

**Productivity in Provincial Economies:
An Empirical Assessment of
Newfoundland and Labrador***

A Discussion Paper Prepared for Industry Canada

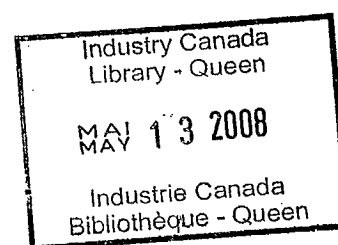
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Revised July 2004

* The authors would like to thank Jonathan Simms, David Chaundy and Lindsay Lawrence for their helpful comments on earlier version of this paper. The paper has also benefited from discussions with Pierre-Marcel Desjardins, Wimal Randaduawa and Talan Iscan. Any errors are the sole responsibility of the authors.

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Executive Summary

Influencing the standard of living in a jurisdiction, as represented by income levels, is a concern for policy makers. To help local policy makers with this concern, this study examined the relation between GDP per capita and labour productivity in Newfoundland and Labrador from 1981 to 2001. The findings for Newfoundland and Labrador were also compared to those which occurred within the region and across the country. This analysis was undertaken at both the aggregate and the industrial levels, utilizing both employees and hours worked as measures of labour effort. In addition, the analysis was performed considering the relationship between standard of living and labour productivity in terms of both growth rates and levels.

The key findings of this study are:

- The standard of living in Newfoundland and Labrador, as reflected by its real GDP per capita (1997 chained dollars), was below that experienced in both the region and the country from 1981 to 2001. For example, in 2001 GDP per capita in Newfoundland and Labrador was \$23,601; compared to \$24,432 in Atlantic Canada and \$33,058 experienced Canada-wide;
- GDP per capita in Newfoundland and Labrador has improved relative to that experienced in both the region and the country from 1981 to 2001. Newfoundland and Labrador's GDP per capita increased from 59% of the Canadian average in 1981 to 72% in 2001. The corresponding increases relative to Atlantic Canada was 90% and 97%, respectively;
- Atlantic Canada's GDP increased relative to that observed in the country. For example, between 1981 and 2001, Atlantic Canada's GDP per capita increased from 66% of the Canadian average to 74%;
- Newfoundland and Labrador experienced the highest growth rates for labour productivity and standard of living from 1981 to 2001. During this period, Newfoundland and Labrador's real GDP per capita grew at a compound annual growth rate of 2.53%, while Atlantic Canada's and Canada's GDP per capita grew at 2.14% and 1.58%, respectively. In addition, labour productivity growth rates recorded during this period were: Newfoundland and Labrador 1.51%, Atlantic Canada 1.20% and Canada 1.25%. That is, Newfoundland and Labrador led the country and the region in terms of labour productivity and GDP per capita growth over this period;
- The province, the region and the country all experienced significant increases in their labour productivity growth rates moving from the 1980s to the 1990s that were reflected in significantly higher growth rates in their standards of living (real GDP per capita);

- Using GDP defined in terms of 1997 prices, the growth in labour productivity was equivalent to approximately 80% of the growth in the standard of living Canada-wide from 1981 to 2001. However, it represented 60% of that figure in Newfoundland and Labrador and 56% of the growth in Atlantic Canada. Obviously, there is a close correspondence between the growth in the standard of living and the growth in labour productivity for Canada. As well, there is a very strong relationship between labour productivity growth and the standard of living in the province and the region;
- The improvements in Newfoundland and Labrador's standard of living and labour productivity coincided with the commencement of offshore oil production in 1997;
- Switching to labour productivity defined in terms of hours worked rather than employees did not have a significant impact on the estimates derived for labour productivity or standard of living in the province, the region or the country. This was a surprising result, which suggests the need for future research;
- Defined in terms of GDP per hour worked (1997 dollars), overall labour productivity at the industry level in Newfoundland and Labrador (\$29.93) was higher than observed in Atlantic Canada (\$28.46) in 2001, a 5.2% difference. There were some industries for which Newfoundland and Labrador's labour productivity exceeded that observed in Atlantic Canada. These were: Construction (8.9% higher), Finance, Insurance and Real Estate (FIRE) (5.0% higher), Professional and Technical Services (4.8% higher), Education Services (22.3% higher), Accommodation and Food Services (7.4% higher), and the Residual sector (33.7% higher). For the other industries, labour productivity observed in Newfoundland and Labrador was lower than that observed in Atlantic Canada. These sectors were: Utilities (5.3% lower), Manufacturing (16.2% lower), Retail and Wholesale Trade (5.8% lower), Health Services (1.7% lower), Other Services (0.1% lower) and Public Services (13.8%). In other words, the industrial composition was important in explaining labour productivity difference observed between Newfoundland and Labrador and Atlantic Canada;
- For Newfoundland and Labrador, the contribution to labour productivity from the Residual category increased from 15.7% in 1987 to 24.4% in 2001, which was the largest contributor to Newfoundland and Labrador's labour productivity in that year. This was explained by the fact that the Residual category includes the oil and gas sector. The contribution of oil and gas sector to provincial GDP and labour productivity increased significantly after 1997, when the first barrel of oil was produced;
- The contribution to labour productivity by the Construction sector represented the largest decrease in Newfoundland and Labrador over the period, decreasing from 9.3% in 1987 to 5.2% in 2001;

- A decline was recorded in the shares of Newfoundland and Labrador's labour productivity accounted by: Utilities, Construction, Manufacturing, Education, Health and Public Services;
- The following sectors' contributions to overall labour productivity in Newfoundland and Labrador increased from 1987 to 2001: Retail and Wholesale Trade, F.I.R.E., Professional and Technical Services, Administration and Waste management, Accommodation and Food Services, Other Services and the Residual sector;
- With the exception of F.I.R.E. and the Residual category, Newfoundland and Labrador fell short of the labour productivity observed in the rest of Canada;
- There is a greater degree of variability in the annual growth rates of labour productivity at the industry level for Newfoundland and Labrador than observed in either the region or the nation. This begs the question — which will be left for further research — why;
- Research and development intensity in Newfoundland and Labrador and Atlantic Canada fell short of that observed in Canada, with this difference worsening over time. As well, the significance of this difference in research intensity was magnified when the business sector was considered;
- Research and development performed in the province was dominated by the educational sector, performing more than 60% in 2000;
- The share accounted for by the educational sector in Newfoundland and Labrador increased over time;
- The share of research and development performed by the business sector in Newfoundland and Labrador averaged 10% and reached only 13.2% in 2000;
- The research and development shares were similar in Atlantic Canada, but the business sector performed slightly higher shares (17.5% in 2000) and the education sector undertook slightly lower shares (56.4% in 2000);
- At the national level, one observes that the business sector accounted for nearly 60% of the research and development activity performed in Canada and the educational sector performed less than 30% of the research and development;
- Newfoundland and Labrador's performance in terms of research and development was low in comparison to that observed in either Atlantic Canada or Canada as a whole. This does not bode well for future productivity increase;
- As expected, within each jurisdiction there is a close correspondence between labour productivity and the capital-labour ratio which prevails in that jurisdiction;

- The capital-output ratio in Newfoundland and Labrador is approximately 75% higher than that observed nationally and about 40% higher than that found in Atlantic Canada. This indicates that Newfoundland and Labrador's efficiency associated with capital utilization is lower than in the region and nationally;
- The education levels in Newfoundland and Labrador are improving, but the improvement is more in the technical skills than in university degrees. While a similar pattern is observed regionally and nationally, the increase in workers with a university degree was highest at the national level;
- Newfoundland and Labrador and the other Atlantic Provinces rank below almost all of the United States in terms of standard of living;
- Both Newfoundland and Labrador and the other Atlantic Provinces do better in terms of their labour productivity, but they are still towards the bottom of the ranking when compared with the United States;
- The relative standard of living and productivity have been rising faster in the United States than in Canada, Atlantic Canada or Newfoundland and Labrador;
- Within the framework utilized in this report, the standard of living (GDP per capita) consists of the multiplicative product of labour productivity (GDP per unit of labour) and the proportion of the population that is employed. Consequently, if both of these parameters are positively correlated, then higher productivity leads to an improved standard of living. On the other hand, if productivity and the employment to population ratio are inversely related, then an improvement in productivity may not lead to a higher standard of living. For Canada, the data indicate that a high level of productivity combined with a high employment to population ratio leads to a high standard of living; and
- In recent years, the productivity improvements in Newfoundland and Labrador have been driven by the economic activity generated in the oil and gas sector.

1. Introduction

Recognizing that GDP is not a perfect measure of economic well-being² or standard of living in a given jurisdiction, this study utilizes this statistic because GDP per capita is readily available or at least, it is easily computable; is utilized quite extensively in national and international studies that examine the relationship between productivity and economic growth or well-being; and is relative free from the types of value judgments that are implicit in other measures of well-being.³ There is a well established relationship between labour productivity and the standard of living within a given jurisdiction⁴ and it was agreed by the study team at the start of this exercise that GDP per capita be utilized as the measure of well-being in this study.

This report is broken into six parts: (1) the introduction; (2) an analysis of standard of living and productivity in select Canadian jurisdictions – Newfoundland and Labrador, Atlantic Canada and Canada; (3) an assessment of the factors behind productivity differences between the select Canadian jurisdictions, which includes a consideration of the role of research and development, capital stock, education levels and industrial composition; (4) a comparison between select Canadian and US jurisdictions on the basis of standard of living and labour productivity; (5) a lessons learned section, which examines the influence of the oil and gas sector on Newfoundland and Labrador's labour productivity; and (6) the conclusion. In addition, several appendices are attached to this report. These include (i) an accounting framework that underlies the analysis undertaken in this paper; (ii) data on the relative rankings of Canadian provinces and the United States in terms of their standard of living and labour productivity; (iii) an analysis of labour productivity utilizing hours worked rather than employees; (iv) an analysis of labour productivity and industrial decomposition and (v) the standard of living and employment to population ratios for Canada and the United States.

² A detailed discussion of the shortfalls of using GDP as a measure of social well being is found on GPI Atlantic's website: www.GPIATLANTIC.ORG, a non-profit organization whose objective is to develop a "Genuine Progress Index" for Atlantic Canada.

³ Government of Canada (1999b).

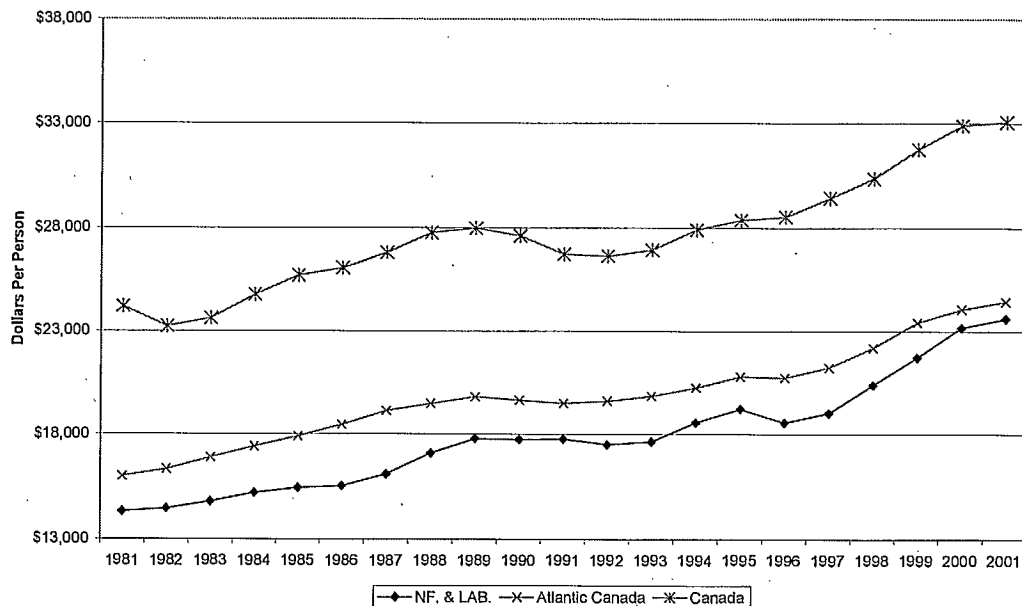
⁴ Baldwin et al. (2000) and CSLS (2002).

2. Standard of Living and Labour Productivity

Figure 1 illustrates the time profiles of real GDP per capita⁵ for Newfoundland and Labrador, Atlantic Canada and Canada as whole over the period 1981 to 2001, inclusive.⁶ From this diagram, it is clear that the standard of living, as measured by real GDP per capita, increased within the province, the region and the nation over this time period. Specifically,

- Newfoundland and Labrador's real GDP per capita increased from \$14,322 in 1981 to \$23,601 in 2001, corresponding to a 65% increase;
- increasing from \$15,985 in 1981 to \$24,432 in 2001, Atlantic Canada's real GDP per capita increased by 53% during this period; and
- real GDP per capita in Canada rose from \$24,184 in 1981 to \$33,058 in 2001 or the average standard of living throughout the country improved by 37% over this period.

Figure 1: Real GDP Per Capita -
Newfoundland and Labrador, Atlantic Canada and Canada



Even though the improvements in the standard of living experienced in Newfoundland and Labrador and Atlantic Canada have occurred at a faster rate than that observed for the country as a whole, the levels of GDP per capita in the province and the region remains below the average recorded Canada-wide. As well, it is important to recognize that while Newfoundland and Labrador experienced the largest increase, more than half

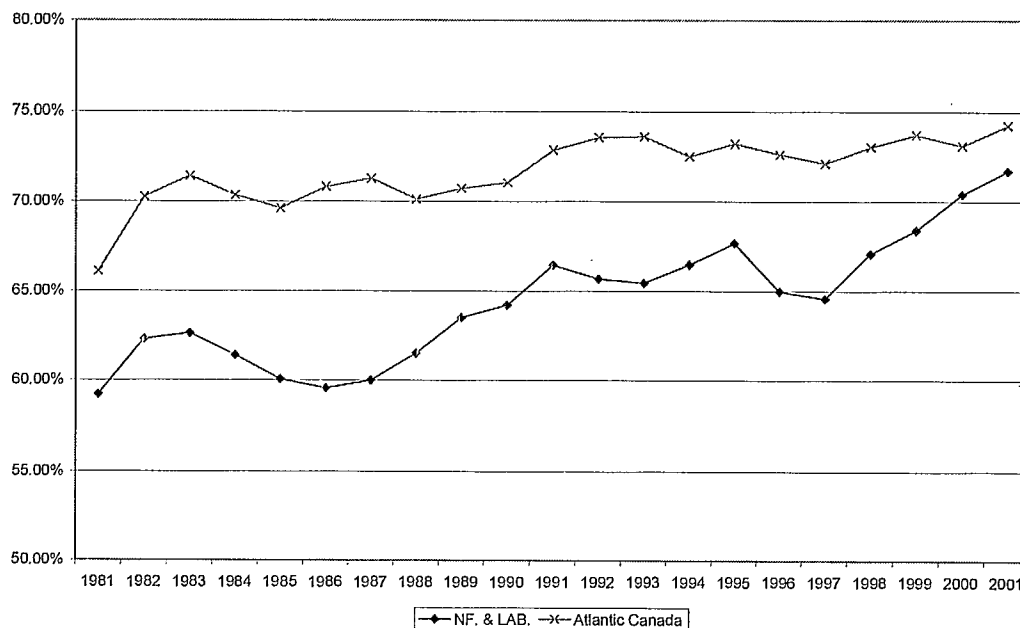
⁵ Real GDP per capita is defined as Gross Domestic Product per person using chained 1997 dollars.

⁶ GDP data employed in this analysis, at either the aggregate provincial, regional or nation level, are defined in terms of market prices to be consistent with aggregate data available from the United States that are used in the international comparisons presented in this paper. However, the data available for industry level productivity analysis for Canada are available only in basic prices.

of the improvement in Newfoundland and Labrador's real per capita GDP happened between 1996 and 2001. That is, real GDP per capita in Newfoundland and Labrador rose by \$9,279 between 1981 and 2001, but the bulk of this increase (\$5,050) occurred between 1996 and 2001. This latter time period happens to coincide with the development of the offshore oil and gas sector within Newfoundland and Labrador.⁷

Since one of the motivations for undertaking this analysis is to compare the relationship between labour productivity and the standard of living achieved in Newfoundland and Labrador and Atlantic Canada with that experienced in other jurisdictions, the levels of real GDP per capita in the region and the province are expressed relative to the Canadian average. This information is displayed in Figure 2.

Figure 2: Real GDP Per Capita Relative to the Canadian Average - 1981 to 2001



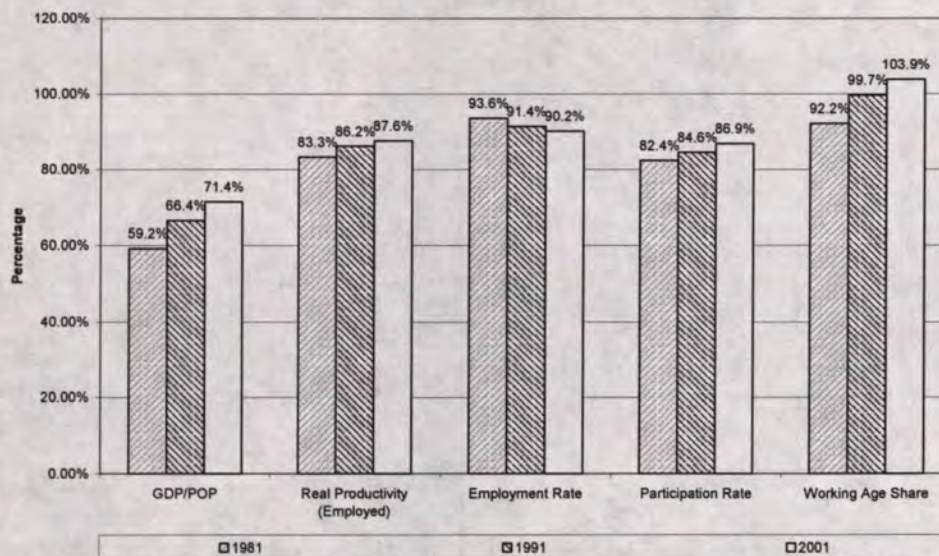
The standard of living in Atlantic Canada and Newfoundland and Labrador grew relative to the Canadian average over the period 1981 to 2001. For instance, Newfoundland and Labrador's real per capita GDP increased from 59% of the Canadian average in 1981 to 72% in 2001, while Atlantic Canada's real GDP per capita grew from 66% of the Canadian average to 74%. Not only has Newfoundland and Labrador's standard of living improved relative to the Canadian average, but it has grown relative to the other Atlantic Provinces. This is demonstrated by the fact that Newfoundland and Labrador's real GDP per capita was equivalent to 90% of the Atlantic Canada average in 1981 and by 2001 this had risen to 97% of the Atlantic Canadian average.

⁷ The first barrel of oil was produced on the Grand Banks in 1997.

Why have the levels of GDP per capita in Newfoundland and Labrador and in Atlantic Canada grown as they have over the period 1981 to 2001? What are the factors that have contributed to this growth? To answer these questions and to help guide decision-makers in formulating policies to further contribute to this relative growth, it is appropriate to consider the factors that contribute to GDP per capita during any given time period. To facilitate the inter-jurisdictional and inter-temporal analysis of living standards, an accounting framework was developed for this study in a separate concept paper⁸.

Drawing upon this accounting framework, this paper models the standard of living (GDP per capita) in any province as being determined by the multiplicative product of a number of provincial parameters. Specifically, the standard of living in any particular province is determined by: the labour productivity achieved within that province; the employment rate or the ratio of employment to the size of the labour force; the participation rate or the ratio of the labour force to the working age population (15+) and the working age share or the proportion of the total population that is of working age.⁹ Deviations in any of these economic parameters across jurisdictions will translate into observed variations in GDP per capita. Consequently, it is possible to relate differences in the standard of living observed for a particular province to differences in specific provincial variables relative to those same variables observed in other jurisdictions, such as the nation as a whole. Figure 3 illustrates how this analysis could be applied to Newfoundland and Labrador for select years – 1981, 1991 and 2001.

Figure 3: Decomposition of GDP Per Capita - Newfoundland and Labrador Relative to Canada



⁸ Locke and Lynch (2003). The relevant sections of this accounting framework are reproduced in Appendix A.

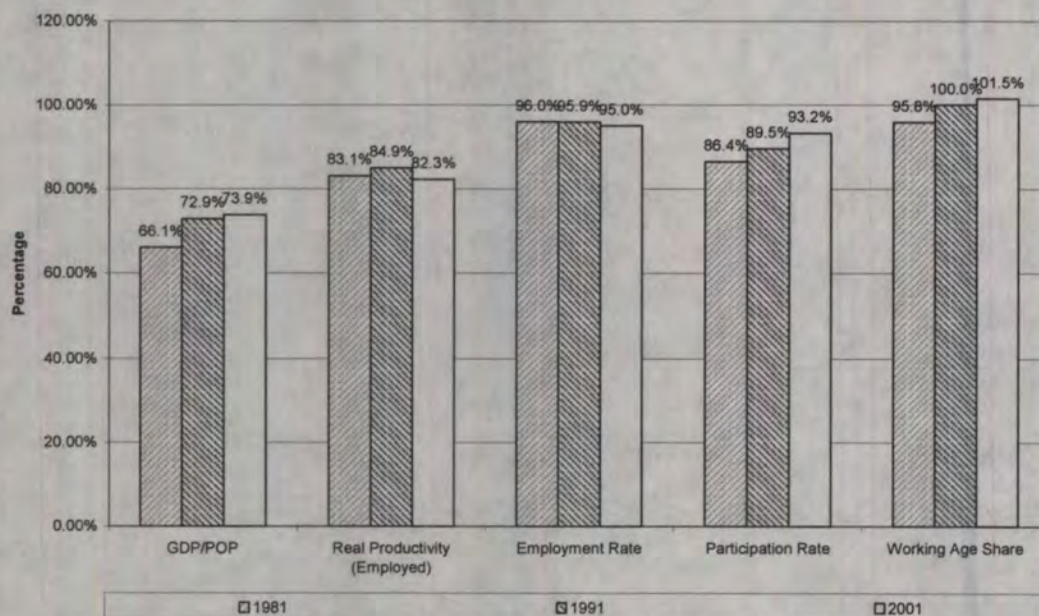
⁹ It should be recognized that the multiplicative product of these last two terms defines the effective participation in terms of total population, rather than in terms of working age population as is done in the formal measurement of the labour force participation rate.

