high average productivity levels. Assuming that workers have, on average, the average productivity level of their province of residence, they will become more productive as a result of migrating. Total national output will increase by the difference in average productivity between high and low productivity provinces for every worker who moves, also increasing aggregate labour productivity.<sup>29</sup>

The study found that in 2006 the total change in nominal output as a result of interprovincial migration was \$1,966.4 million, equivalent to 0.137 per cent of GDP. About 70 per cent of the gains (\$1,387 million equivalent to 0.097 per cent of GDP<sup>30</sup>) were from the reallocation of workers and 30 per cent (\$579 million equivalent to 0.04 per cent of GDP) from employment increases.<sup>31</sup>

It should be noted that the contribution of interprovincial migration to nominal output in 2006 at 0.137 per cent of GDP was over three times the 0.04 average contribution for the 1987-2006 period. This is explained by three factors: the very large net interprovincial migration to Alberta in 2006 (62,291 persons); the widening gap in nominal labour productivity levels between provinces with positive net migration and those with negative net migration, due to rising energy prices; and the widening gap in employment rates between provinces with positive net migration and those with negative net migration.

The gains to aggregate productivity from interprovincial migration based on the methodologies discussed above are not huge, although they are likely underestimated for a number of reasons, including the fact that migrants self-select and likely have non-

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<sup>29</sup> In more concrete terms, gains in output due to employment changes are equal to the product of the number of new jobs gained as a result of migration between provinces with different employment rates (provinces with net gains will have higher employment rates) and the average productivity level of provinces with net migration gains. The gains in output due to re-allocation are equal to the difference in average productivity between provinces with net migration gains and provinces with net migration losses, multiplied by the number of workers who leave provinces with net migration losses. Total gains in output due to interprovincial migration are equal to the sum of the two factors. Many assumptions had to be made concerning the migrants in order to quantify the effects of migration on output. It was assumed that the migrating workers have had, on average, the average productivity of their province and that when they moved to a new province, they obtained jobs with the average productivity of the new province. In addition, it was assumed that migrants had the demographic structure of their province of origin. The results obviously depend on the validity of the assumptions. The CSLS is currently examining interprovincial migration data from the SLID and the census to assess the realism of these assumptions.

<sup>30</sup> This is double the 0.05 per cent of GDP contribution found through the productivity impact of interprovincial migration as measured by the effect on wages.

<sup>31</sup> Measured in 1997 dollars, the contribution of interprovincial migration to output was about half the size, at 0.074 per cent of GDP (883 million), with 0.041 per cent (485 million) from reallocation of workers and 0.033 per cent (\$398 million) from employment increases (Sharpe, Arsenault and Ershov, 2007). The large increase in commodity prices accounts for the difference.

observable characteristics such as drive that distinguish them from non-migrants and that lead them to have above average productivity.<sup>32</sup> The inclusion of intraprovincial migration, nearly three times that of interprovincial migration, would have also greatly increased the gains to aggregate productivity from migration.

Importantly, however, the estimated annual output gains from migration are positive and cumulate over time. For example, the gains to nominal output from the level effects of interprovincial migration from 1987 to 2006 cumulate to 0.75 per cent of GDP, or over \$11 billion in 2006 dollars, a significant number.<sup>33</sup> Migration should be recognized as a contributor to aggregate productivity growth.

### 3) Policies to Foster Internal Migration in Canada

Trends in interprovincial and intraprovincial migration are largely determined by market forces. Differences in employment opportunities, as evidenced by differentials in unemployment rates and labour compensation between provinces and regions, are the main drivers of net internal migration in Canada. In most instances, government policies do not directly promote migration. Indeed, it is probably accurate to say that the net effect of government policies is to reduce migration. For example, the federal employment insurance program, which is more generous in high unemployment than in low unemployment regions, reduces the incentive for the unemployed to leave high unemployment regions, although this disincentive effect may not be particularly large.<sup>34</sup> Provincial governments, which invest heavily in the human capital of their population, naturally prefer to see their residents find employment in the province, and establish policies and programs to achieve this objective.