As shown in Figure 3, Newfoundland and Labrador's real GDP per capita is 59.2% of the Canadian average in 1981. This estimate is explained by the fact that: (1) Newfoundland and Labrador's labour productivity, defined in terms of real GDP per employed person, was 83.3% of the Canada-wide estimate; (2) its employment rate, defined as one minus the measured unemployment rate, was 93.6% of the national rate; (3) its labour force participation rate was 82.4% of the Canadian rate; and (4) its working age share was 92.2% of that which exists nationally. In other words, the ratio of Newfoundland and Labrador's real GDP per capita in 1981 to that observed Canada-wide (59.2%) in 1981 was equivalent to the multiplicative product of 83.3% (productivity), 93.6% (employment), 82.4% (participation) and 92.2% (working age share).

In going from 1981 to 2001, Figures 1, 2 and 3 demonstrate that the standard of living in Newfoundland and Labrador increased both in absolute terms and relative that which prevailed nationally. This improvement in the standard of living by 12.2 percentage points (representing a 20.6% improvement) is explained by the fact that labour productivity increased by 4.3 percentage points (a 5.2% improvement), the participation rate increased by 4.5 percentage points (a 5.5% improvement) and the working age share of population increased by 11.7 percentage points (a 12.7% improvement). These increases were offset partially by a decline of 3.4 percentage points in the employment rate (a 3.6% drop).¹⁰

Figure 4 provides the corresponding relevant data for Atlantic Canada.

Figure 4: Decomposition of GDP Per Capita -
Atlantic Canada Relative to Canada



¹⁰ Specifically, $71.4/59.2 = 1.206$. This equals $1.052 \times 0.964 \times 1.055 \times 1.127$.

Atlantic Canada's real GDP per capita relative to Canada as whole increased from 66.1% in 1981 to 73.9% in 2001, representing an increase of 7.8 percentage points. This relative increase occurred even though labour productivity in Atlantic Canada relative to that achieved nationally over the period declined by approximately one percentage point and the relative employment rate declined by one percentage point. These relative declines were offset by a 6.8 percentage point increase in the relative participation rate and a 5.7 percentage point increase in the relative working age share of population.

In summary, Newfoundland and Labrador's increase in its standard of living exceeded that experienced in the rest of Atlantic Canada and that observed on average Canada-wide. Its labour productivity grew relative to that observed in the rest of Canada. Unfortunately, during this time period, Newfoundland and Labrador's economic activity was influenced by the cod moratorium and a downsizing of the public sector. This caused employment growth to be lower and lessened the relative gains in the standard of living that otherwise would have been observed. Atlantic Canada experienced relatively lower labour productivity and employment growth than were observed nationally. However, this was counterbalanced by the effective increase in people participating in the labour force.

The discussion up to this point has been defined in terms of levels. Instead of focusing on the relative levels of well being, it is also useful to consider the factors that influence the growth in well being from one period to another. To facilitate the analysis of standard of living in terms of growth rates, the accounting framework developed in the concept paper is also utilized here.¹¹ Accordingly, the growth in the standard of living in a province or region is equal to the sum of the growth rates of labour productivity, the employment ratio, the labour force participation rate and the working age share of population. The data required for this analysis of growth rates¹² in Newfoundland and Labrador, Atlantic Canada and Canada are listed in Table 1.

From Table 1, it is possible to identify the contribution that the growth in labour productivity made to the growth in the standard of living in Newfoundland and Labrador, Atlantic Canada and to Canada as a whole. Between 1981 and 2001, the compound annual growth rate in Newfoundland and Labrador's standard of living was 2.53% annually, while the corresponding growth in labour productivity was 1.51% per annum; the employment rate declined slightly, 0.16% on an annual basis; the labour force participation rate grew 0.35% annually and the ratio of the working age population to total population grew at a compound annual growth rate of 0.82%. During this period, labour productivity accounted for 60% of the growth in Newfoundland and Labrador's GDP per capita (derived as $1.51\% / 2.53\%$). The growth in Newfoundland and Labrador's standard of living consists of two distinct periods – the early period, 1981 to 1991 and the later period, 1991 to 2001. The later period was characterized by higher growth in the standard of living (2.88% per annum), higher growth in the labour productivity (1.74% per annum), growth in employment relative to the growth in the

¹¹ The detailed accounting framework is provided Appendix A.

¹² The growth rates are calculated utilizing geometric averages. This implies that the growth rates being considered are compound annual growth rates.

**Table 1: Average Annual Growth Rates (Geometric Averages) –
Newfoundland and Labrador, Atlantic Canada and Canada for Select
Periods – Using Per Employee Labour Productivity**

Area	Annual Growth Rate in Real GDP Per Capita	Annual Growth Rate in Real GDP Per Employed Person	Annual Growth Rate in the Employment Rate	Annual Growth Rate in Participation Rate	Annual Growth Rate in Working Age Share
Time Period – 1981 to 2001					
N.L.	2.53%	1.51%	-0.16%	0.35%	0.82%
A.Canada	2.14%	1.20%	-0.03%	0.46%	0.51%
Canada	1.58%	1.25%	0.02%	0.08%	0.22%
Time Period – 1981 to 1991					
N.L.	2.17%	1.27%	-0.53%	0.50%	0.92%
A.Canada	2.00%	1.15%	-0.31%	0.59%	0.56%
Canada	1.01%	0.93%	-0.30%	0.24%	0.14%
Time Period – 1991 to 2001					
N.L.	2.88%	1.74%	0.21%	0.19%	0.72%
A.Canada	2.29%	1.25%	0.25%	0.32%	0.45%
Canada	2.15%	1.57%	0.34%	-0.08%	0.30%

labour force (0.21%), growth in labour force participation (0.19% per annum) and a growth in the working age population relative to the total population (0.72%). The growth experienced in its standard of living during this later period was 0.71 of one percentage point higher than Newfoundland and Labrador experienced in the earlier period. This was explained primarily by two factors: (1) relatively lower growth in labour productivity in the earlier period (1.27% as opposed to 1.74%) and (2) growth in jobs that did not keep up with the growth in the labour force, as evident by a negative growth rate of -0.53% for the employment ratio in the earlier period and a positive growth rate of 0.21% in the later period. These large growth rates in labour productivity and employment in the later period are explained, in part, by the fact that the offshore oil sector started producing in 1997.

The corresponding information for Atlantic Canada and for Canada as a whole is also provided Table 1. From 1981 to 2001, the standard of living grew at 2.14% per annum regionally, while the growth rate experienced nationally was only 1.58%. Newfoundland and Labrador's standard of living improved faster than that observed in either the rest of Atlantic Canada or Canada-wide. As well, Atlantic Canada as a whole experienced faster growth in its standard of living than averaged throughout Canada for that whole period. In addition, during this period the annual growth in Newfoundland and Labrador's labour productivity (1.51%) exceeded that experienced on average in Canada (1.25%), which, in turn, was larger than that observed in Atlantic Canada (1.20%). The improvement in Newfoundland and Labrador's standard of living emanating from the growth in its labour productivity was in part offset by the fact that new job creation in that province did not keep up with the annual growth in its labour force (-0.16%). The same situation occurred

in Atlantic Canada, but to a lesser extent (-0.03%). However, the contribution that labour productivity made to Canada's standard of living was bolstered by the fact that job creation Canada-wide exceeded the annual growth in the labour force (0.02%). The contribution to GDP per capita in the province, the region and the country was enhanced by the annual growth in both the labour force participation rate and the ratio of the working age population to the total population.

In the earlier period (1981 - 1991), Newfoundland and Labrador and Atlantic Canada experienced similar annual growth rates in their standard of living, 2.17% and 2.00% per annum, respectively. While Newfoundland and Labrador experienced a higher labour productivity growth rate than the region (1.27% versus 1.15%), its labour force grew faster in relation to its employment growth than was experienced in Atlantic Canada or its employment ratio declined (-0.53% versus -0.31%). It is also noteworthy that during this earlier period, both Newfoundland and Labrador's and Atlantic Canada's growth rate in its standard of living doubled that experienced Canada-wide, which came in at 1.01% per annum. This is explained by Canada's lower labour productivity (0.93% per annum), lower growth in labour force participation (0.24% per annum) and lower growth in the ratio of the working age population to the total population (0.14% per annum).

Canada's relative performance picked up significantly in the later period. Specifically, the annual growth in GDP per capita increased from 1.01% to 2.15%. This is explained by the improvement in labour productivity growth (0.93% to 1.57%) and an improvement in employment growth relative to the growth in the labour force (-0.30% to 0.34%).

In summary, it is possible to draw the following inferences from this data:

- (1) from 1981 to 2001, the annual growth rate in Newfoundland and Labrador's standard of living (2.53%) exceeded that experienced in Atlantic Canada and Canada-wide;
- (2) The annual growth in the standard of living in the region exceeded that experienced in the nation during the period 1981 to 2001. The principle reason being that labour force participation grew at a faster rate in Atlantic Canada than it did Canada-wide;
- (3) The growth in labour productivity was equivalent to approximately 80% of the growth in the standard of living Canada-wide from 1981 to 2001. However, it represented 60% of that figure in Newfoundland and Labrador and 56% of the growth in Atlantic Canada. Obviously, there is a close correspondence between the growth in the standard of living and the growth in labour productivity for Canada. As well, there is a very strong relationship between labour productivity growth and the standard of living in the province and the region; and
- (4) The province, the region and the country as a whole experienced much improved growth rates for their standard of living in the second period relative to the first period. This was explained primarily by an improvement in labour productivity growth and in relative employment growth.

This analysis was repeated with labour productivity defined in terms of hours worked instead of employees. There was no fundamental difference between the results when hours worked were used to define labour productivity. The detailed analysis and discussion for hours worked is provided in Appendix C.

3. Factors Behind the Productivity Changes

Locke and Lynch (2001) noted that the sectoral composition of research and development activities within a province may help explain inter-provincial differences in productivity across Canada. In addition, the size of the capital stock, changes in capital accumulation, public sector capital stock and labour quality have been recognized in the literature as other important determinants of productivity.¹³ Pilat (1996) has emphasized the role of competition, labour costs and foreign direct investment in influencing productivity.¹⁴ Finally, the stage of the business cycle is an important determinant of short-run productivity.¹⁵

To understand the factors that influence labour productivity in different jurisdictions, consider that economy-wide output is determined by: (1) the state of technology, which is affected by research and development activity; (2) the capital stock and its vintage, which reflects embodied technical change¹⁶; (3) the amount of labour available and its quality, as reflected in its education and skill levels, which also influences the role that technology can play¹⁷ and (4) other factors, such as the degree of competition, openness of the economy and the level of foreign direct investment. This framework implies that labour productivity is a function of the capital-labour ratio, technology, which is

¹³ Centre for the Study of Living Standards (1998) suggests that the "more capital that a worker has to work with, the greater the output he can produce" and since technical change is predominately embodied in new capital equipment, capital accumulation is also important. This study also highlights the importance of labour quality and the public sector capital stock (roads, airports, harbours) for productivity.

¹⁴ Pilat (1996) suggests that "weak competition may result in resources being tied to activities with low productivity" and that "low competition reduces the pressure on firms to incorporate new technology or innovate, resulting in low growth of productivity and loss of competitiveness". He also highlights that labour costs are important for productivity in that in the presence of low labour costs, firms may use labour intensive technology, resulting in lower productivity. He also notes that "foreign direct investment is important element in improving efficiency ... the highest degree of productivity is achieved by companies competing directly with best-practice firms across the globe."

¹⁵ Government of Canada (1999b) "During a business cycle, inputs are not necessarily varied proportional to output – this is especially true of employment. Consequently, labour productivity will vary over the course of a business cycle, even though no fundamental changes have taken place in the production process. Productivity declines sharply as the economy moves into recession and it grows as the economy starts to recover". Baldwin, Maynard and Wells (2000) finds that "there are substantial cyclical effects in the measured rates of productivity growths. The rates of productivity growth for both Canada and the United States show the effects of the recession in the early 1980s." This implies that inter-jurisdictional and inter-temporal comparisons can be quite sensitive to the time periods chosen. The Centre for the Study of Living Standards (1998) also highlights the cyclical aspects of productivity and suggests that temporary hoarding of skilled labour may be one explanation of this phenomenon.

¹⁶ Since technological innovations get incorporated into new machines and equipment, the average age of the capital stock will be inversely proportional to the amount of new technology embodied in it.

¹⁷ The more highly skilled and educated is the workforce, the more sophisticated is the technology that can be utilized in the production process and the higher will be the productivity of the labour employed.

influenced by the level of research and development, the level of education and the amount of technology embodied in new additions to the capital stock.

In the next four sections, the role of research and development, the contribution of the capital stock, the effect of education levels and industrial composition are evaluated in terms of their contribution to explaining productivity differences between Newfoundland and Labrador, Atlantic Canada and Canada as a whole.

3a. The Role of Research and Development

Investment in research and development contributes to productivity through new products and processes or through innovation.¹⁸ This, in turn, translates into enhanced competitiveness, elevated economic growth and a higher standard of living than otherwise would be the case. That is, there is a direct connection, albeit not necessarily a linear one, between the level of innovation within an area and the level of prosperity its residents attain.¹⁹

Past knowledge and research makes it easier to develop new technological innovations that will contribute to future productivity.²⁰ The ideas embodied in current research and development initiatives spill over to other industries through their research and development activities. Consequently, the acquisition of knowledge facilitates and promotes the development of new knowledge, further increasing productivity in an area. This concept is generally reflected in the statement that the social return on research and

¹⁸ In the context of economics, Globerman (2000) notes that new processes lead to reductions in the costs of production and new products, with their corresponding new or enhanced attributes at similar or lower prices, improves the welfare of consumers. Government of Canada (2001) asserts that "Unquestionably, innovation is the link between science and technology (S&T) and both long-term economic growth and quality of life." As well, Locke and Lynch (2001) find that higher investments in research and development within an area generate improved levels of productivity for that area and Baldwin, Hanel and Sabourin (2000) demonstrated that Canadian firms who perform research and development are four times more likely to introduce an innovation. Other studies that show the link between research and development and productivity are: Centre for the Study of Living Standards (1998), Coe and Helpman (1995), Kao, Chiang and Chen (1999), Criscuolo and Haskel (2002) and Visco (2000).

¹⁹ For example, Orr (2000) demonstrated that the differences in GDP per capita across provinces are explained primarily by variations in productivity exhibited by these provinces. In other words, the differences in the standards of living across jurisdictions can be explained by differences in productivity and differences in productivity can be traced to differences in both the research and development activities and the state of innovation achieved by these jurisdictions. As well, OECD (2000) found that "countries with larger increases in the intensity of business R&D to GDP and in the share of business R&D in total R&D...appear to have experienced a pick-up in productivity in the 1990s."

²⁰ Research and development and the knowledge acquired from the same have a snowball effect. Specifically, the acquisition of knowledge facilitates and promotes the development of new knowledge, further increasing productivity in an area. These points were emphasized by an OECD (1991) report, which stated: *technical change does not occur randomly for two main reasons: (1) in spite of considerable variations with regard to specific innovations, the directions of technical change are often defined by the state-of-the-art of the technologies already in use, and (2) the probability of technological advances by firms, organizations and even countries is, among other things, a function of the technological levels already achieved by them. In other words, ... technical change is to a large extent a cumulative activity.*

development exceeds the private return.²¹ Equally important, as pointed out by Rosenberg (1990), in order for firms to effectively benefit from the diffusion of research and development activities of other firms, they need to possess a certain knowledge base that is fostered by their own research and development activities.²² That is, the magnitude of the spillover effects of research and development are contingent upon the research and development activities of the recipient firms. The implication of this is that the lack of research and development activities in the private sector limits their productivity growth through direct and indirect mechanisms.²³ The direct effect results because their innovation activity is low and their development of new goods or processes for their own benefits is suboptimal. The indirect effect occurs because they have a diminished capacity to take advantage of research and development spillovers that occur through the activities of other firms. Consequently, areas characterized by lower research and development have less goods and processes developed locally and a lower ability to utilize research and development from elsewhere.

Given the relationship between research and development and productivity, the discussion below considers a number of research and development indicators that may help explain differences in productivity observed in Newfoundland and Labrador relative to the region and the country. The indicators considered are: research and development intensity (all sectors and the business sector), research and development performed relative to the area's population and the sectoral composition of research and development performed within an area. While numerous other indicators could be considered, this really requires a separate analysis, which is beyond the scope of this paper.²⁴

Figure 5 profiles research and development intensity in Newfoundland and Labrador, Atlantic Canada and Canada. That is, it considers the level of research and development activities performed in a given area relative to the size of its economy (GDP). Newfoundland and Labrador's and Atlantic Canada's research and development intensities are very similar, representing approximately 1% of GDP. For all but one year, Newfoundland and Labrador's research and development intensity is slightly below that observed in Atlantic Canada and both are significantly below that observed in Canada. In addition, research and development intensity nationally has grown consistently over the time period, from 1.2% of GDP in 1981 to 1.8% of GDP in 2000. The growing research and development intensity nationally, combined with the relatively stable research and

²¹ The fact that the social return on R&D is higher than the private return is demonstrated by: Bernstein (1996), Bernstein and Nadiri (1988), Bernstein (1989), Bernstein and Nadiri (1991), Goto and Suzuki (1989), Griffith (2000), Griliches (1995), Funke (2000), Mansfield, Rapoport, Romeo, Wagner and Beardsley, (1977), Mohnene (1992), Nadiri, (1993), OECD (2000), Scherer (1982), Scherer (1984), Sveilkauskas, (1981), and Terleckyi, (1974).

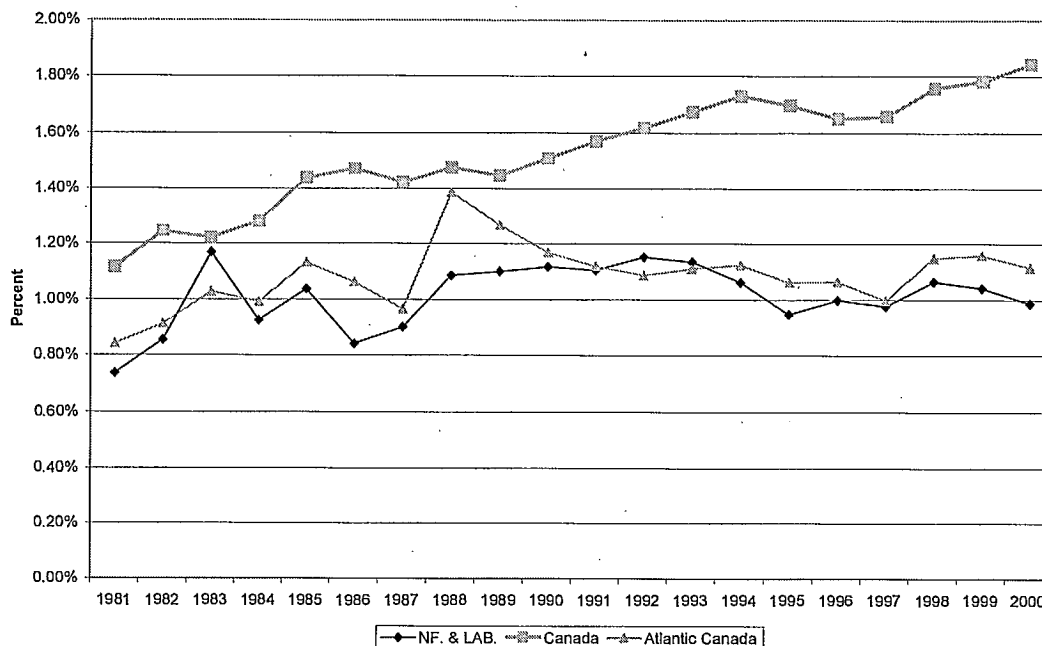
²² Mohnen and Hoareau (2002) and Griffith, Redding and Van Reenen (2000) provide empirical support for the absorptive capacity hypothesis. As well, Mansfield, Swartz and Wagner (1981) finds that there are substantial costs associated with copying innovations developed by others.

²³ Griffith (2000) highlights the empirical support for the dual role of research and development – it stimulates innovation and facilitates the adoption of existing technology.

²⁴ Locke and Lynch (2002) provide an analysis of the state of innovation across Canada utilizing available statistical indicators.

development intensity provincially and regionally, has resulted in a divergence of research and development intensity observed in all three areas.

Figure 5: Total R&D Performed as a Percent of GDP



While Newfoundland and Labrador is falling behind the total research and development intensity found Canada-wide, the situation is even more of a concern when one focuses on research and development intensity in the business sector only. These indicators are displayed in Figure 6. Clearly, the discrepancy between Newfoundland and Labrador and Canada is large and growing. For example, business sector research and development performed in Newfoundland and Labrador is more or less constant at 0.1% of GDP, while the corresponding estimate for Canada nearly doubles from 0.6% of GDP in 1981 to 1.1% of GDP in 2000. That is, the research and development intensity by Newfoundland and Labrador's business sector is less than one-tenth of that observed nationally. As well, the pattern displayed for the business sector in Atlantic Canada is similar to that observed for Newfoundland and Labrador, but generally twice as large. In other words, the level of research and development undertaken by the business sector relative to the size of the economy is falling well behind the national level in both the province and the region. This is very troubling because it is well established that research and development by the business sector is a key driver of productivity within an area.

Utilizing population to normalize research and development performed improves Newfoundland and Labrador's and Atlantic Canada's position relative to that achieved on average Canada-wide, see Figure 7. Even though the relative position is improved, the province and the region are falling below the nation on this indicator as well.

Figure 6: R&D Performed by the Business Sector as a Percent of GDP

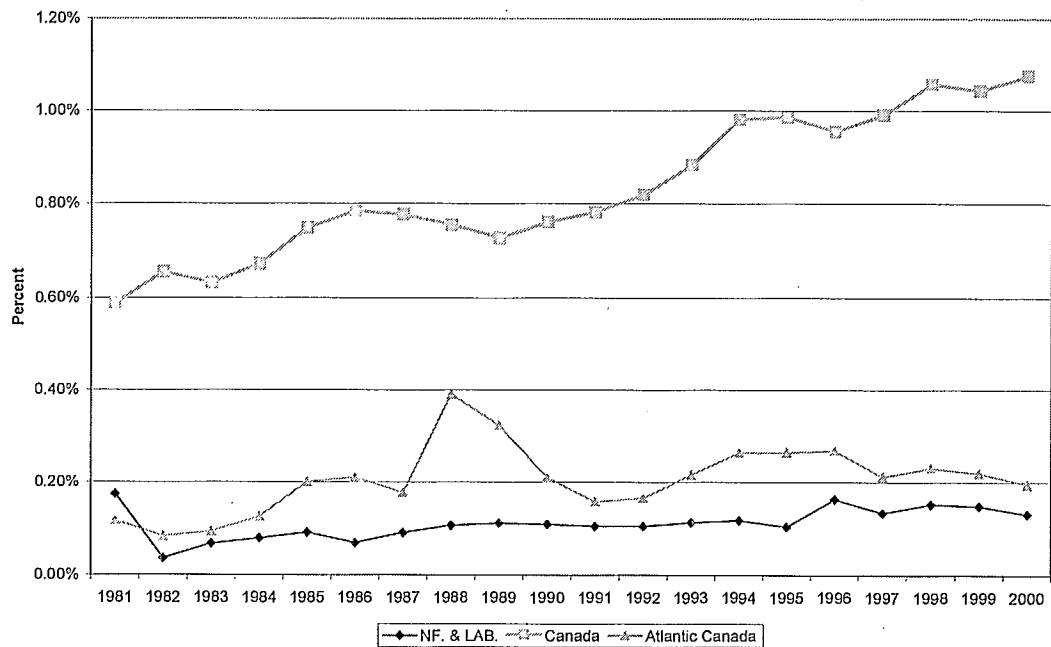
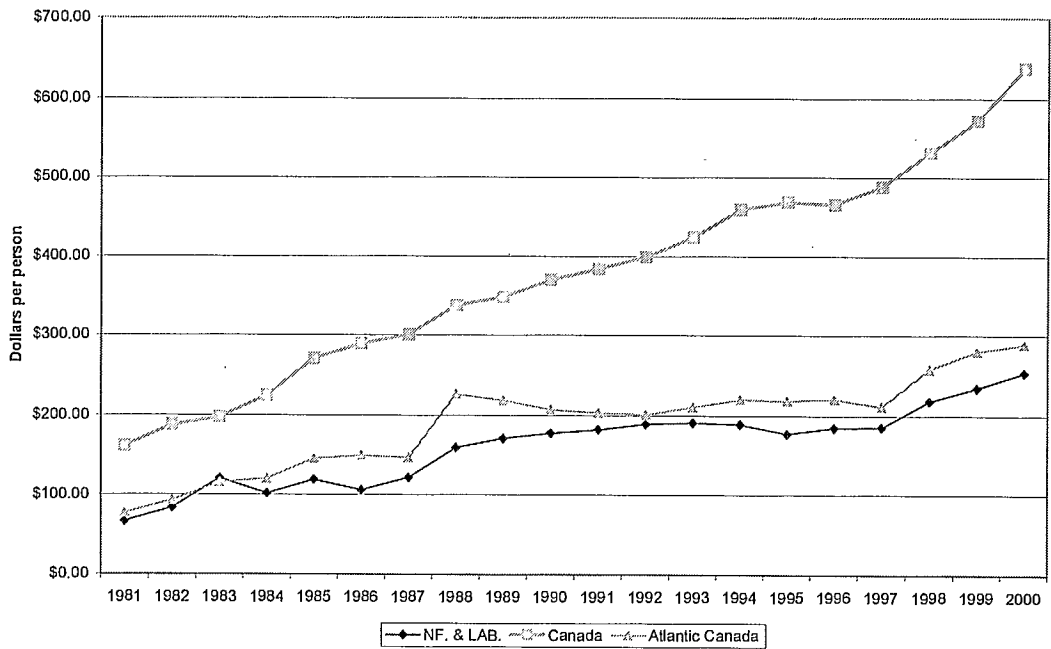


Figure 7: Total R&D Performed Per Capita



Figures 8, 9 and 10 display the sectoral composition of research and development performed in Newfoundland and Labrador, Atlantic Canada and Canada. The points to highlight here are:

- Research and development performed in the province is dominated by the education sector, which performed more than 60% of Newfoundland and Labrador's research and development in 2000;
- The share accounted for by the education sector in Newfoundland and Labrador has been increasing over time;
- The share of research and development performed by the business sector in Newfoundland and Labrador has averaged 10% and reached only 13.2% in 2000;
- The research and development shares are similar in Atlantic Canada, but the business sector performs slightly higher shares (17.5% in 2000) and the education sector performs slightly lower shares (54.6% in 2000); and
- At the national level, one observed that the business sector accounts for nearly 60% of the research and development activity performed in Canada and the education sector performed less than 30% of the research and development.

Figure 8: Relative Shares of R&D Performed by Sector - Newfoundland and Labrador

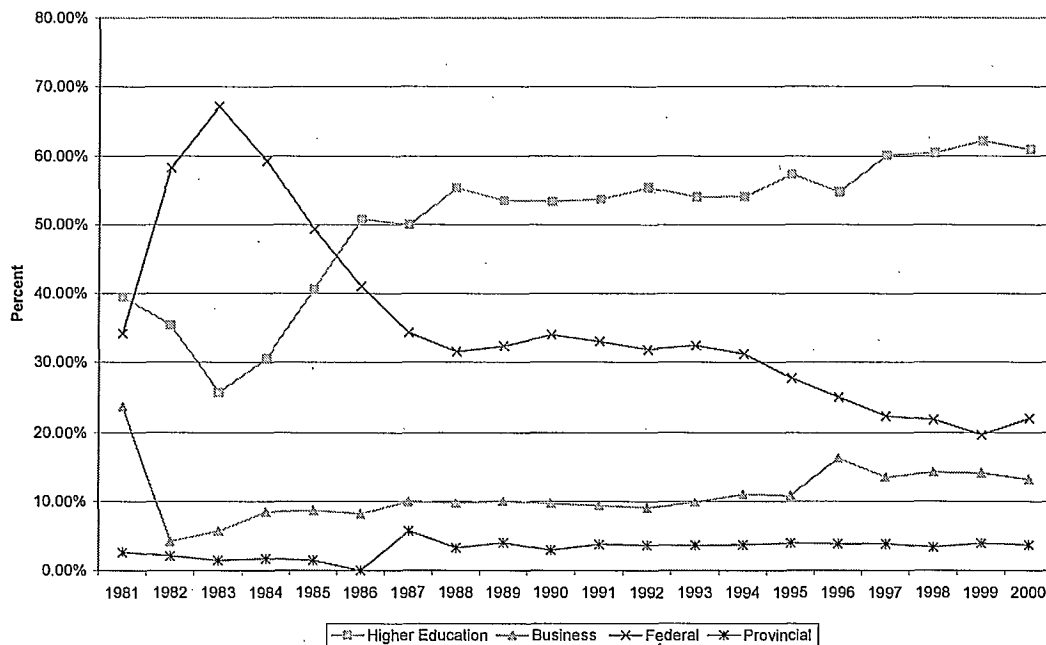


Figure 9: Relative Shares of R&D Performed by Sector - Atlantic Canada

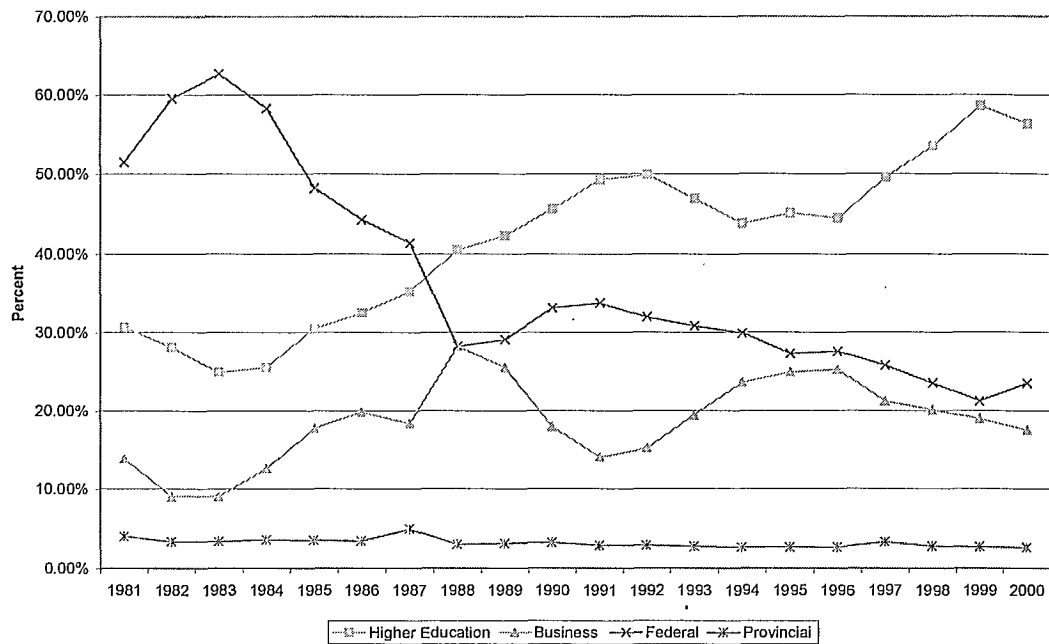
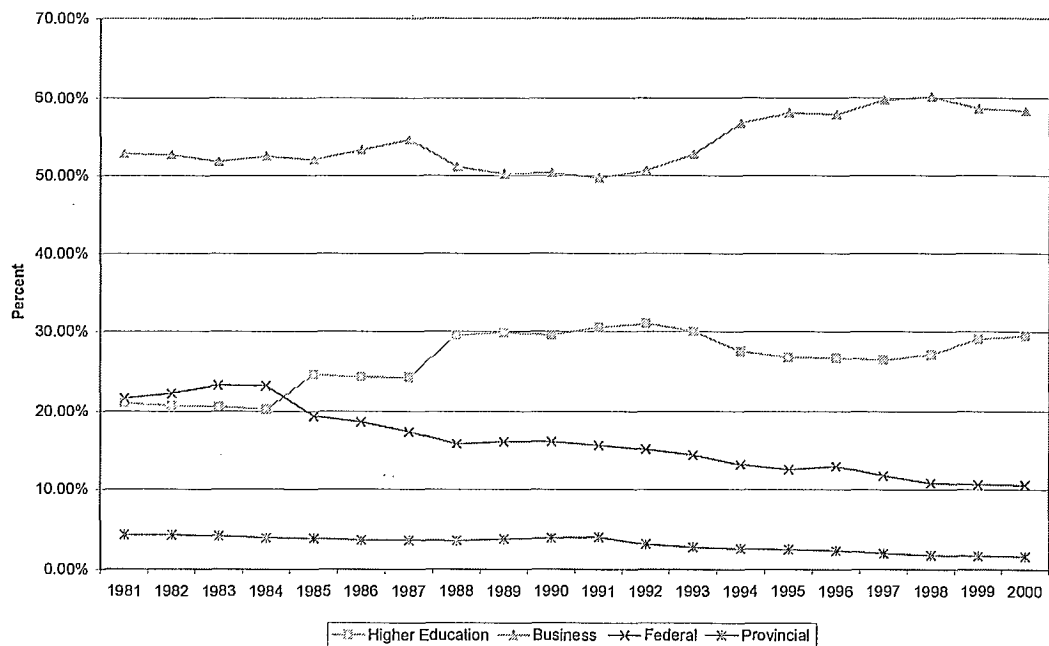


Figure 10: Relative Shares of R&D Performed by Sector - Canada



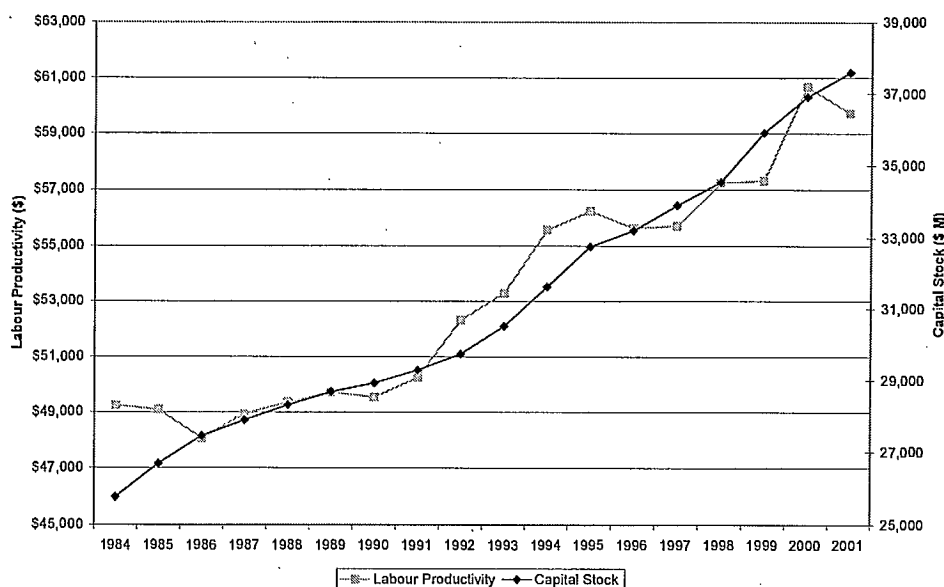
Based on these indicators, it is possible to conclude that research and development activities in Newfoundland and Labrador have not had the prominent role in facilitating

productivity that they might have had. The overall level of research and development intensity is low and the research and development intensity associated with the business sector is extremely low. As well, the research and development performed in Newfoundland and Labrador is dominated by the education sector. These three factors combined imply that incentive for commercialization of research and development activities is lower in Newfoundland and Labrador than in the region or the nation. Consequently, there is less innovation, in terms of goods and services or new processes, and, as such, this results in lower productivity. Finally, the low levels of research and development activities performed by the business sector reduce the ability of the local business sector to benefit through the diffusion of technology developed in other jurisdictions.

3b. The Influence of the Capital Stock

One should expect that there would be a direct relationship between the capital-labour ratio²⁵ in a jurisdiction and the level of labour productivity exhibited by that jurisdiction. Figures 11, 12 and 13 plot constant dollar estimates for labour productivity against capital stock for Newfoundland and Labrador, Atlantic Canada and Canada, respectively. There is a fairly close correspondence between the size of the capital stock and the output per worker observed in each jurisdiction. While the relationship is not perfect, one should not expect it to be given that capital stock is only one of the factors that influence labour productivity. However, the close correspondence does indicate that differences in capital per employee across these jurisdictions may be important in explaining differences in productivity.

Figure 11: Labour Productivity and Capital Stock - Newfoundland and Labrador



²⁵ The capital-labour ratio indicates the amount of machinery and equipment that is available per worker to produce goods and services in the economy. In general, the more capital available per worker, the higher will be the output per worker or the higher will be labour productivity.

Figure 12: Labour Productivity and Capital Stock - Atlantic Canada

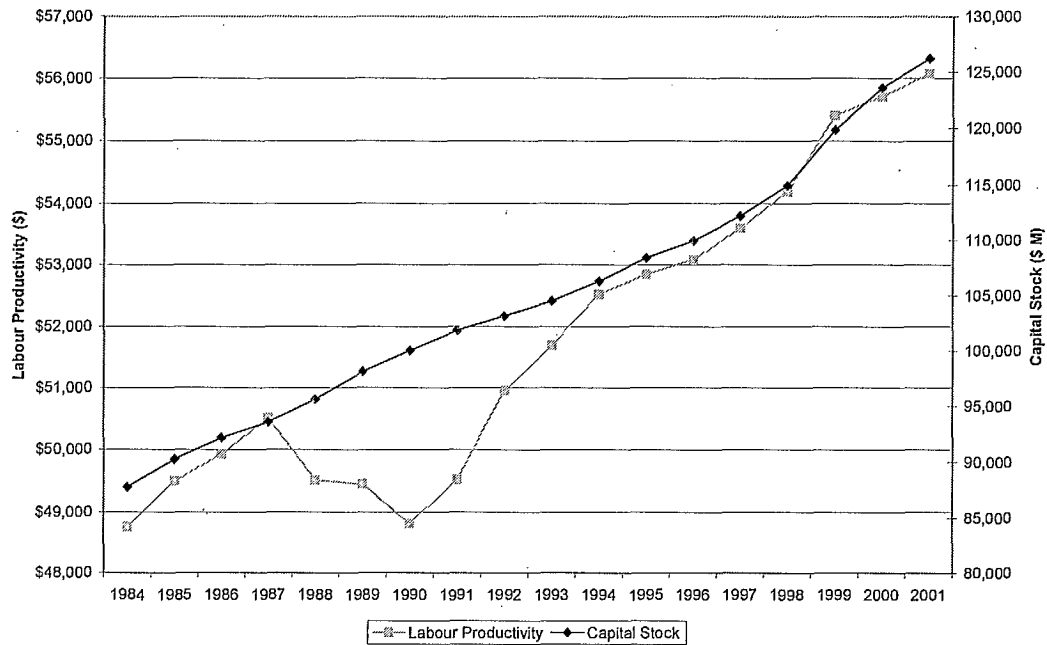
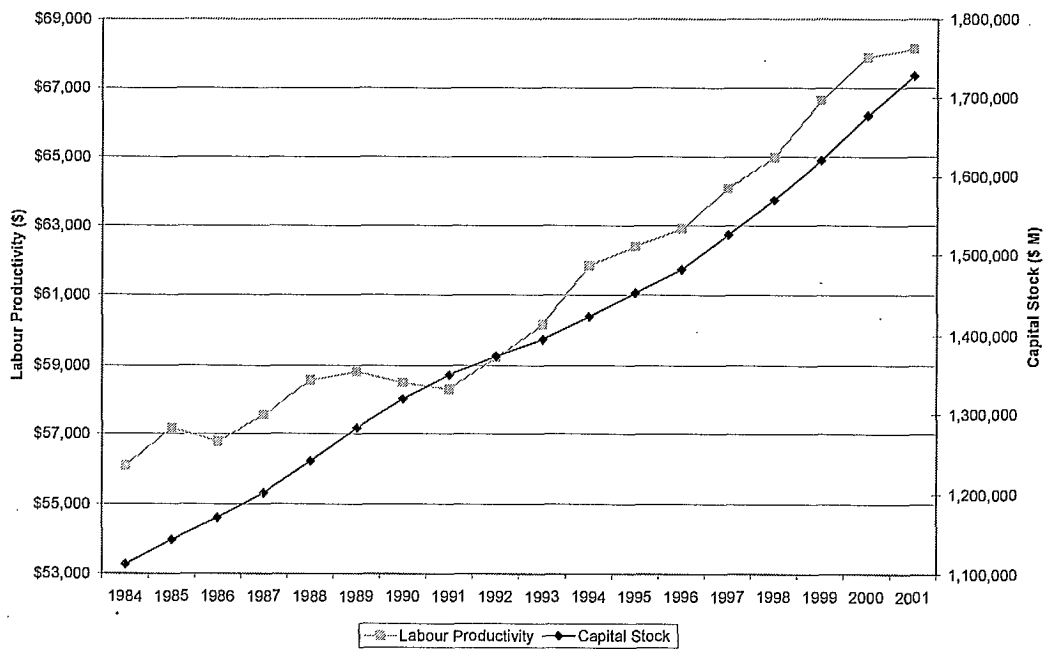


Figure 13: Labour Productivity and Capital Stock - Canada



Figures 14 and 15 illustrate the relationship between the capital-labour ratio and labour productivity achieved in Newfoundland and Labrador for various years. Clearly, there is a close relationship between the two. In fact, Figure 15 fits a nonlinear trend through the data and the r^2 is 0.88, indicating that there is a close relationship between the two.

Figure 14: Capital-Labour Ratio and Labour Productivity - Newfoundland and Labrador

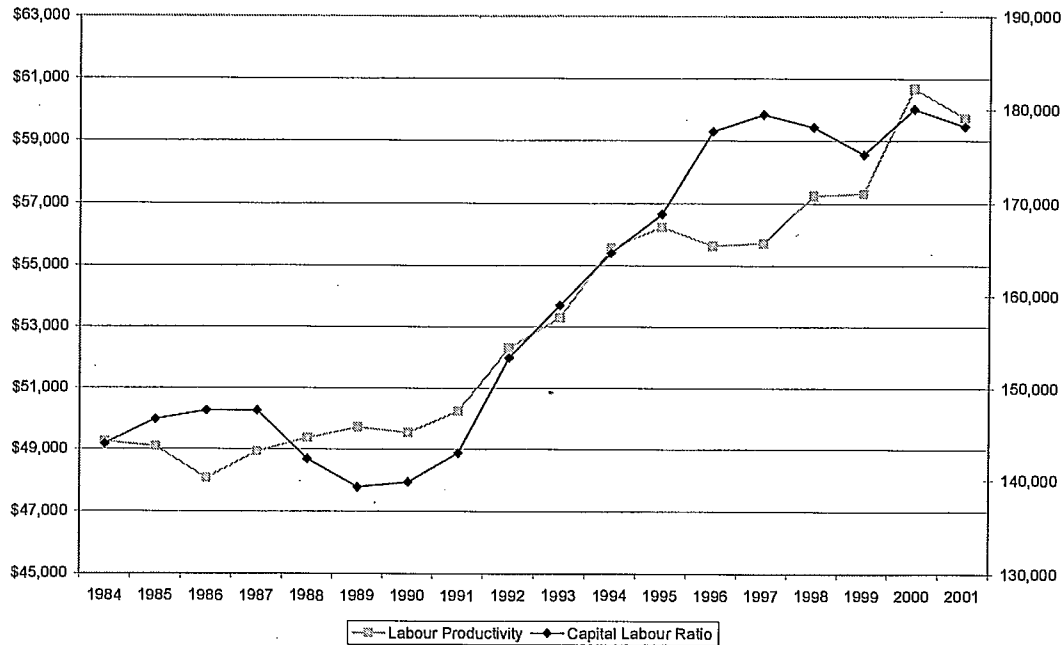
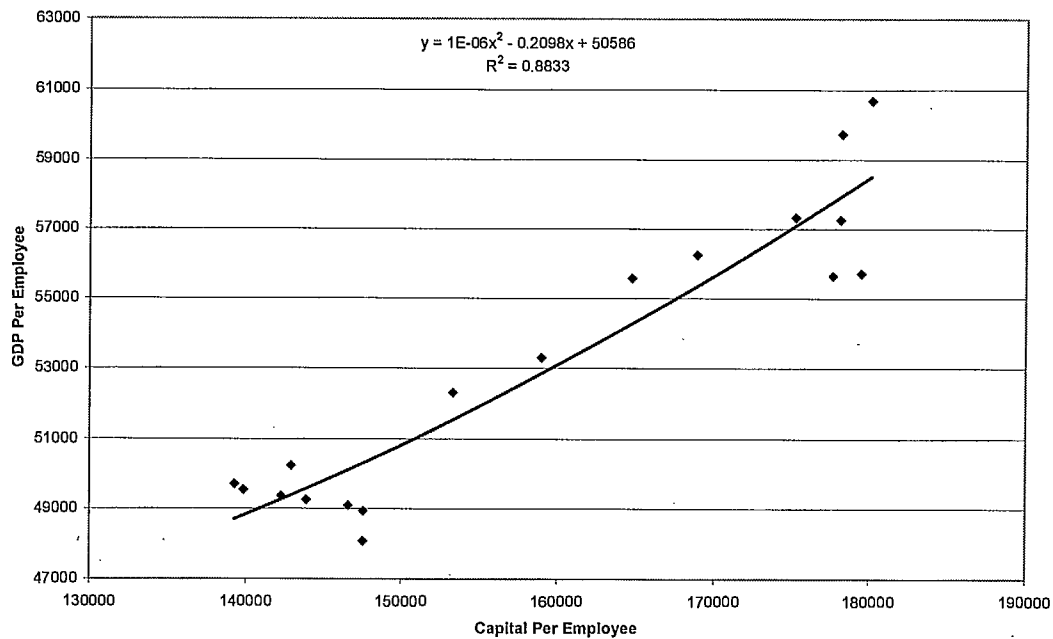


Figure 15: Labour Productivity and Capital Labour Ratio - Newfoundland and Labrador



A similar pattern is illustrated for Atlantic Canada, see Figures 16 and 17. With an $r^2 = 0.96$, the correspondence between labour productivity and the capital-labour ratio is even stronger for Atlantic Canada than was observed for Newfoundland and Labrador.