Nevertheless, from the pan-Canadian point of view of the federal government, policies that promote interprovincial migration by reducing barriers to mobility<sup>35</sup> foster the national economic interests through their positive impact on output and productivity. One current initiative that does promote interprovincial mobility is the labour market information (LMI) programs run by Human Resources and Social Development Canada. These programs, such as the National Job Bank and Job Futures, provide information on job vacancies and career and employment opportunities to all Canadians.

One concrete suggestion would be the creation of an independent agency for the development and dissemination of LMI along the lines of the Canadian Institute for Health Information (CIHI). Both federal and provincial government play a role in the

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<sup>32</sup> On the other hand, the gains may be overestimated to the degree that the employment rate and the labour productivity level of interprovincial out-migrants and in-migrants differs from the average of the province.

<sup>33</sup> The cumulative gains to real GDP (1997 dollars) from interprovincial migration over the 1987-2006 period were 0.66 per cent of GDP, or \$6.2 billion 1997 dollars.

<sup>34</sup> Lin (1995) finds that receipt of unemployment insurance, on average, does not statistically significantly increase the probability of interprovincial labour mobility, although he does note that specific aspects of the UI system may positively affect mobility. Duclos (2007) in this volume proposes changes to EI that would eliminate the negative effect on mobility.

<sup>35</sup> See Gomez and Gunderson (2007) for an overview of the barriers to interprovincial labour mobility in Canada.

LMI area, but their efforts are often uncoordinated and duplicative. A non-governmental agency funded by both levels of government could potentially invigorate the LMI field and make Canadians more aware of employment opportunities throughout the country.

The federal government is also attempting to reduce barriers to labour mobility in provincially licensed professions through the Agreement on Internal Trade secretariat. Macmillan and Grady (2007) report that remaining interprovincial barriers related to licensing are limited. But measures to eliminate these remaining barriers to mobility would still have an economic payoff.

In terms of new policies to foster interprovincial mobility, this paper also proposes that the federal government establish a tax credit for expenses associated with job search in other provinces. Moving expenses are currently deductible from income. But the expenses associated with initial job search, such as travel and accommodation expenses, are currently not covered. Their coverage would reduce the after-tax cost of interprovincial job search and hence provide an additional fiscal incentive for workers to seek better employment opportunities in other provinces.

A risk associated with such a mobility tax credit is that it might encourage “game playing.” Persons may claim a deduction for job search costs even though they were not engaged in genuine job search. Proof of job search, such as submission of a form signed by employers approached, might be required for this deduction.

The actual costs of such a program would be small. According to Finance Canada tax expenditure estimates (Finance Canada, 2005), the cost of the moving expense deduction to the federal treasury was \$88 million in 2002 and projected to rise to \$100 million in 2007. As this number includes the cost of moving possessions and family members and applies to both interprovincial and intraprovincial moves, the cost of a deduction for interprovincial job search expenses for one family member would be much less. A ballpark estimate of the cost of the initiative might be in the range of \$15 to \$25 million.

In addition to the positive (although probably minor) effect at the margin on the decision of Canadians to engage in interprovincial job search, another advantage of the proposal is to highlight the role of interprovincial mobility for a dynamic labour market. Such a tax credit would be a concrete manifestation of the importance that the federal government attaches to workers seeking employment opportunities where they arise throughout the country.

## **IV. Conclusion**

This paper has made the case that productivity is our economic destiny and that Canada's dismal productivity performance, both from a historical and international perspective, therefore represents our biggest economic challenge. It then put forward three specific policies to improve Canada's productivity performance: foster the diffusion of best-practice technologies; remove the provincial sales tax on purchases of machinery and equipment; and promote interprovincial movement of workers by improving labour market information, removing professional barriers to labour mobility, and establishing a tax credit for interprovincial job search. The short-term costs of these policies would be greatly outweighed by the long-term benefits.

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