Figure 16: Capital-Labour Ratio and Labour Productivity - Atlantic Canada

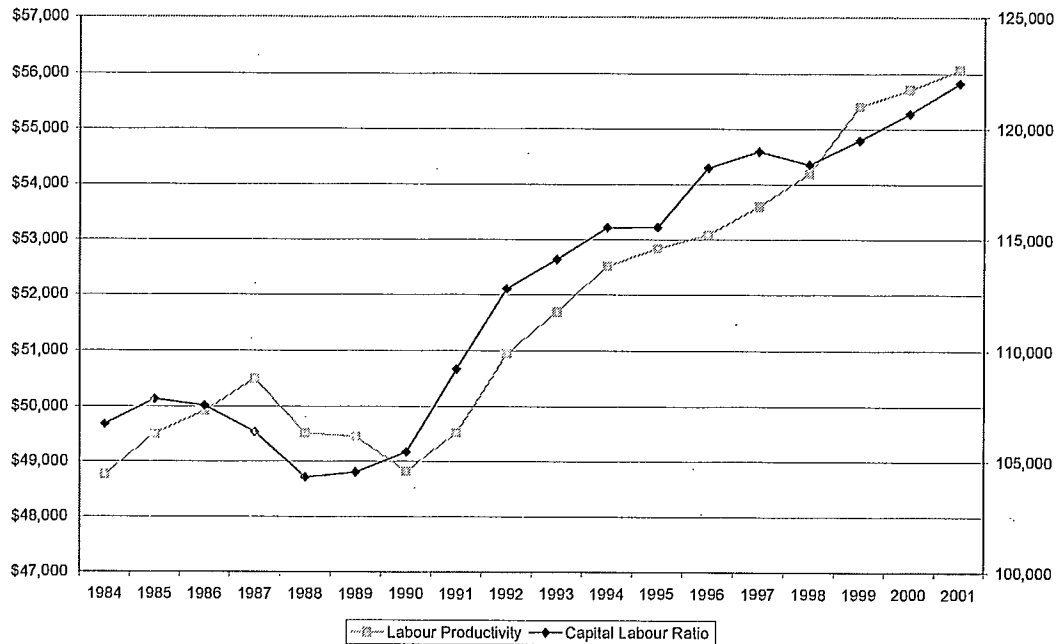
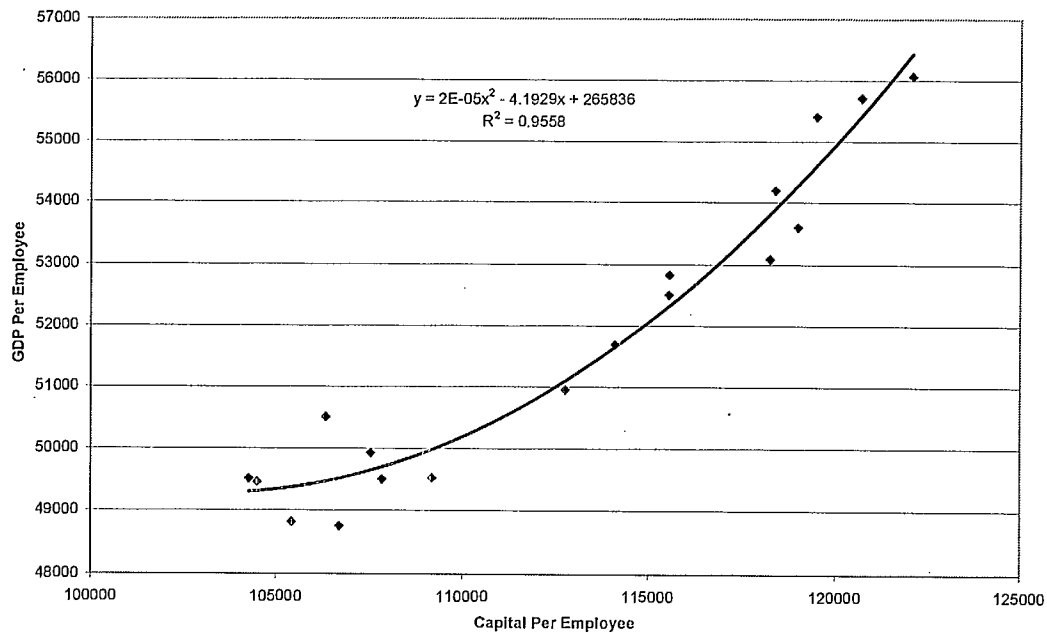


Figure 17: Labour Productivity and Capital Labour Ratio - Atlantic Canada



Likewise, Figures 18 and 19 indicate that the relationship between labour production and the capital-labour ratio is strong, as indicated by an $r^2 = 0.92$ for Canada as a whole.

Figure 18: Capital-Labour Ratio and Labour Productivity - Canada

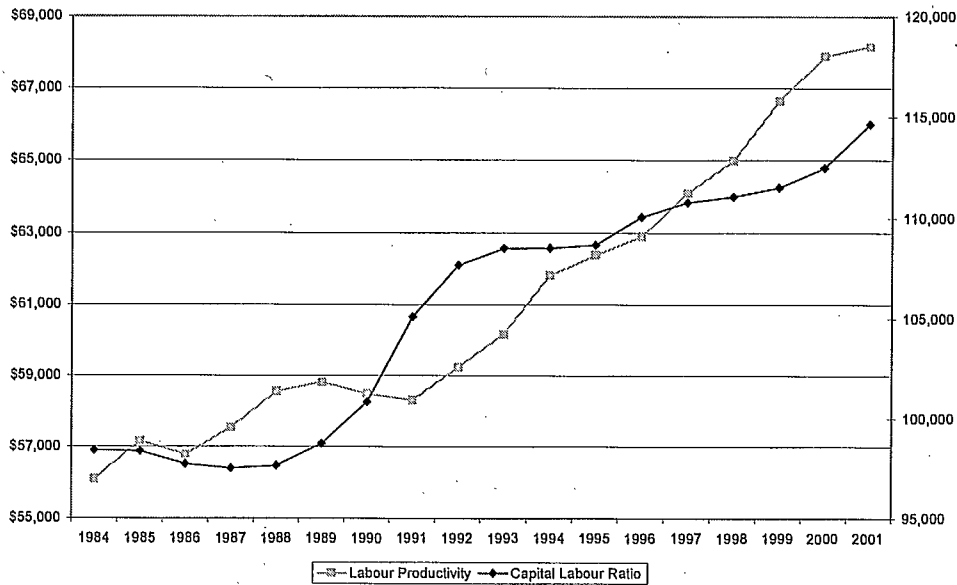


Figure 19: Labour Productivity and Capital Labour Ratio - Canada

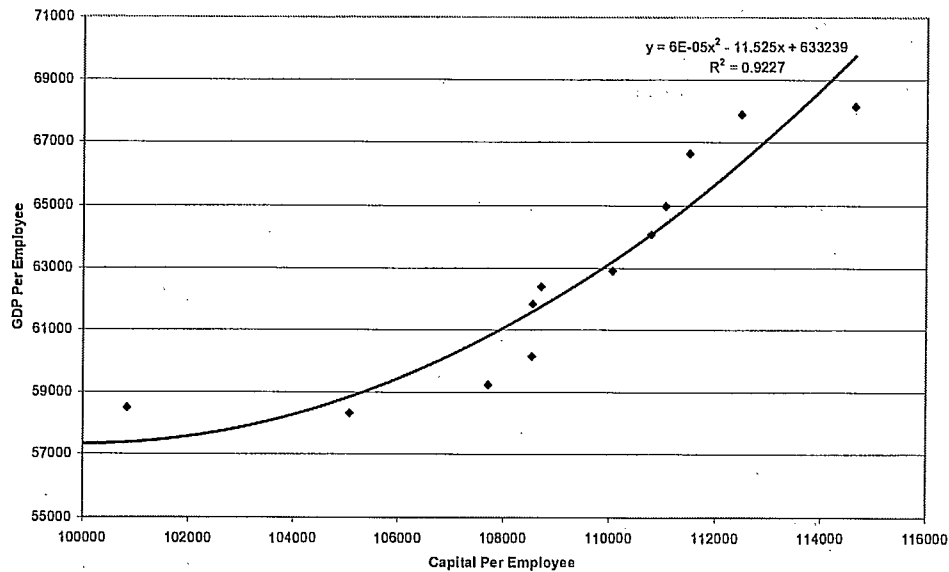


Figure 20 indicates that the capital-labour ratio in Newfoundland and Labrador has increased from 1990 until 1997 relative to that exhibited in Atlantic Canada and the nation as a whole. As indicated in Figure 34, during this period oil and gas development phase investment for the Hibernia project was high. The pattern in Atlantic Canada traces fairly closely that observed nationally.

Figure 20: Capital-Labour Ratios for Newfoundland and Labrador, Atlantic Canada and Canada - Select Years

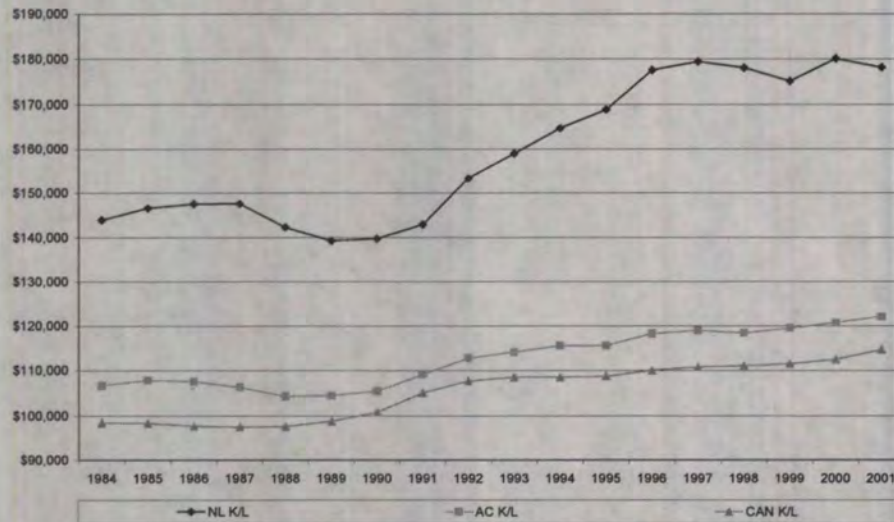
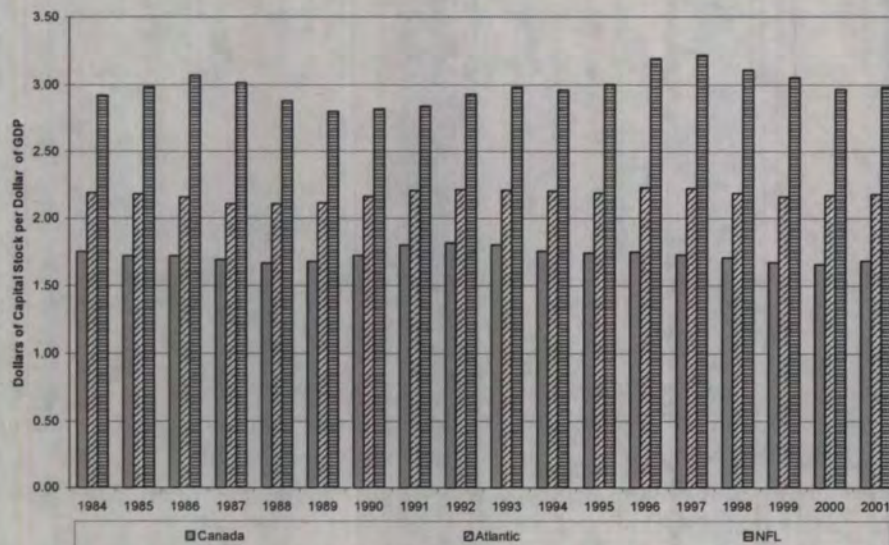


Figure 21 indicates that the capital-output ratio in Newfoundland and Labrador was approximately 75 percent higher than that exhibited Canada-wide and about 40 percent higher than that found in Atlantic Canada. This indicates that the efficiency with which the capital is being utilized in Newfoundland and Labrador is lower than that found in either the region or the country. While there may be many different explanations for this phenomenon, including problems with measuring capital stock, one partial explanation may be the higher proportion of seasonal industrial output that makes up Newfoundland and Labrador's GDP. In particular, the fact that fish plants in Newfoundland and Labrador cannot be utilized year round may explain the apparent lower capital productivity.

Figure 21: Capital-Output Ratio - Newfoundland and Labrador, Atlantic Canada and Canada



3c. The Contribution of Education Levels

Another possible set of indicators that may help explain labour productivity is the education level and skill set possessed by the employees. *Ceteris paribus*, the more educated the workforce, the higher will be their productivity. This is explained, in part, by the fact that the more educated workforce can utilize productivity-enhancing technological innovations more effectively. Figures 22, 23, 24 and 25 compare education levels in Newfoundland and Labrador to those that existed in Atlantic Canada and Canada-wide.

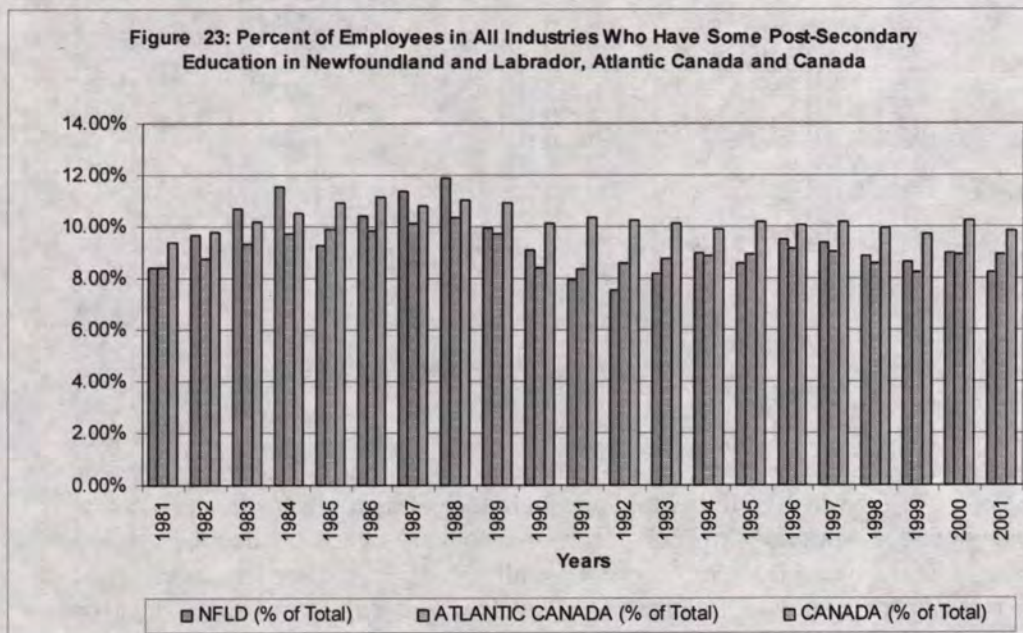
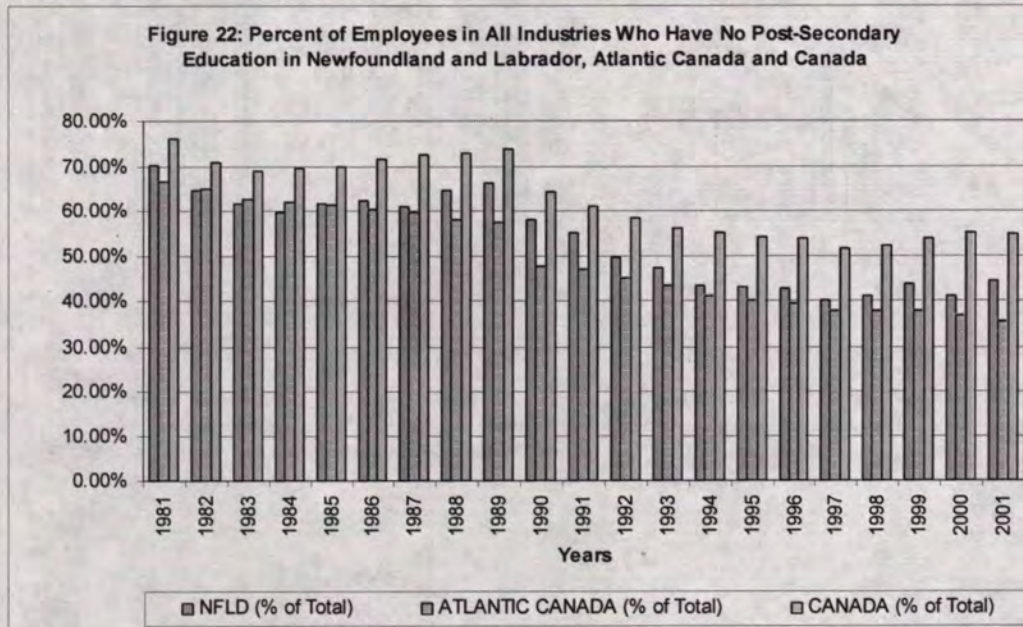


Figure 24: Percent of Employees in All Industries Who Have A Post-Secondary Education Certificate or Diploma in Newfoundland and Labrador, Atlantic Canada and Canada

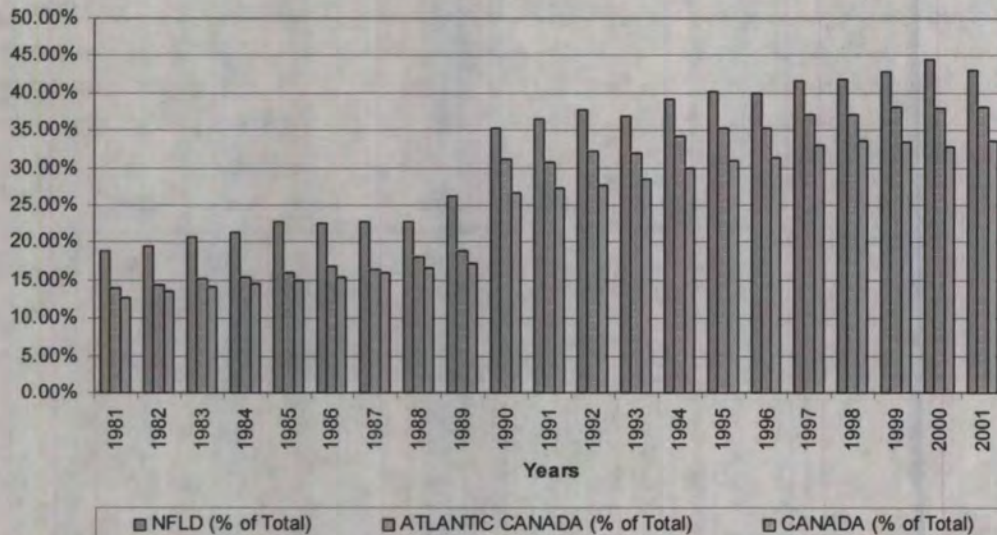
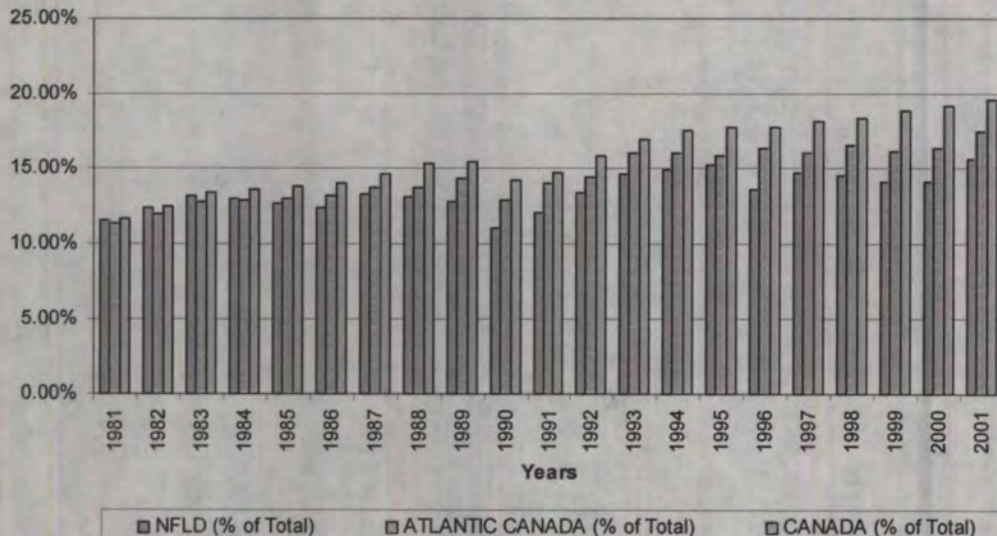


Figure 25: Percent of Employees in All Industries Who Have A University Degree in Newfoundland and Labrador, Atlantic Canada and Canada



From these diagrams, one observes that the education levels exhibited by the workforce improved over time in Newfoundland and Labrador, Atlantic Canada and Canada. The percentage of the workers with less than post-secondary education declined significantly – approximately one-third less workers in all three jurisdictions had less than post-secondary education in 2001 relative to the levels which existed in 1981. The proportion

of the employees with some post-secondary education remained basically unchanged from 1981 to 2001 for all three areas. The percentage of the workforce that possessed a post-secondary certificate or diploma increased in all three regions and the increase in this group matched very closely the drop in the proportion of the workforce that had less than post-secondary education. Finally, the proportion of workers in Canada with a university degree increased by 8 percentage points - from 11.6 percent to 19.6 percent. The corresponding improvement in Atlantic Canada was about 6 percentage points while the increase in the proportion of Newfoundland and Labrador workers with a university degree was 4 percentage points higher in 2001 than existed in 1981. Clearly, skill levels are improving in all parts of the country, but Newfoundland and Labrador is not benefiting to the same degree as other parts of the country in terms of the higher education levels.

Figure 26, 27 and 28 also reinforce this basic story. The education levels in Newfoundland and Labrador are improving, but the largest improvement is in terms of technical skills rather than university degrees. This is also observed Canada-wide and in the region, but in both areas, the increases in workers with university degrees are higher than that observed in Newfoundland and Labrador.

Figure 26: Percent of Newfoundland and Labrador Employees in All Industries by Educational Attainment

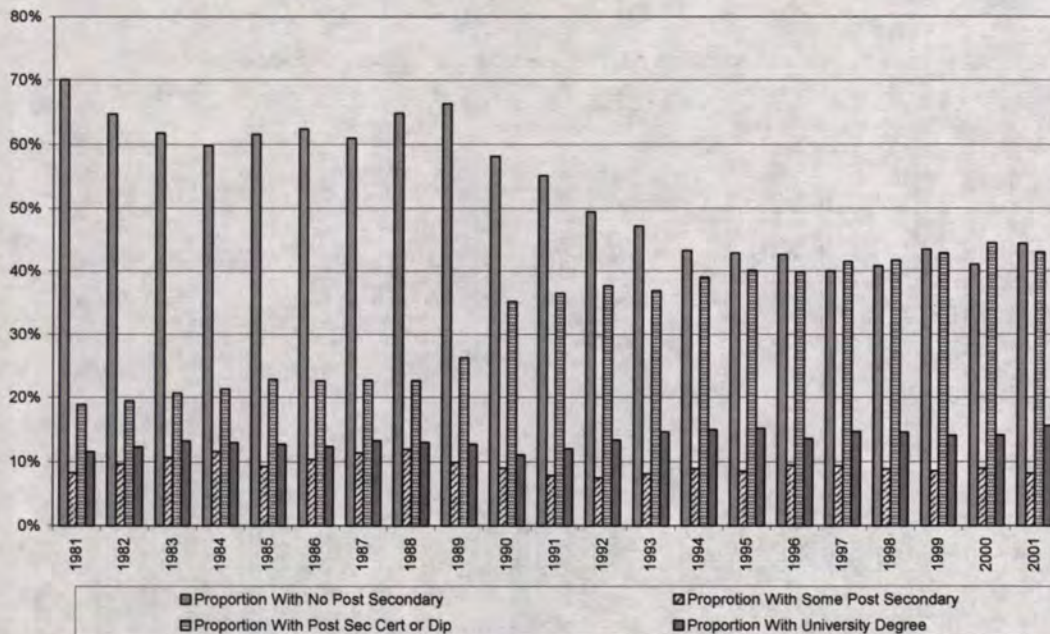


Figure 27: Percent of Atlantic Canadian Employees in All Industries by Educational Attainment

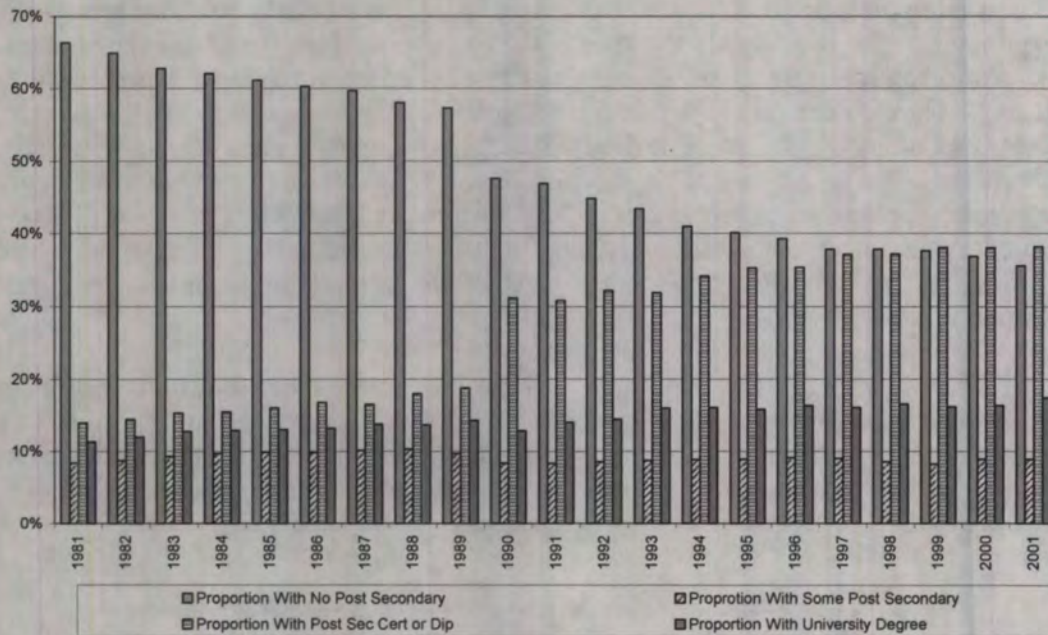
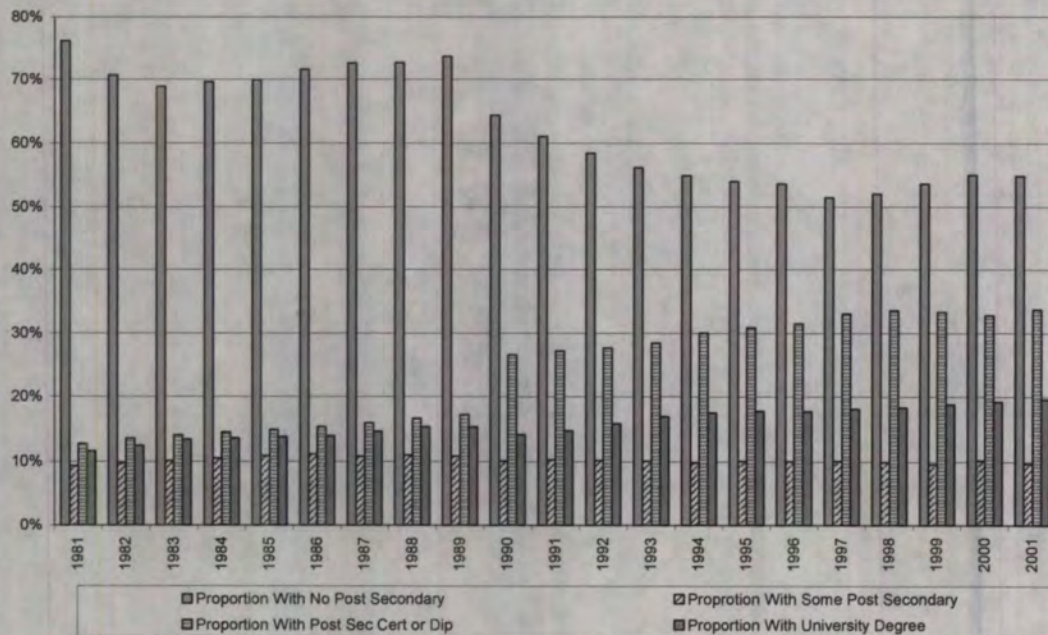
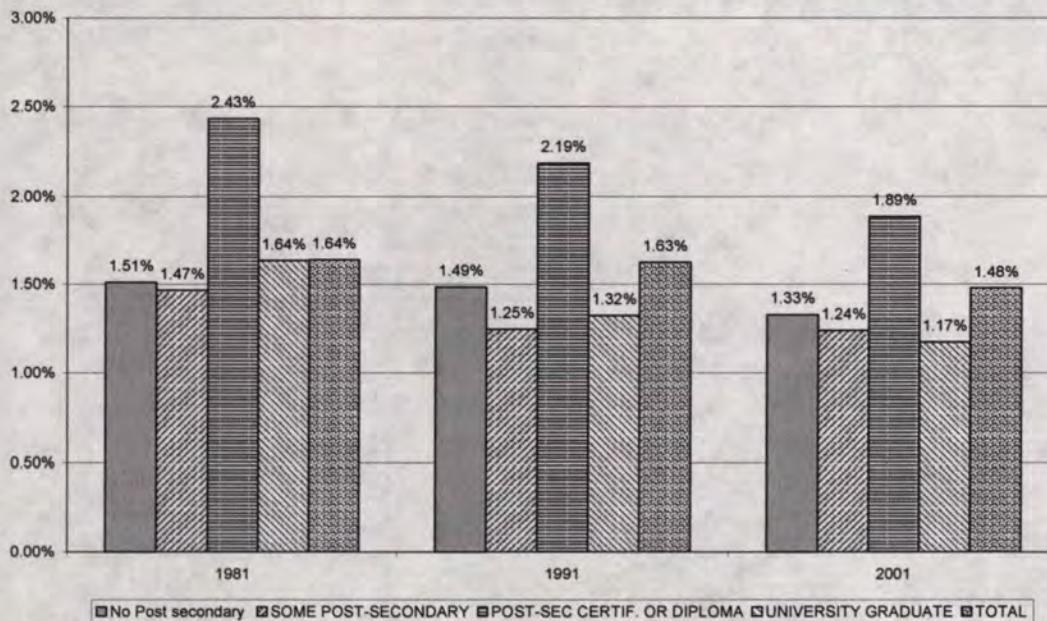


Figure 28: Percent of Canadian Employees in All Industries by Educational Attainment



Finally, Figure 29 illustrates that Newfoundland and Labrador share of workers is declining, but not as quickly as is its share of university graduates. For example, in 1981 Newfoundland and Labrador's share of university graduates nationally was equal to its share of employees, both were at 1.6%. However, by 2001 Newfoundland and Labrador's share of employees declined to 1.5%, while its share of university graduates declined to 1.2%. Not being able to maintain its share of more educated workers does not bode well for improving its labour productivity through internally generated solutions in the future.

Figure 29: National Shares of Employees in Newfoundland and Labrador by Educational Attainment



3d. The Effect of Industrial Composition

It is interesting to consider the extent to which differences in aggregate labour productivity across various jurisdictions can be explained by the differences in industrial structure that exist within those jurisdictions. To compare the productivity differences, evaluated in terms of employment or hours worked, across jurisdictions that result from industrial composition, it is necessary to express aggregate labour productivity as a weighted average of the levels of labour productivity observed in each industry, where the weights are the share of the jurisdiction's employment or hours worked accounted for by that industry.²⁶ As well, the relationship between aggregate and industrial productivity growth, measured by employment or hours worked, is a weighted average of the sum of growth in labour productivity in each sector and the growth in the share of

²⁶ A more detailed explanation of the relationship between the aggregate provincial analysis and the disaggregated industrial analysis is provided by the accounting framework developed in the concept paper and reproduced in Appendix A.

employees or hours worked accounted for by that sector. The weights utilized in this calculation are the GDP or value-added shares of each sector.²⁷

The analysis provided below examines the difference in labour productivity by industry using hours worked as the relevant measure of labour effort.²⁸ The same analysis was undertaken utilizing employees. However, since there were no significant differences between both labour productivity estimates, it was decided to omit the employee analysis to avoid unnecessary repetition.²⁹

Appendix D: Tables D1 to D6 present the labour productivity achieved in each industry, measured as real GDP per hour worked, and the contribution that each industry makes to overall labour productivity for Newfoundland and Labrador, Atlantic Canada and Canada from 1987 to 2001. These tables are supplemented by Figures 30, 31 and 32.

Figure 30: Change in Labour Productivity (GDP per Hour Worked) by Industry - Newfoundland and Labrador - 1987 to 2001

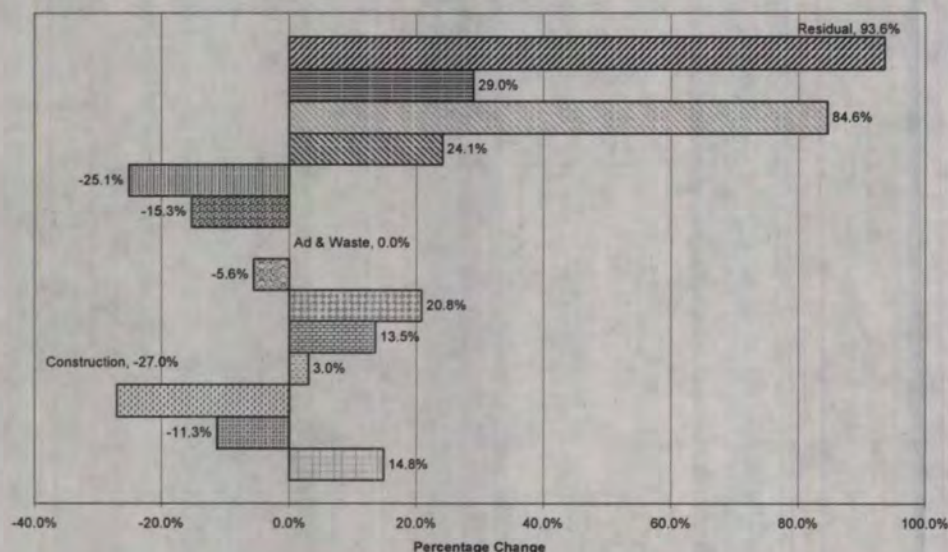


Figure 30 indicate that Newfoundland and Labrador's real GDP per hour worked for all industries combined increased from \$26.07 in 1987 to \$29.93 in 2001, an increase of 14.8%. In addition, during this time period the Utilities sector declined from \$91.11 to \$80.81. However, the decline in labour productivity in Utilities occurred in the last year – real GDP per hour worked in the Utilities sector declined from \$139.33 in 2000 to \$80.81 in 2001. Four other sectors that had labour productivity decreases were:

²⁷ This relationship is elaborated on in Appendix A.

²⁸ This analysis uses actual hours worked in their main job as the labour input statistic.

²⁹ The analysis at the industry level utilizing employees as a measure of labour is available upon request.

- The Construction sector had its labour productivity decline from \$33.03 (1987) to \$24.13 (2001), corresponding to a 27% fall;
- The Professional and Technical Services sector's labour productivity fell by 5.6%, declining from \$22.91 in 1987 to \$21.63 in 2001;
- Falling from \$34.79 (1987) to \$29.45 (2001), the Education Services sector experienced a 15.3% decline in its labour productivity; and
- The Health Services sector's labour productivity declined from \$25.50 (1987) to \$19.09 (2001), representing a 25.1% fall.

The Administration and Waste Management Services sector did not record any change in its labour productivity over the time period. All other sectors saw their labour productivity increase over this time period. Increases in labour productivity were recorded in the following sectors:

- The Manufacturing sector's labour productivity increased by 3%, rising from \$22.31 (1987) to \$22.97 (2001);
- The Retail and Wholesale Trade sector, which had its labour productivity increase from \$15.28 (1987) to \$17.34 (2001), recorded to a 13.5% increase;
- Experiencing a 20.8% increase in its labour productivity, the F.I.R.E. sector saw its labour productivity rise from \$114.51 (1987) to \$137.88 (2001);
- The Accommodations and Food Services sector's labour productivity improved from \$10.54 (1987) to \$13.08 (2001), representing a 24.1% increase;
- The Other Services sector saw its labour productivity increase from \$8.27 (1987) to \$15.27 (2001), which corresponded to a 84.6% increase;
- The Public Services sector, with a 29.0% increase, observed its labour productivity increase from \$29.83 (1987) to \$38.49 (2001); and
- The best improvement in labour productivity was recorded in the Residual sector.³⁰ Corresponding to a 93.6% increase, the Residual sector's labour productivity increased from \$21.14 (1987) to \$40.93 (2001).

Appendix D: Table D2 displays the contribution that each of the industries made to overall labour productivity in Newfoundland and Labrador from 1987 to 2001.³¹ The highlights of this table are:

- The contribution to labour productivity from the Residual category increased from 15.7% in 1987 to 24.4% in 2001. This is explained by the fact that the residual category includes the oil and gas sector. The contribution of the oil and gas sector

³⁰ At the provincial and regional levels, data on a number of industries had to be suppressed for confidentiality reasons. Rather than lose this data, it was grouped into a residual sector for the purposes of this study. The residual sector is calculated by deducting the information for industries that are available from the total. The residual sector includes the following sectors: agriculture, forestry, fishing and hunting, oil and gas, mining, transportation and warehousing, information and arts. For Newfoundland and Labrador the residual category accounted for 15.5% of its GDP in 1987 and by 2001 this had risen to 24.4%. Given the significance of these omitted sectors for the Newfoundland and Labrador economy, it is unfortunate that they have to be grouped into a residual category. There is, however, nothing that can be done about that at this point in time.

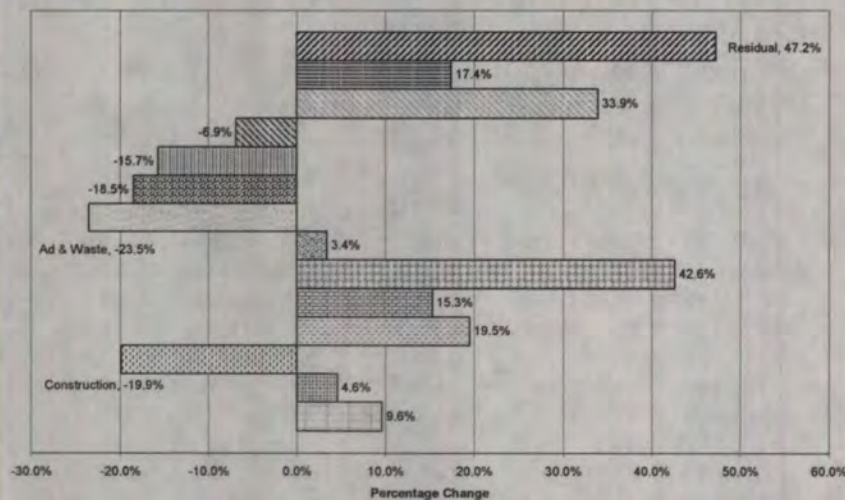
³¹ The contribution to productivity that each sector makes to overall productivity is derived by weighting the sector's labour productivity by its employment share and dividing this product by the labour productivity recorded in all industries.

to provincial GDP and labour productivity increased significantly after 1997, when the first barrel of oil was produced;

- The Residual category is also the largest contributor to provincial labour productivity, contribution 24.4% of the labour productivity in 2001;
- The contribution to labour productivity by the Construction sector represented the largest decrease over the period, decreasing from 9.3% in 1987 to 5.2% in 2001;
- A decline was recorded in the shares of labour productivity accounted for by: Utilities, Construction, Manufacturing, Education, Health and Public Services; and
- The following sectors' contribution to overall labour productivity increased from 1987 to 2001: Retail and Wholesale Trade, Finance, Insurance and Real Estate (F.I.R.E.), Professional and Technical Services, Administration and Waste Management, Accommodation and Food Services, Other Services and the Residual sector.

For Atlantic Canada, Appendix D: Table D3 profiles the labour productivity achieved by each industry, Figure 31 shows the change in labour productivity by industry and Appendix D: Table D4 indicates the associated contribution that each sector made to overall labour productivity. The pattern exhibited in Atlantic Canada for the changes in the contribution that each sector made to overall productivity in the region are very similar to those noted above for Newfoundland and Labrador. While the change in the contribution being made by the Residual sector (3 percentage points) is not as dramatic as was observed in Newfoundland and Labrador, it is nonetheless in the same direction and represents a significant increase. The Manufacturing sector takes on a more prominent role in Atlantic Canada than it did in Newfoundland and Labrador – accounting for nearly 11% of labour productivity in Atlantic Canada in 2001 and only 6.4% of labour productivity in Newfoundland and Labrador for the same year. As well, the contribution to labour productivity by the F.I.R.E. sector is higher in Atlantic Canada than it was in Newfoundland and Labrador.

Figure 31: Change in Labour Productivity (GDP per Hour Worked) by Industry - Atlantic Canada - 1987 to 2001



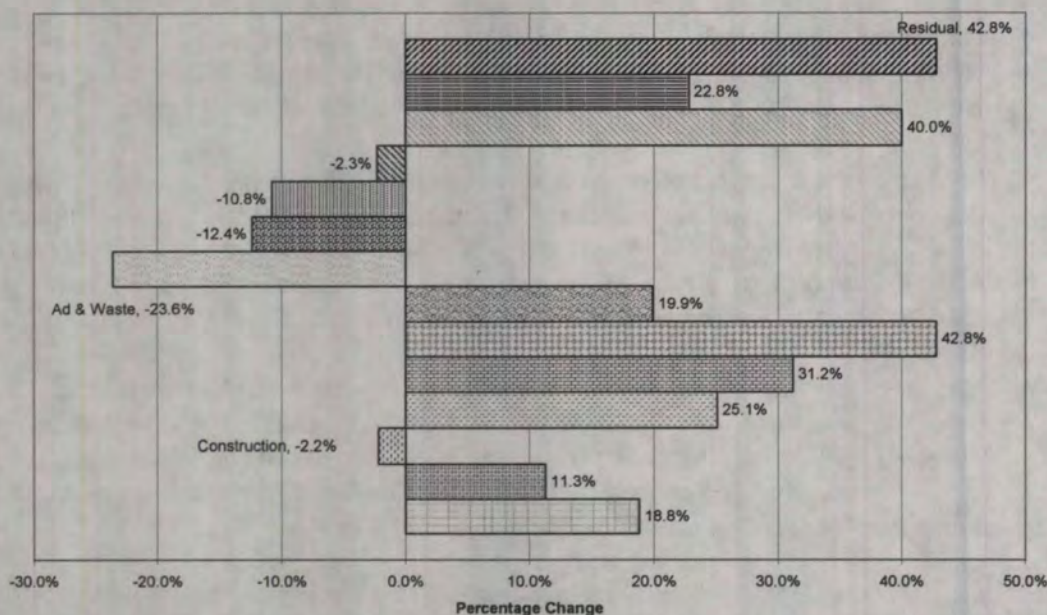
Comparing the levels of labour productivity observed in Newfoundland and Labrador with those that prevailed in Atlantic Canada in 2001, one finds:

- Overall labour productivity in Newfoundland and Labrador (\$29.93) is higher than observed in Atlantic Canada (28.46), a 5.2% difference;
- Newfoundland and Labrador's labour productivity for all industries grew by 14.8% between 1987 and 2001, while it only grew by 9.6% for Atlantic Canada as a whole;
- For some industries, Newfoundland and Labrador's labour productivity exceeded that observed in Atlantic Canada. These were: Construction (8.9% higher), F.I.R.E. (5.0% higher), Professional and Technical Services (4.8% higher), Administration and Waste Management (4.8% higher), Education Services (22.3% higher), Accommodation and Food Services (7.4% higher), and the Residual sector (33.7% higher); and
- For the other industries, labour productivity observed in Newfoundland and Labrador was lower than that observed in Atlantic Canada. These sectors were: Utilities (5.3% lower), Manufacturing (16.2% lower), Retail and Wholesale Trade (5.8% lower), Health Services (1.7% lower), Other Services (0.1% lower) and Public Services (13.8% lower).

Appendix D: Tables D5 and D6 and Figure 32 present the corresponding information for Canada as a whole. Note that overall productivity in Canada (\$35.81 in 2001) exceeded that recorded in either Newfoundland and Labrador (\$29.93 in 2001) or Atlantic Canada (\$28.46 in 2001). Between 1987 and 2001, the increase in labour productivity for all industries in Canada was 18.8%. This exceeded the 14.8% achieved in Newfoundland and Labrador and the 9.6% recorded for Atlantic Canada. In addition, labour productivity in most of the sectors increased in Canada from 1987 to 2001. Specifically, labour productivity increased in: Utilities, Manufacturing, Retail and Wholesale Trade, F.I.R.E., Professional and Technical Services, Other Services, Public Services and the Residual sector. Over this same period, labour productivity declined in: Construction, Administration and Waste Management, Education, Health, and Accommodation and Food Services. The sectors that contributed the most to labour productivity throughout Canada in 2001 were:

- F.I.R.E. with 19.7%;
- Manufacturing with 17.0%;
- The Residual sector with 16.2%; and
- Retail and Wholesale Trade with 11.3%.

Figure 32: Change in Labour Productivity (GDP per Hour Worked) by Industry - Canada - 1987 to 2001



The F.I.R.E. sector and the Professional and Technical Services sector experienced the biggest increases in the contribution being made to overall labour productivity, with 2 and 1.9 percentage point increases, respectively. The largest decreases in the share contributed to overall labour productivity were observed in Education Services (-1.6 percentage points) and Construction (-1.4 percentage points).

With the exception of F.I.R.E. and the Residual category, Newfoundland and Labrador fell short of the labour productivity observed in the rest of Canada. Specifically, Newfoundland and Labrador's labour productivities in 2001, expressed as a percent of the Canadian average, were:

- All industries: -16.4%;
- Utilities: -33.3%;
- Construction: -21.4%;
- Manufacturing: -37.3%;
- Wholesale and Retail Trade: -35.2%;
- F.I.R.E.: 12.6%;
- Professional and Technical services: -10.3%;
- Administration and Waste Management: -48.8%;
- Education Services: -1.6%;
- Health Services: -15.8%;
- Accommodations and Food Services: -14.4%;
- Other Services: -15.4%;
- Public Services: -6.3%; and
- The Residual sector: 7.5%.

The growth in labour productivity by industrial sector was also considered in this analysis. The results of this analysis are presented in Appendix D. There was much more volatility in labour productivity growth within Newfoundland and Labrador than within either the region or the country.

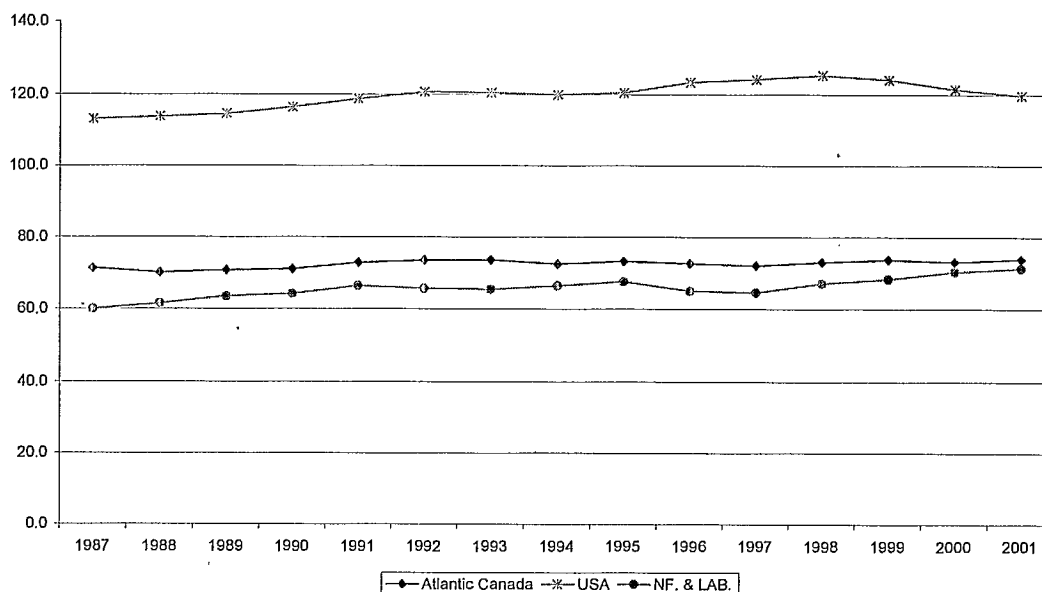
4. Comparison to the United States

Comparing the standard of living across countries requires a common unit that measures the standard of living for each state and province. The standard metric that is used to measure the standard of living is per capita real gross domestic product.

For this analysis, three variables (employment, population, and real GDP) are used to compare the standard of living between states and provinces. Real output is measured in Canadian dollars for both provinces and states. That is, real Gross State Product is expressed in Canadian dollar terms using the purchasing power parity value of the exchange rate for 1997.

Figure 33 presents measures of the standard of living for the period 1987 to 2001 for the United States, Atlantic Canada, and Newfoundland and Labrador relative to Canada as a whole. The standard of living in the United States is typically 20 percent higher than the standard of living in Canada and Atlantic Canada is consistently more than 20 percent below the Canadian average. Newfoundland and Labrador has the lowest standard of living, but the gap is decreasing over time. For example, in 1987 the standard of living was 40 percent below the Canadian average and by 2001 this had closed to 29 percent. As well, the standard of living in 2001 in Newfoundland and Labrador is very close to the value recorded for Atlantic Canada.

Figure 33: Standard of Living - 1987 to 2001 (Canada = 100)



A similar analysis allows for a ranking according to the standard of living for the 10 provinces and 50 states relative to Canada as a whole. Values of less than 100 imply that those jurisdictions have standards of living below those found Canada-wide and values of greater than 100 imply that their standards of living exceed those found on average in Canada. Tables 2, 3 and 4 present the rankings of the provinces and states from highest to lowest for select periods - 1987, 1994 and 2001.³² As indicated in Table 2, each Atlantic Province is ranked in the lowest ten percent, with Newfoundland and Labrador having the lowest standard of living in 1987. By 1994, as demonstrated in Table 3, the relative rankings were more-or-less the same with the four Atlantic Provinces clustered at the bottom. Table 4 illustrates the ranking for 2001. Again, the standard of living in all four Atlantic Provinces is the lowest when compared to all other states and provinces.

³² Tables for all other years are presented in Appendix B.

Table 2: Ranking of Canadian Provinces and United States Standard of Living for 1987 (Canada=100)			
1. Alaska	234.6	31. Florida	102.5
2. Delaware	157.9	32. Tennessee	99.5
3. Connecticut	150.5	33. Wisconsin	98.3
4. New York	142.0	34. Arizona	98.1
5. Massachusetts	138.5	35. Nebraska	98.0
6. New Jersey	136.4	36. Maine	97.5
7. Hawaii	131.5	37. Vermont	97.5
8. California	131.5	38. Indiana	95.9
9. Nevada	129.8	39. Oregon	95.6
10. Wyoming	122.9	40. Iowa	91.5
11. Maryland	122.5	41. South Carolina	90.2
12. Virginia	121.9	42. South Dakota	89.6
13. Illinois	117.3	43. Québec	89.0
14. New Hampshire	115.9	44. Manitoba	88.5
15. Minnesota	115.4	45. Alabama	88.1
16. Washington	114.6	46. Oklahoma	88.0
17. Ontario	114.5	47. North Dakota	87.9
18. Colorado	113.7	48. Kentucky	87.7
19. Alberta	112.9	49. Utah	87.5
20. Georgia	111.1	50. Saskatchewan	85.1
21. Rhode Island	108.1	51. New Mexico	84.3
22. Michigan	106.8	52. Montana	82.9
23. Texas	105.9	53. Arkansas	79.0
24. British Columbia	105.6	54. Idaho	78.1
25. Louisiana	105.5	55. New Brunswick	76.1
26. North Carolina	105.0	56. Nova Scotia	75.8
27. Kansas	104.9	57. Mississippi	75.6
28. Missouri	104.8	58. West Virginia	72.7
29. Ohio	104.2	59. Prince Edward Island	63.4
30. Pennsylvania	103.4	60. Newfoundland and Labrador	60.0

Table 3: Ranking of Canadian Provinces and United States Standard of Living for 1994 (Canada=100)			
1. Alaska	183.0	31. Indiana	109.5
2. Delaware	166.4	32. New Mexico	109.3
3. Connecticut	156.0	33. Kansas	109.2
4. New Jersey	147.2	34. Ontario	108.7
5. New York	143.7	35. Iowa	108.1
6. Hawaii	142.4	36. South Dakota	107.2
7. Nevada	141.8	37. Oregon	106.3
8. Massachusetts	140.4	38. Florida	105.5
9. Wyoming	139.3	39. Vermont	105.4
10. Illinois	129.5	40. British Columbia	102.8
11. Alberta	126.2	41. Arizona	102.4
12. California	126.0	42. Kentucky	101.2
13. Colorado	125.7	43. South Carolina	99.6
14. Virginia	124.8	44. Utah	99.0
15. Washington	124.3	45. North Dakota	98.0
16. Minnesota	123.1	46. Maine	97.1
17. Maryland	122.5	47. Alabama	95.7
18. Georgia	120.2	48. Saskatchewan	95.6
19. Texas	119.3	49. Idaho	95.3
20. Nebraska	116.6	50. Oklahoma	93.6
21. North Carolina	115.7	51. Arkansas	93.0
22. Michigan	115.3	52. Montana	89.6
23. New Hampshire	114.4	53. Manitoba	88.4
24. Tennessee	112.9	54. Québec	88.4
25. Ohio	112.8	55. Mississippi	86.3
26. Pennsylvania	112.6	56. West Virginia	85.1
27. Louisiana	112.0	57. New Brunswick	76.4
28. Rhode Island	111.4	58. Nova Scotia	73.8
19. Wisconsin	111.2	59. Prince Edward Island	68.1
30. Missouri	110.8	60. Newfoundland and Labrador	66.5

Table 4: Ranking of Canadian Provinces and United States Standard of Living for 2001 (Canada=100)			
1. Delaware	167.6	31. Missouri	108.6
2. Connecticut	163.2	32. New Mexico	108.5
3. Massachusetts	152.1	33. Michigan	108.4
4. New York	147.4	34. Vermont	107.5
5. New Jersey	143.7	35. Tennessee	107.3
6. Alaska	142.0	36. Iowa	107.0
7. Wyoming	135.3	37. Indiana	106.0
8. California	133.2	38. Arizona	105.6
9. Colorado	131.8	39. Louisiana	103.3
10. New Hampshire	130.6	40. Utah	103.0
11. Oregon	130.0	41. North Dakota	101.0
12. Illinois	129.0	42. Idaho	100.7
13. Minnesota	128.3	43. Florida	100.1
14. Washington	123.8	44. Kentucky	99.4
15. Virginia	123.3	45. Maine	97.2
16. Nevada	123.0	46. South Carolina	95.6
17. Alberta	121.3	47. Saskatchewan	91.7
18. Texas	119.8	48. Alabama	91.7
19. Maryland	119.6	49. British Columbia	91.5
20. Georgia	119.3	50. Oklahoma	90.7
21. Hawaii	116.6	51. Québec	89.0
22. Rhode Island	116.2	52. Manitoba	86.4
23. Nebraska	112.9	53. Arkansas	85.9
24. Wisconsin	112.4	54. Montana	83.7
25. Ohio	112.0	55. West Virginia	79.3
26. Pennsylvania	111.7	56. Mississippi	78.8
27. South Dakota	110.5	57. New Brunswick	75.8
28. North Carolina	109.8	58. Nova Scotia	74.5
29. Ontario	109.7	59. Newfoundland and Labrador	71.4
30. Kansas	108.8	60. Prince Edward Island	69.0

From the above tables there is a marginal improvement in the standard of living in Newfoundland and Labrador in the years 2000 and 2001. However, Newfoundland and Labrador has consistently ranked in the lower end of the spectrum relative to the other provinces and fifty states.

A similar ranking can be constructed comparing productivity between states and provinces. Unlike the standard of living rankings, Newfoundland and Labrador is consistently above the other Atlantic Provinces when comparing productivity.

Tables 5, 6 and 7 present the rankings of the provinces and states by labour productivity from highest to lowest for the periods 1987, 1994 and 2001.³³ From Table 5, all of the Atlantic Provinces tend to be ranked at the bottom. However, unlike the standard of living comparisons, the provinces are more dispersed when they are ranked according to productivity. Relative to the states and provinces, Newfoundland and Labrador is ranked 57th out of 60 in 1987. In 1994 (Table 6), the other three Atlantic Provinces clustered at the bottom of the list. Newfoundland and Labrador's relative ranking improved from 57th in 1987 to 52nd in 1994. As illustrated in Table 7, the four Atlantic Provinces remained at the bottom in 2001, but Newfoundland and Labrador's relative ranking had dropped from 52nd to 55th.

³³ Tables for all other years are presented in Appendix B

Table 5: Ranking of Canadian Provinces and United States Productivity for 1987 (Canada=100)			
1. Alaska	264.3	31. Rhode Island	99.9
2. New York	146.3	32. New Hampshire	99.4
3. Delaware	145.9	33. Kansas	99.1
4. Connecticut	134.3	34. Kentucky	97.9
5. Hawaii	132.4	35. Utah	96.5
6. California	131.4	36. Maine	95.9
7. Massachusetts	128.1	37. Indiana	95.0
8. New Jersey	128.0	38. Alabama	94.3
9. Louisiana	124.5	39. West Virginia	94.1
10. Wyoming	124.2	40. Wisconsin	94.1
11. Nevada	118.5	41. New Mexico	93.3
12. Virginia	117.3	42. Québec	93.3
13. Illinois	116.7	43. Nebraska	92.6
14. Washington	116.0	44. Oregon	92.4
15. Maryland	113.2	45. New Brunswick	92.4
16. Georgia	111.5	46. South Carolina	92.1
17. Colorado	110.3	47. Oklahoma	90.9
18. Michigan	110.0	48. Manitoba	89.4
19. British Columbia	109.2	49. Saskatchewan	88.5
20. Texas	108.4	50. Mississippi	88.2
21. Alberta	107.7	51. Nova Scotia	88.1
22. Ohio	106.9	52. Iowa	86.1
23. Pennsylvania	106.6	53. Vermont	86.1
24. Minnesota	106.5	54. Arkansas	86.1
25. Ontario	105.2	55. North Dakota	85.9
26. Arizona	103.9	56. South Dakota	85.4
27. Florida	103.1	57. Newfoundland and Labrador	84.9
28. Missouri	101.8	58. Montana	83.2
29. Tennessee	101.7	59. Idaho	82.3
30. North Carolina	100.1	60. Prince Edward Island	71.7

Table 6: Ranking of Canadian Provinces and United States Productivity for 1994 (Canada=100)			
1. Alaska	176.3	31. Arizona	101.7
2. New York	147.1	32. Kentucky	101.2
3. Delaware	146.4	33. Kansas	100.6
4. New Jersey	140.7	34. Nebraska	99.8
5. Connecticut	140.3	35. New Hampshire	98.3
6. Hawaii	138.5	36. Indiana	98.0
7. Massachusetts	128.2	37. British Columbia	97.4
8. Nevada	127.2	38. West Virginia	97.4
9. California	126.2	39. South Carolina	96.5
10. Wyoming	125.3	40. Wisconsin	95.9
11. Louisiana	122.0	41. Alabama	95.9
12. Illinois	121.3	42. South Dakota	95.9
13. Washington	117.8	43. Saskatchewan	95.7
14. Alberta	115.7	44. Maine	95.3
15. Virginia	113.4	45. Oregon	95.2
16. Georgia	112.8	46. Oklahoma	94.3
17. Texas	112.3	47. Québec	92.7
18. Pennsylvania	112.0	48. Utah	92.0
19. New Mexico	111.8	49. Vermont	91.8
20. Michigan	109.9	50. Iowa	91.5
21. Colorado	108.2	51. Arkansas	90.0
22. Ohio	108.1	52. Newfoundland and Labrador	89.8
23. Maryland	107.8	53. Mississippi	88.7
24. Rhode Island	107.4	54. Manitoba	88.1
25. North Carolina	107.3	55. North Dakota	87.6
26. Ontario	105.4	56. Idaho	87.5
27. Florida	104.5	57. New Brunswick	86.3
28. Tennessee	103.7	58. Montana	82.9
29. Missouri	102.9	59. Nova Scotia	82.7
30. Minnesota	102.6	60. Prince Edward Island	74.3

Table 7: Ranking of Canadian Provinces and United States Productivity for 2001 (Canada=100)			
1. Connecticut	160.2	31. Michigan	107.7
2. New York	157.0	32. Ontario	105.9
3. Delaware	156.3	33. Indiana	105.0
4. Alaska	145.9	34. Florida	104.0
5. Massachusetts	144.5	35. Kentucky	103.7
6. New Jersey	143.8	36. Missouri	103.1
7. California	137.5	37. Utah	102.6
8. Oregon	128.7	38. South Dakota	102.2
9. Illinois	127.9	39. Nebraska	102.0
10. Washington	127.5	40. Wisconsin	102.0
11. Wyoming	123.8	41. South Carolina	101.9
12. Colorado	123.8	42. Idaho	99.7
13. Texas	123.6	43. Alabama	98.2
14. Hawaii	123.0	44. Vermont	97.5
15. Virginia	121.1	45. Iowa	96.8
16. Georgia	120.0	46. Saskatchewan	95.7
17. Nevada	119.7	47. Oklahoma	95.0
18. New Hampshire	118.1	48. Arkansas	94.8
19. New Mexico	117.6	49. British Columbia	93.6
20. Louisiana	116.0	50. North Dakota	92.9
21. Maryland	114.6	51. Québec	92.0
22. Rhode Island	114.4	52. Maine	91.6
23. Pennsylvania	112.6	53. West Virginia	88.6
24. Minnesota	111.5	54. Mississippi	88.5
25. Arizona	110.6	55. Newfoundland and Labrador	87.5
26. Ohio	110.5	56. Manitoba	86.4
27. Alberta	110.5	57. New Brunswick	83.2
28. North Carolina	110.1	58. Montana	83.1
29. Tennessee	109.4	59. Nova Scotia	80.5
30. Kansas	107.8	60. Prince Edward Island	70.6

As with the ranking according to the standard of living, Newfoundland and Labrador's productivity ranking is slightly better. The tables illustrate that there has been a small relative improvement in productivity over time.

The analysis above shows that when comparing the provinces over time to their US counterparts, the relative standard of living and productivity have been rising faster in the United States than in Canada. It also shows that the standard of living in Newfoundland and Labrador is "catching-up" to the other Atlantic Provinces. Even so, there remains a significant gap between the average standard of living in Canada and the standard of living in Newfoundland and Labrador.

Returning to the analytical framework that was used to compare the standards of living, a high level of productivity and a larger proportion of the population at work should result in a high standard of living. Using the reference years 1987, 1994 and 2001, there appears to be a strong positive relationship between the standard of living index and the employment to population ratio in the Canadian data and a weak positive relationship in the United States data. This observation is confirmed by the Pearson product-moment correlation coefficients which are presented in Table 8. There is a strong positive relationship between per capita GDP and the employment to population ratio in Canada. For example, in Canada, the correlation coefficients range from 0.89 in 1987 to 0.81 in 2001, whereas in the United States, the coefficients range from 0.24 in 1987 to 0.37 in 2001. The scattered plots of the standard of living index and the employment to population ratios for the ten provinces and fifty states are illustrated in Appendix E. That is, a high level of productivity combined with a high employment to population ratio leads to a high standard of living in Canada. However, in the United States the correlation coefficients are positive, but relatively small. This observation is confirmed by the Pearson product-moment correlation coefficients which are presented in Table 20. There is a strong positive relationship between per capita GDP and the employment to population ratio in Canada. For example, in Canada, the correlation coefficients range from 0.89 in 1987 to 0.81 in 2001, whereas in the United States, the coefficients range from 0.24 in 1987 to 0.37 in 2001. That is, a high level of productivity combined with a high employment to population ratio leads to a high standard of living in Canada. However, in the United States the correlation coefficients are positive, but relatively small. One inference that can be drawn is that low dependency may imply a high standard of living in Canada, which may not be the case in the United States. Hence, there could be a difference in the nature of dependency in Canada and the US. However, this would require a separate analysis that is beyond the scope of this paper.

**Table 8: Pearson Product-Moment Correlation Coefficients
The Standard of Living and the Employment to Population Ratio**

	1987	1994	2001
Canada (10 Provinces)	0.89	0.89	0.81
United States (50 States)	0.24	0.24	0.37

It is evident that for some provinces higher productivity is not translating, as much as one would expect, into a higher standard of living. This is a common phenomenon that applies to all of the Atlantic Provinces and in particular to Newfoundland and Labrador. Figure 33 presents the employment to population ratios for Canada, Atlantic Canada, and Newfoundland and Labrador. All four Atlantic Provinces have relatively low employment to population ratios. This is not surprising given that the unemployment rates in the Atlantic region are typically higher than in the rest of Canada. The employment to population ratio in Newfoundland and Labrador is significantly below the Canadian values for the entire period. Again, this is consistent with the fact that

Newfoundland and Labrador has the highest unemployment rate and the lowest participation in the country.

5. Lessons Learned

Figure 34 illustrates the influence of offshore oil and gas activity on labour productivity for the province as a whole in Newfoundland and Labrador. The significant increase in GDP per employee after 1997 corresponds to the increase in the value of oil produced. As well, the investment associated with the development activity for this industry has also added to the labour productivity experienced in Newfoundland and Labrador in recent years. In 2003, the value of oil and gas produced is approximately \$4 billion. Given that the contribution to GDP has far exceeded the contribution to employment for this capital intensive industry, the net result is that labour productivity has increased substantially with oil and gas activity. For example, Shrimpton (2003) reports that between 1999 and 2002, real GDP in Newfoundland and Labrador resulting from oil and gas activity was approximately 15 percent higher while the corresponding employment was approximately seven percent higher.³⁴ The relevant section of Shrimpton's analysis is presented in Table 9 below.

Figure 34: Labour Productivity, Value of Offshore Oil and Gas Production and Expenditure

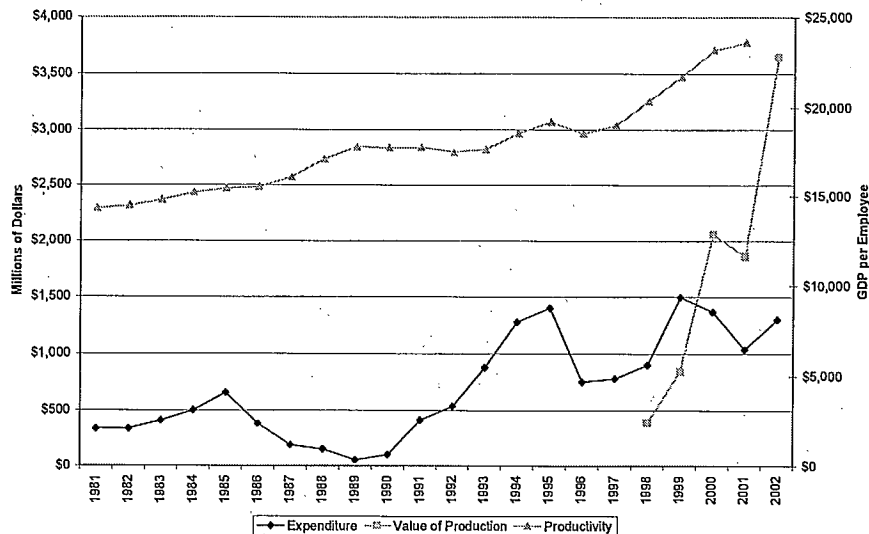


Table 9: Economic Impacts of Offshore Oil and Gas on Newfoundland and Labrador

	1999	2000	2001	2002	Average
Real GDP (\$1997)	\$1.5 b	\$1.8 b	\$1.7 b	\$2.7 b	\$1.9 b
Share of Total	12.1%	14.0%	13.5%	19.1%	14.7%
Employment (000s)	11.5	17.5	15.8	10.7	13.9
Share of Total	5.6%	8.6%	7.5%	5.0%	6.7%

Source: Shrimpton (2003, Table 2, p. 12)

³⁴ Shrimpton (2003, p. 12, Table 2).

6. Conclusion

The analysis presented above demonstrates that there is a close relationship between the standard of living achieved by an area and its labour productivity. It should help guide policy makers who are concerned with influencing the standard of living in Newfoundland and Labrador or Atlantic Canada. The key findings of this analysis were:

- The standard of living in Newfoundland and Labrador, as reflected by its real GDP per capita (1997 chained dollars), was below that experienced in both the region and the country from 1981 to 2001. For example, in 2001 GDP per capita in Newfoundland and Labrador was \$23,601; compared to \$24,432 in Atlantic Canada and \$33,058 experienced Canada-wide;
- GDP per capita in Newfoundland and Labrador has improved relative to that experienced in both the region and the country from 1981 to 2001. Newfoundland and Labrador's GDP per capita increased from 59% of the Canadian average in 1981 to 72% in 2001. The corresponding increases relative to Atlantic Canada was 90% and 97%, respectively;
- Atlantic Canada's GDP increased relative to that observed in the country. For example, between 1981 and 2001, Atlantic Canada's GDP per capita increased from 66% of the Canadian average to 74%;
- Newfoundland and Labrador experienced the highest growth rates for labour productivity and standard of living from 1981 to 2001. During this period, Newfoundland and Labrador's real GDP per capita grew at a compound annual growth rate of 2.53%, while Atlantic Canada's and Canada's GDP per capita grew at 2.14% and 1.58%, respectively. In addition, labour productivity growth rates recorded during this period were: Newfoundland and Labrador 1.51%, Atlantic Canada 1.20% and Canada 1.25%. That is, Newfoundland and Labrador led the country and the region in terms of labour productivity and GDP per capita growth over this period;
- The province, the region and the country all experienced significant increases in their labour productivity growth rates moving from the 1980s to the 1990s that were reflected in significantly higher growth rates in their standards of living (real GDP per capita);
- Using GDP defined in terms of 1997 prices, the growth in labour productivity was equivalent to approximately 80% of the growth in the standard of living Canada-wide from 1981 to 2001. However, it represented 60% of that figure in Newfoundland and Labrador and 56% of the growth in Atlantic Canada. Obviously, there is a close correspondence between the growth in the standard of living and the growth in labour productivity for Canada. As well, there is a very strong relationship between labour productivity growth and the standard of living in the province and the region;

- The improvements in Newfoundland and Labrador's standard of living and labour productivity coincided with the commencement of offshore oil production in 1997;
- Switching to labour productivity defined in terms of hours worked rather than employees did not have a significant impact on the estimates derived for labour productivity or standard of living in the province, the region or the country. This was a surprising result, which suggests the need for future research;
- Defined in terms of GDP per hour worked (1997 dollars), overall labour productivity at the industry level in Newfoundland and Labrador (\$29.93) was higher than observed in Atlantic Canada (\$28.46) in 2001, a 5.2% difference. There were some industries for which Newfoundland and Labrador's labour productivity exceeded that observed in Atlantic Canada. These were: Construction (8.9% higher), Finance, Insurance and Real Estate (FIRE) (5.0% higher), Professional and Technical Services (4.8% higher), Education Services (22.3% higher), Accommodation and Food Services (7.4% higher), and the Residual sector (33.7% higher). For the other industries, labour productivity observed in Newfoundland and Labrador was lower than that observed in Atlantic Canada. These sectors were: Utilities (5.3% lower), Manufacturing (16.2% lower), Retail and Wholesale Trade (5.8% lower), Health Services (1.7% lower), Other Services (0.1% lower) and Public Services (13.8%). In other words, the industrial composition was important in explaining labour productivity difference observed between Newfoundland and Labrador and Atlantic Canada;
- For Newfoundland and Labrador, the contribution to labour productivity from the Residual category increased from 15.7% in 1987 to 24.4% in 2001, which was the largest contributor to Newfoundland and Labrador's labour productivity in that year. This was explained by the fact that the Residual category includes the oil and gas sector. The contribution of oil and gas sector to provincial GDP and labour productivity increased significantly after 1997, when the first barrel of oil was produced;
- The contribution to labour productivity by the Construction sector represented the largest decrease in Newfoundland and Labrador over the period, decreasing from 9.3% in 1987 to 5.2% in 2001;
- A decline was recorded in the shares of Newfoundland and Labrador's labour productivity accounted by: Utilities, Construction, Manufacturing, Education, Health and Public Services;
- The following sectors' contributions to overall labour productivity in Newfoundland and Labrador increased from 1987 to 2001: Retail and Wholesale Trade, F.I.R.E., Professional and Technical Services, Administration and Waste

management, Accommodation and Food Services, Other Services and the Residual sector;

- With the exception of F.I.R.E. and the Residual category, Newfoundland and Labrador fell short of the labour productivity observed in the rest of Canada;
- There is a greater degree of variability in the annual growth rates of labour productivity at the industry level for Newfoundland and Labrador than observed in either the region or the nation. This begs the question, which will be left for further research – why. However, this will have to be left for future research;
- Research and development intensity in Newfoundland and Labrador and Atlantic Canada fell short of that observed in Canada, with this difference worsening over time. As well, the significance of this difference in research intensity was magnified when the business sector was considered;
- Research and development performed in the province was dominated by the educational sector, performing more than 60% in 2000;
- The share accounted for by the educational sector in Newfoundland and Labrador increased over time;
- The share of research and development performed by the business sector in Newfoundland and Labrador averaged 10% and reached only 13.2% in 2000;
- The research and development shares were similar in Atlantic Canada, but the business sector performed slightly higher shares (17.5% in 2000) and the education sector undertook slightly lower shares (56.4% in 2000);
- At the national level, one observes that the business sector accounted for nearly 60% of the research and development activity performed in Canada and the educational sector performed less than 30% of the research and development;
- Newfoundland and Labrador's performance in terms of research and development was low in comparison to that observed in either Atlantic Canada or Canada as a whole. This does not bode well for future productivity increase;
- As expected, within each jurisdiction there is a close correspondence between labour productivity and the capital-labour ratio which prevails in that jurisdiction;
- The capital-output ratio in Newfoundland and Labrador is approximately 75% higher than that observed nationally and about 40% higher than that found in Atlantic Canada. This indicates that Newfoundland and Labrador's efficiency associated with capital utilization is lower than in the region and nationally;

- The education levels in Newfoundland and Labrador are improving, but the improvement is more in the technical skills than in university degrees. While a similar pattern is observed regionally and nationally, the increase in workers with a university degree was highest at the national level;
- Newfoundland and Labrador and the other Atlantic Provinces rank below almost all of the United States in terms of standard of living;
- Both Newfoundland and Labrador and the other Atlantic Provinces do better in terms of their labour productivity, but they are still towards the bottom of the ranking when compared with the United States;
- The relative standard of living and productivity have been rising faster in the United States than in Canada, Atlantic Canada or Newfoundland and Labrador;
- Within the framework utilized in this report, the standard of living (GDP per capita) consists of the multiplicative product of labour productivity (GDP per unit of labour) and the proportion of the population that is employed. Consequently, if both of these parameters are positively correlated, then higher productivity leads to an improved standard of living. On the other hand, if productivity and the employment to population ratio are inversely related, then an improvement in productivity may not lead to a higher standard of living. For Canada, the data indicate that a high level of productivity combined with a high employment to population ratio leads to a high standard of living; and
- In recent years, the productivity improvements in Newfoundland and Labrador have been driven by the economic activity generated in the oil and gas sector.

References

- Balwin, J., Hanel, P., and Sabourin, D., (2000), *Determinants of Innovative Activity in Canadian Manufacturing Firms: The Role of Intellectual Property*, Statistics Canada Research Paper.
- Baldwin, J., Maynard, J. P., and Well, (2000), "Productivity Growth in Canada and the United States", *ISUMA*, Volume 1, No. 1.
- Bernstein, J., (1989), "The Structure of Canadian Inter-Industry R&D Spillovers and the Rate of Return to R&D", *The Journal of Industrial Economics*, 37, 3, p. 315-28.
- Bernstein, J., (1996), *R&D and Productivity Growth in Canadian Communications Equipment and Manufacturing*, Working Paper, Industry Canada, Ottawa.
- Bernstein, J. and Nadiri, I., (1988) "Interindustry Spillovers, Rates of Return, and Production in High-Tech Industries", *American Economic Review Papers and Proceedings*, Vol. 78, 429-434.
- Bernstein, J. and Nadiri, M. I., (1991) *Product Demand, Cost of Production, Spillovers, and the Social Rate of Return to R & D*, NBER Working paper No. 3625.
- Centre for the Study of Living Standards, (1998), *Productivity: Key to Economic Success*, Report prepared for the Atlantic Canada Opportunities Agency.
- Coe, D. and E. Helpman, (1995) "International R & D Spillovers", *European Economic Review*.
- Funke, M. and Niebuhr, A., (2000), *Spatial R&D Spillovers and Economic Growth – Evidence from West Germany*, Hamburgisches Welt-Wirtschafts-Archiv Discussion Paper, Hamburg Institute of International Economics, Hamburg, Germany.
- Globerman, S., (2000), *Linkages Between Technological Change and Productivity Growth*, Occasional Paper, Industry Canada, Ottawa.
- Goto, A. and K. Suzuki, (1989) "R&D Capital, Rate of Return on R&D Investment and Spillover of R&D in Japanese Manufacturing Industries, *Review of Economics and Statistics*, vol. LXXI (4), 555-564.
- Government of Canada (1999), *Productivity With a Purpose: Improving the Standard of Living of Canadians – Twentieth Report of the Standing Committee on Finance*, www.parl.gc.ca.
- Government of Canada, (2001), *A Canadian Innovation Agenda for the Twenty-First Century*, Fifth Report of the Standing Committee on Industry, Science and Technology, Ottawa, www.parl.gc.ca.

Griffith, R., (2000), *How Important is Business R&D for Economic Growth and Should the Government Subsidize it?*, Briefing Note No 12, The Institute for Fiscal Studies, London, UK.

Griffith, R., Redding, S. and Van Reenen, J., (2000), *Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries*, Center for Economic Policy Research, Discussion Paper, No. 2457.

Griliches, Z., (1995), "R&D and Productivity: Econometric Results and Measurement Issues ", in Stoneman, P. (ed), *Handbook of Industrial Innovation and Technological Change*, Blackwell Press, London.

Locke, W. and Lynch, S., (2001), *R&D, Productivity and Economic Development in Atlantic Canada*, mimeo.

Locke, W. and Lynch, S., (2002), *The State of Innovation – An Inter-Provincial Comparison – Final Report*, A Discussion Paper Prepared for the Atlantic Canada Opportunities Agency and Industry Canada.

Locke, W. and Lynch, S. (2003), *Concept Paper for Industry Canada's Productivity Benchmarking Study for Atlantic Canada*, mimeo.

Mansfield, E., J. Rapoport, A. Romeo, S. Wagner and G. Beardsley, (1977) "Social and Private Rates of Return Industrial Innovation," *Quarterly Journal of Economics*, vol. 77, 221-240.

Mansfield, E., Swartz, M. and Wagner, S., (1981), "Imitation Costs and Patents: An Empirical Study", *Economic Journal*, 91, p. 907-18.

Mohnen, P., (1992), *The Relationship Between R&D and Productivity Growth in Canada and Other Major Industrialized Countries*, Ottawa, Minister of Supply and Services Canada.

Mohnen, P. and Hoareau, C., (2002), *What Type of Enterprise Forges Close Links With Universities and Government Labs? Evidence From CIS 2*, Scientific Series, CIRANO, Montreal.

Nadiri, I., (1993) *Innovations and Technological Spillovers*, NBER Working Paper series No. 4423.

OCED (1991), *Technology in a Changing World*, The Technology/Economy Programme. Organization for Economic Co-operation and Development, (1996), *Science, Technology and Industry Outlook*, OECD, Paris.

OECD (2000) *A New Economy? The Changing Role of Innovation and Information Technology in Growth*, Organization for Economic Co-operation and Development, Paris.

Orr, D., (2000), *Why do Some Provinces Have a Higher Standard of Living Than Others?*, WEFA Canada Inc.

Pilat, D., (1996), "From Growth to Competition", *The OECD Observer*, No. 202, www.oecd.org.

Scherer, F.M., (1982) "Inter-industry Technology Flows and Productivity Growth", *Review of Economics and Statistics*, vol. LXIV, 627-634.

Scherer, F.M., (1984) "Using Linked Patent and R&D Data to measure Inter-Industry Technology Flows", in Z. Griliches (ed.) *Patents and Productivity*, University of Chicago Press, Chicago.

Shrimpton, M., (2003), Socio-Economic Benefits From Petroleum Industry Activity in Newfoundland and Labrador, a report prepared for Petroleum Research Atlantic Canada, Halifax, NS.

Sveilkauskas, L., (1981) "Technology Inputs and Multi-factor Productivity Growth", *Review of Economics and Statistics*, vol. 63, 275-282.

Terleckyi, N., (1974) *Effects of R&D on the Productivity Growth of Industries: An Exploratory Study*, National Planning Association, Washington, D.C.

Visco, I., (2000), *The New Economy: Fact or Fiction?*, OECD Observer

Appendix A **Accounting Framework to Analyze the Relationship Between** **Labour Productivity and Standard of Living in Select Provinces**³⁵

The starting point of this approach is to assume that GDP per capita is an appropriate measure of well being for use in this study. Next, it is necessary to develop an identity that can be decomposed into indicators, for which economic statistics are readily available. The identity that forms the basis for the proposed accounting framework is:

$$\frac{GDP_t}{POP_t} = \frac{GDP_t}{POP_t} * \frac{EMP_t}{EMP_t} * \frac{LF_t}{LF_t} * \frac{WAP_t}{WAP_t} \dots \dots \dots eqn.(A1)$$

where: GDP_t \equiv the amount of gross domestic product in period t ;
 POP_t \equiv the size of the population in period t ;
 EMP_t \equiv the number of people working in period t ;
 LF_t \equiv the size of the labour force in period t ; and
 WAP \equiv the working age population in period t .

It is useful to reconfigure this identity in the following way:

$$\frac{GDP_t}{POP_t} = \frac{GDP_t}{EMP_t} * \frac{EMP_t}{LF_t} * \frac{LF_t}{WAP_t} * \frac{WAP_t}{POP_t} \dots \dots \dots eqn.(A2)$$

This can also be rewritten more conveniently as:

$$\frac{GDP_t}{POP_t} = \frac{GDP_t}{EMP_t} * (1 - UNRATE_t) * PART_t * (1 - DEPEND_t) \dots \dots \dots eqn.(A3)$$

It is now useful to interpret this expression in terms of commonly understood economic statistics. This expression indicates that an area's standard of living, as reflected in its GDP per capita (GDP/POP), is determined by the following four terms: (1) labour productivity, as measured by GDP per person working (GDP/EMP); (2) an employment ratio as reflected by one minus the measured unemployment rate (1 – UNRATE); (3) the participation rate (PART); and (4) a dependency variable as determined by one minus the share that the working age population makes up of the total population (DEPEND). Note that this last term is not normally considered in this kind of exercise, but given that the labour force participation is defined relative to working age population, this adjustment is required to make the identity hold.

At this point, it important to acknowledge that this equation relates to levels — in terms of well being, productivity, etc. Sometimes it is useful to undertake analyses employing

³⁵ This is taken from Locke and Lynch (2003).

rates of change or growth rates for the variables of interest. Expressing equation (A3) in terms of growth rates, yields:

$$GRSL_t = GRLPE_t + GRER_t + GRPR_t + GRDR_t \dots \dots \dots eqn.(A4)$$

where: $GRSL$ \equiv the annual growth rate in the standard of living;

$GRLPE$ \equiv the annual growth rate in labour productivity - using employees;

$GRER$ \equiv the annual growth rate in the employment ratio as measured by the rate of change of one minus the unemployment rate;

$GRPR$ \equiv the annual growth rate in the participation rate; and

$GRDR$ \equiv the annual growth rate in the working age population to total population as measured by one minus the dependency ratio.

Depending upon the data availability in the reference and comparison jurisdictions, one could rewrite these identities with productivity evaluated in terms of hours worked, rather than in terms of employees. This would allow the analyst, for example, to separate out the effect that seasonal or part-time work has had on productivity or the impact that differences in the average hours worked per job in each jurisdiction has in masking the productivity differential associated with output per employee. For instance, in considering the output per worker in two jurisdictions – A and B, if one observes that the average annual productivity of workers in A is twice that of B, then that might be explained by the differences in the quality of the two workforces, the size of the capital stock available to each workforce, the efficiency with which inputs are combined in each jurisdiction, etc. Or, it could be explained by everything being identical, except for the fact that workers in jurisdiction B working only one-half of the year. Since seasonal employment and part-time employment might be more important in some jurisdictions, such as the Atlantic Provinces, one should at least be aware that labour productivity measured via employment may generate different results than productivity estimated utilizing hours worked. As well, the policy implications of these two types of impacts are substantially different.

The relevant identity, expressed in levels, to employ when hours of work statistics are available is:

$$\frac{GDP_t}{POP_t} = \frac{GDP_t}{POP_t} * \frac{HOURS_t}{HOURS_t} * \frac{EMP_t}{EMP_t} * \frac{LF_t}{LF_t} * \frac{WAP_t}{WAP_t} \dots \dots \dots eqn.(A5)$$

where: $HOURS_t$ \equiv hours worked per year in period t .

This can be rewritten as:

$$\frac{GDP_t}{POP_t} = \frac{GDP_t}{HOURS_t} * \frac{HOURS_t}{EMP_t} * (1 - UNRATE_t) * PART_t * (1 - DEPEND_t) \dots \dots \dots eqn.(A6)$$

This adjustment decomposes output per unit of labour into the product of output per hour worked and the number of hours worked per employee. This distinction is important in

that it permits one to consider separately the factors that may influence the output per hour worked from the effect of less hours being worked per employee. Equation (A6) can be converted from levels to growth rates as follows:

$$GRSL_t = GRLPH_t + GRH_t + GRER_t + GRPR_t + GRDR_t \dots \dots \dots eqn.(A7)$$

where: $GRLPH_t \equiv$ the annual growth rate in labour productivity - using hours; and
 $GRH_t \equiv$ the annual growth in hours worked.

While this accounting framework allows the study team to examine the contributing factors to differences in standard of living across comparison jurisdictions at an aggregate level, it may be interesting to ask whether productivity differences are identical for the same industries located in different jurisdictions. By addressing this question, the study team can evaluate whether areas characterized by low productivity levels are simply reflective of the fact that they have predominately more industries that have relatively low productivity. That is, since aggregate productivity measures are weighted averages of the productivity levels that are exhibited by the various sectors that make up the economic activity within that jurisdiction, this disaggregation will enable the study team to assess the contribution that industrial structure makes to lower productivity levels in different jurisdictions. While identifying the contribution that industrial composition makes to overall productivity is interesting in its own right, it may also enable decision makers to examine reasons for why high-productivity industries are not locating in their areas. For example, is it taxation levels, regulations, fiscal policy, market size, or something else? This issue is dealt with in more detail below.

To illustrate the potential impact of industrial composition, consider that GDP in a given jurisdiction is simply the sum of the GDP contributed by different sectors, which can be represented mathematically as:

$$GDP_t = \sum_{i=1}^n GDP_t^i \dots \dots \dots eqn.(A8)$$

where: $GDP_t^i \equiv$ the contribution to GDP or value-added from sector i .

Based on equation (A8), it is possible to rewrite aggregate labour productivity as a weighted average of the productivity that is exhibited within the sectors that make up the economy in the jurisdiction under study. In other words, to evaluate the productivity differences across jurisdictions that result from industrial composition, then it is necessary to consider the following weighted average:

$$\frac{GDP_t}{EMP_t} = \sum_{i=1}^n \theta_E^i \frac{GDP_t^i}{EMP_t^i} \dots \dots \dots eqn.(A9)$$

where $\theta_E^i \equiv$ the share of the jurisdiction's employment accounted for by sector i ;

Equation (A9) indicates that the labour productivity observed for an area is a weighted average of the productivity of the all the sectors or industries that exists within that area, where the weights corresponds to the share of employment in that sector or industry. This representation is important for the current study because it allows the study team to consider the impact of the natural gas industry on productivity in Nova Scotia and the impact of the oil industry in Newfoundland and Labrador's productivity levels. As well, this representation allows one to isolate the contribution to productivity differences that are explainable by differences in the industrial composition of various areas, as oppose to differences in the quality of labour forces or the quality and availability of capital. For example, if fish plants are less productive than other industries and they make up a higher proportion of the employment in a given area, then everything else the same, one should expect that area to be characterized by lower productivity. Since the policy implications of a compositional effect are different than lower productivity resulting from a lower quality workforce, it is useful to isolate the impact of industrial composition on labour productivity for each jurisdiction.

Expressing equation (A9) in terms of growth rates yields:

$$\frac{\Delta\left(\frac{GDP_t}{EMP_t}\right)}{\frac{GDP_t}{EMP_t}} = \sum_{i=1}^n \left(\theta_E^i * \frac{\Delta\left(\frac{GDP_t^i}{EMP_t^i}\right)}{\frac{GDP_t^i}{EMP_t^i}} + \frac{GDP_t^i}{GDP_t} * \frac{EMP_t^i}{EMP_t} * \Delta\theta_E^i \right) \dots \dots \dots eqn.(A10)$$

This can be rewritten as:

$$\frac{\Delta\left(\frac{GDP_t}{EMP_t}\right)}{\frac{GDP_t}{EMP_t}} = \sum_{i=1}^n \gamma_i * \left(\frac{\Delta\left(\frac{GDP_t^i}{EMP_t^i}\right)}{\frac{GDP_t^i}{EMP_t^i}} + \frac{\Delta\theta_E^i}{\theta_E^i} \right) \dots \dots \dots eqn.(A11)$$

where: $\gamma_i \equiv$ the share of GDP attributable to sector i .

From equation (A11), observe that productivity growth, measured by employment, is a weighted average of the sum of growth in labour productivity in sector i and the growth in the share of employment accounted for by sector i . The weights utilized in this calculation are the shares of GDP or value-added accounted for by the different sectors.

The productivity equation in terms of levels for hours worked is:

$$\frac{GDP_t}{HOURS_t} = \sum_{i=1}^n \theta_H^i \frac{GDP_t^i}{HOURS_t^i} \dots \dots \dots eqn.(A12)$$

where $\theta_H^i \equiv$ the share of the jurisdiction's hours worked accounted for by sector i ;

Equation (A12) can also be expressed in terms of growth rates. Making the appropriate adjustments, the growth in labour productivity, expressed in terms of hours worked, can be written as:

$$\frac{\Delta \left(\frac{GDP_t}{HOURS_t} \right)}{\frac{GDP_t}{HOURS_t}} = \sum_{i=1}^n \gamma_i * \left(\frac{\Delta \left(\frac{GDP_t^i}{HOURS_t^i} \right)}{\frac{GDP_t^i}{HOURS_t^i}} + \frac{\Delta \theta_H^i}{\theta_H^i} \right) \dots \dots \dots eqn.(A13)$$

Substituting from equations (A9) and (A12), it is possible to rewrite the standard of living identities, defined in terms of levels, as:

$$\frac{GDP_t}{POP_t} = \sum_{i=1}^n \theta_E^i * \frac{GDP_t^i}{EMP_t^i} * (1 - UNRATE_t) * PART_t * (1 - DEPEND_t) \dots \dots \dots eqn.(A14)$$

and

$$\frac{GDP_t}{POP_t} = \sum_{i=1}^n \theta_H^i * \frac{GDP_t^i}{HOURS_t^i} * \frac{HOURS_t}{EMP_t} * (1 - UNRATE_t) * PART_t * (1 - DEPEND_t) \dots \dots \dots eqn.(A15)$$

The corresponding equations for growth rates are:

$$GRSL_t = \sum_{i=1}^n \gamma_i * (GRLPE_t^i + GRES_t^i) + GRER_t + GRPR_t + GRDR_t \dots \dots \dots eqn.(A16)$$

$$GRSL_t = \sum_{i=1}^n \gamma_i * (GRLPH_t^i + GRHS_t^i) + GRH_t + GRER_t + GRPR_t + GRDR_t \dots \dots \dots eqn.(A17)$$

where: $GRLPE^i \equiv$ the annual growth rate in labour productivity in sector i - using employment;
 $GRES^i \equiv$ the annual growth rate in the share of employment accounted for by the i th sector;
 $\gamma_i \equiv$ the share of GDP accounted for by the i th sector;
 $GRLPH^i \equiv$ the annual growth rate in labour productivity in sector i - using hours;
 $GRHS^i \equiv$ the annual growth rate in the share of hours accounted for by the i th sector.

Appendix B: Ranking of Canadian Provinces and United States by Standard of Living and Productivity

Table B1: Ranking of Canadian Provinces and United States Standard of Living for 1987 (Canada=100)			
1. Alaska	234.6	31. Florida	102.5
2. Delaware	157.9	32. Tennessee	99.5
3. Connecticut	150.5	33. Wisconsin	98.3
4. New York	142.0	34. Arizona	98.1
5. Massachusetts	138.5	35. Nebraska	98.0
6. New Jersey	136.4	36. Maine	97.5
7. Hawaii	131.5	37. Vermont	97.5
8. California	131.5	38. Indiana	95.9
9. Nevada	129.8	39. Oregon	95.6
10. Wyoming	122.9	40. Iowa	91.5
11. Maryland	122.5	41. South Carolina	90.2
12. Virginia	121.9	42. South Dakota	89.6
13. Illinois	117.3	43. Québec	89.0
14. New Hampshire	115.9	44. Manitoba	88.5
15. Minnesota	115.4	45. Alabama	88.1
16. Washington	114.6	46. Oklahoma	88.0
17. Ontario	114.5	47. North Dakota	87.9
18. Colorado	113.7	48. Kentucky	87.7
19. Alberta	112.9	49. Utah	87.5
20. Georgia	111.1	50. Saskatchewan	85.1
21. Rhode Island	108.1	51. New Mexico	84.3
22. Michigan	106.8	52. Montana	82.9
23. Texas	105.9	53. Arkansas	79.0
24. British Columbia	105.6	54. Idaho	78.1
25. Louisiana	105.5	55. New Brunswick	76.1
26. North Carolina	105.0	56. Nova Scotia	75.8
27. Kansas	104.9	57. Mississippi	75.6
28. Missouri	104.8	58. West Virginia	72.7
29. Ohio	104.2	59. Prince Edward Island	63.4
30. Pennsylvania	103.4	60. Newfoundland and Labrador	60.0

Table B2: Ranking of Canadian Provinces and United States Standard of Living for 1988 (Canada=100)			
1. Alaska	222.5	31. Florida	102.1
2. Delaware	155.4	32. Vermont	100.7
3. Connecticut	153.7	33. Maine	99.9
4. New York	143.4	34. Wisconsin	99.5
5. New Jersey	141.1	35. Tennessee	99.1
6. Massachusetts	140.2	36. Nebraska	98.5
7. Hawaii	134.1	37. Oregon	96.7
8. California	131.4	38. Indiana	96.2
9. Nevada	130.6	39. Arizona	95.6
10. Wyoming	128.5	40. Iowa	92.2
11. Maryland	124.1	41. South Carolina	90.9
12. Virginia	121.3	42. Oklahoma	90.7
13. Illinois	118.1	43. Québec	89.1
14. Alberta	116.7	44. Alabama	88.6
15. Washington	114.6	45. Kentucky	88.4
16. New Hampshire	114.5	46. Utah	87.7
17. Ontario	114.1	47. South Dakota	86.8
18. Minnesota	113.6	48. Manitoba	84.6
19. Colorado	112.0	49. New Mexico	81.7
20. Rhode Island	110.7	50. Saskatchewan	79.7
21. Georgia	110.1	51. Montana	79.6
22. Louisiana	109.2	52. North Dakota	79.6
23. Texas	108.9	53. Idaho	79.0
24. Michigan	106.3	54. Arkansas	78.9
25. North Carolina	106.0	55. Mississippi	75.2
26. British Columbia	105.6	56. West Virginia	74.4
27. Missouri	104.6	57. New Brunswick	73.7
28. Pennsylvania	104.1	58. Nova Scotia	73.7
29. Ohio	103.7	59. Prince Edward Island	63.2
30. Kansas	102.4	60. Newfoundland and Labrador	61.5

Table B3: Ranking of Canadian Provinces and United States Standard of Living for 1989 (Canada=100)			
1. Alaska	222.2	31. Florida	102.5
2. Delaware	163.6	32. Kansas	101.9
3. Connecticut	154.7	33. Nebraska	101.0
4. New Jersey	142.2	34. Maine	100.1
5. New York	142.1	35. Wisconsin	100.0
6. Hawaii	140.3	36. Tennessee	99.1
7. Massachusetts	139.4	37. Indiana	98.3
8. California	132.9	38. Oregon	97.5
9. Nevada	132.6	39. Iowa	95.1
10. Wyoming	127.8	40. Arizona	93.1
11. Maryland	124.7	41. South Carolina	92.0
12. Virginia	123.0	42. Kentucky	90.0
13. Illinois	119.0	43. Oklahoma	90.0
14. Washington	117.3	44. South Dakota	88.8
15. Alberta	115.5	45. Alabama	87.8
16. Minnesota	115.0	46. Québec	87.8
17. Ontario	113.9	47. Utah	87.6
18. Rhode Island	112.4	48. Manitoba	86.1
19. Colorado	112.0	49. North Dakota	84.2
20. New Hampshire	111.1	50. Idaho	83.1
21. Georgia	109.9	51. Montana	82.2
22. Texas	109.6	52. New Mexico	81.9
23. Louisiana	107.6	53. Saskatchewan	81.7
24. North Carolina	107.2	54. Arkansas	80.1
25. Michigan	106.2	55. Mississippi	75.4
26. Missouri	105.6	56. West Virginia	75.0
27. British Columbia	105.4	57. New Scotia	74.2
28. Pennsylvania	105.3	58. New Brunswick	73.3
29. Ohio	104.5	59. Prince Edward Island	63.9
30. Vermont	103.1	60. Newfoundland and Labrador	63.5

Table B4: Ranking of Canadian Provinces and United States Standard of Living for 1990 (Canada=100)			
1. Alaska	220.8	31. Missouri	104.8
2. Delaware	166.8	32. Vermont	103.6
3. Connecticut	156.4	33. Florida	102.4
4. Hawaii	151.1	34. Wisconsin	102.2
5. New York	144.7	35. Oregon	100.7
6. New Jersey	143.7	36. Indiana	99.6
7. Wyoming	138.2	37. Tennessee	99.0
8. Massachusetts	136.3	38. Maine	98.75
9. California	135.5	39. Iowa	98.5
10. Nevada	135.2	40. South Carolina	94.8
11. Maryland	125.7	41. South Dakota	94.0
12. Virginia	123.5	42. Arizona	93.7
13. Washington	122.2	43. Utah	92.2
14. Illinois	121.4	44. Oklahoma	92.1
15. Alberta	117.2	45. Kentucky	91.7
16. Minnesota	116.0	46. Alabama	89.9
17. Colorado	115.4	47. Saskatchewan	89.7
18. Texas	113.1	48. North Dakota	89.6
19. Louisiana	112.9	49. Manitoba	89.2
20. Rhode Island	112.0	50. Québec	88.3
21. Ontario	111.4	51. Idaho	85.3
22. Georgia	111.0	52. Montana	84.5
23. Pennsylvania	107.6	53. New Mexico	83.8
24. North Carolina	107.0	54. Arkansas	81.5
25. Ohio	106.9	55. West Virginia	77.6
26. New Hampshire	106.7	56. Mississippi	76.3
27. Nebraska	106.1	57. Nova Scotia	74.5
28. Michigan	105.5	58. New Brunswick	73.4
29. British Columbia	105.3	59. Prince Edward Island	64.7
30. Kansas	105.2	60. Newfoundland and Labrador	64.2

Table B5: Ranking of Canadian Provinces and United States Standard of Living for 1991 (Canada=100)			
1. Alaska	200.2	31. Wisconsin	105.9
2. Delaware	175.1	32. Michigan	105.5
3. Connecticut	157.9	33. Tennessee	104.6
4. Hawaii	155.1	34. Florida	104.4
5. New Jersey	147.4	35. Oregon	103.5
6. New York	144.1	36. Vermont	103.2
7. Wyoming	144.0	37. Iowa	102.1
8. Massachusetts	137.4	38. Indiana	101.8
9. Nevada	136.1	39. South Dakota	101.6
10. California	135.7	40. Maine	98.8
11. Washington	126.2	41. South Carolina	96.9
12. Maryland	126.0	42. Utah	96.8
13. Virginia	125.4	43. Arizona	95.6
14. Illinois	124.5	44. Oklahoma	95.2
15. Colorado	120.4	45. Kentucky	94.6
16. Alberta	119.6	46. Alabama	94.5
17. Minnesota	119.1	47. New Mexico	94.5
18. Texas	116.9	48. Saskatchewan	94.1
19. Louisiana	115.7	49. North Dakota	92.6
20. Georgia	114.3	50. Manitoba	88.8
21. Nebraska	112.7	51. Montana	88.8
22. Rhode Island	111.9	52. Idaho	88.1
23. New Hampshire	111.8	53. Québec	88.0
24. Pennsylvania	111.3	54. Arkansas	87.6
25. Kansas	109.3	55. West Virginia	80.6
26. Missouri	109.3	56. Mississippi	80.3
27. Ontario	109.2	57. Nova Scotia	75.9
28. North Carolina	109.1	58. New Brunswick	75.2
29. Ohio	108.7	59. Prince Edward Island	67.2
30. British Columbia	106.4	60. Newfoundland and Labrador	66.4

Table B6: Ranking of Canadian Provinces and United States Standard of Living for 1992 (Canada=100)			
1. Alaska	195.1	31. Michigan	108.3
2. Delaware	172.2	32. Louisiana	107.9
3. Connecticut	159.2	33. Vermont	107.4
4. Hawaii	155.6	34. Indiana	107.0
5. New Jersey	150.4	35. British Columbia	106.4
6. New York	147.8	36. Florida	105.9
7. Wyoming	142.0	37. Iowa	105.5
8. Nevada	139.3	38. South Dakota	105.2
9. Massachusetts	138.7	39. Oregon	104.7
10. California	133.2	40. Arizona	99.8
11. Illinois	128.0	41. Maine	99.3
12. Washington	127.8	42. North Dakota	99.2
13. Virginia	125.7	43. Kentucky	98.7
14. Maryland	124.7	44. South Dakota	98.0
15. Minnesota	124.2	45. Utah	97.7
16. Colorado	123.6	46. Alabama	97.4
17. Alberta	119.3	47. New Mexico	96.8
18. Texas	118.9	48. Oklahoma	95.9
19. Georgia	118.1	49. Arkansas	91.7
20. Nebraska	116.0	50. Montana	91.5
21. New Hampshire	115.0	51. Idaho	91.5
22. Pennsylvania	114.3	52. Saskatchewan	90.7
23. Rhode Island	113.6	53. Manitoba	89.8
24. North Carolina	113.2	54. Québec	88.1
25. Ohio	111.9	55. Mississippi	83.5
26. Missouri	111.2	56. West Virginia	83.1
27. Kansas	110.8	57. Nova Scotia	76.9
28. Tennessee	110.5	58. New Brunswick	76.5
29. Wisconsin	109.8	59. Prince Edward Island	68.8
30. Ontario	109.1	60. Newfoundland and Labrador	65.7

Table B7: Ranking of Canadian Provinces and United States Standard of Living for 1993 (Canada=100)			
1. Alaska	192.0	31. Indiana	108.6
2. Delaware	170.2	32. Louisiana	108.5
3. Connecticut	159.0	33. South Dakota	108.0
4. Hawaii	151.0	34. Ontario	107.7
5. New Jersey	150.3	35. Vermont	107.6
6. New York	145.9	36. Florida	106.9
7. Wyoming	143.5	37. British Columbia	106.8
8. Nevada	141.8	38. Oregon	106.7
9. Massachusetts	139.6	39. Iowa	104.1
10. California	129.5	40. New Mexico	103.8
11. Illinois	128.0	41. Arizona	100.7
12. Washington	126.9	42. Kentucky	99.8
13. Virginia	126.3	43. South Dakota	99.0
14. Colorado	126.0	44. Maine	98.3
15. Alberta	124.6	45. Utah	98.3
16. Maryland	124.2	46. Alabama	96.5
17. Minnesota	121.8	47. Oklahoma	96.2
18. Texas	119.9	48. North Dakota	96.2
19. Georgia	119.4	49. Saskatchewan	95.2
20. Pennsylvania	114.6	50. Idaho	95.1
21. New Hampshire	114.4	51. Arkansas	92.3
22. Nebraska	114.2	52. Montana	92.1
23. Rhode Island	114.2	53. Manitoba	88.7
24. North Carolina	113.8	54. Québec	88.2
25. Tennessee	112.3	55. Mississippi	85.1
26. Wisconsin	111.7	56. West Virginia	83.6
27. Ohio	111.6	57. New Brunswick	77.6
28. Michigan	111.4	58. Nova Scotia	76.3
29. Kansas	109.5	59. Prince Edward Island	68.2
30. Missouri	109.3	60. Newfoundland and Labrador	65.5

Table B8: Ranking of Canadian Provinces and United States Standard of Living for 1994 (Canada=100)			
1. Alaska	183.0	31. Indiana	109.5
2. Delaware	166.4	32. New Mexico	109.3
3. Connecticut	156.0	33. Kansas	109.2
4. New Jersey	147.2	34. Ontario	108.7
5. New York	143.7	35. Iowa	108.1
6. Hawaii	142.4	36. South Dakota	107.2
7. Nevada	141.8	37. Oregon	106.3
8. Massachusetts	140.4	38. Florida	105.5
9. Wyoming	139.3	39. Vermont	105.4
10. Illinois	129.5	40. British Columbia	102.8
11. Alberta	126.2	41. Arizona	102.4
12. California	126.0	42. Kentucky	101.2
13. Colorado	125.7	43. South Carolina	99.6
14. Virginia	124.8	44. Utah	99.0
15. Washington	124.3	45. North Dakota	98.0
16. Minnesota	123.1	46. Maine	97.1
17. Maryland	122.5	47. Alabama	95.7
18. Georgia	120.2	48. Saskatchewan	95.6
19. Texas	119.3	49. Idaho	95.3
20. Nebraska	116.6	50. Oklahoma	93.6
21. North Carolina	115.7	51. Arkansas	93.0
22. Michigan	115.3	52. Montana	89.6
23. New Hampshire	114.4	53. Manitoba	88.4
24. Tennessee	112.9	54. Québec	88.4
25. Ohio	112.8	55. Mississippi	86.3
26. Pennsylvania	112.6	56. West Virginia	85.1
27. Louisiana	112.0	57. New Brunswick	76.4
28. Rhode Island	111.4	58. Nova Scotia	73.8
19. Wisconsin	111.2	59. Prince Edward Island	68.1
30. Missouri	110.8	60. Newfoundland and Labrador	66.5

Table B9: Ranking of Canadian Provinces and United States Standard of Living for 1995 (Canada=100)			
1. Alaska	187.4	31. Indiana	109.9
2. Delaware	171.0	32. Ontario	109.2
3. Connecticut	157.9	33. Oregon	109.0
4. New Jersey	147.7	34. South Dakota	108.4
5. New York	143.4	35. Iowa	108.1
6. Nevada	141.7	36. Kansas	107.7
7. Massachusetts	141.1	37. New Mexico	106.9
8. Wyoming	139.1	38. Florida	105.6
9. Hawaii	137.9	39. Arizona	103.9
10. Illinois	130.3	40. Vermont	103.0
11. California	127.3	41. Kentucky	102.3
12. Colorado	127.0	42. Utah	101.6
13. Alberta	126.3	43. British Columbia	100.7
14. Virginia	124.7	44. South Carolina	100.7
15. Minnesota	123.4	45. Idaho	98.8
16. Georgia	122.4	46. North Dakota	98.5
17. Maryland	121.1	47. Maine	97.2
18. Washington	121.0	48. Alabama	96.5
19. Texas	120.6	49. Saskatchewan	94.7
20. New Hampshire	120.5	50. Oklahoma	93.8
21. North Carolina	117.1	51. Arkansas	93.3
22. Nebraska	116.9	52. Québec	87.9
23. Louisiana	115.5	53. Mississippi	87.8
24. Pennsylvania	114.5	54. Montana	87.6
25. Ohio	114.0	55. Manitoba	86.7
26. Michigan	113.6	56. West Virginia	85.6
27. Missouri	113.5	57. New Brunswick	77.4
28. Rhode Island	113.5	58. Nova Scotia	73.7
29. Tennessee	112.8	59. Prince Edward Island	70.6
30. Wisconsin	111.3	60. Newfoundland and Labrador	67.7

Table B10: Ranking of Canadian Provinces and United States Standard of Living for 1996 (Canada=100)			
1. Alaska	181.2	31. Tennessee	113.4
2. Delaware	172.5	32. Iowa	112.9
3. Connecticut	161.3	33. Indiana	112.2
4. New Jersey	151.8	34. South Dakota	111.1
5. New York	148.4	35. Kansas	110.8
6. Nevada	146.8	36. Ontario	108.5
7. Massachusetts	146.5	37. Utah	108.4
8. Wyoming	140.2	38. New Mexico	108.3
9. Hawaii	135.1	39. Florida	107.9
10. Illinois	133.1	40. Arizona	107.5
11. Colorado	130.4	41. Vermont	105.7
12. California	129.7	42. Kentucky	104.0
13. Minnesota	128.6	43. North Dakota	103.5
14. Virginia	127.6	44. South Carolina	101.5
15. New Hampshire	127.2	45. British Columbia	100.0
16. Georgia	127.0	46. Idaho	98.9
17. Alberta	126.3	47. Maine	98.9
18. Washington	124.6	48. Alabama	98.0
19. Texas	123.6	49. Oklahoma	96.5
20. Maryland	122.1	50. Saskatchewan	96.5
21. Nebraska	121.8	51. Arkansas	95.5
22. Oregon	120.2	52. Manitoba	88.6
23. North Carolina	118.5	53. Mississippi	88.5
24. Pennsylvania	116.4	54. Québec	87.9
25. Ohio	115.8	55. Montana	87.3
26. Missouri	115.6	56. West Virginia	86.7
27. Rhode Island	115.1	57. New Brunswick	77.5
28. Louisiana	115.0	58. Nova Scotia	73.5
29. Michigan	115.0	59. Prince Edward Island	71.8
30. Wisconsin	114.7	60. Newfoundland and Labrador	65.0

Table B11: Ranking of Canadian Provinces and United States Standard of Living for 1997 (Canada=100)			
1. Alaska	176.5	31. Louisiana	114.8
2. Delaware	172.0	32. Tennessee	114.1
3. Connecticut	167.0	33. Kansas	112.8
4. New Jersey	150.6	34. New Mexico	112.3
5. New York	147.9	35. Indiana	112.2
6. Massachusetts	147.8	36. South Dakota	109.4
7. Nevada	143.0	37. Arizona	108.6
8. Wyoming	136.9	38. Ontario	108.5
9. Illinois	134.8	39. Utah	107.8
10. Colorado	134.7	40. Florida	107.3
11. Minnesota	131.4	41. Vermont	106.6
12. California	131.2	42. Kentucky	105.1
13. Hawaii	131.0	43. South Carolina	101.8
14. New Hampshire	129.2	44. North Dakota	100.4
15. Alberta	128.2	45. Maine	98.8
16. Virginia	127.4	46. Idaho	98.2
17. Georgia	127.3	47. British Columbia	98.1
18. Texas	127.2	48. Alabama	97.6
19. Washington	126.5	49. Saskatchewan	96.9
20. Maryland	122.8	50. Oklahoma	96.9
21. Oregon	121.6	51. Arkansas	94.8
22. North Carolina	120.7	52. Manitoba	88.9
23. Rhode Island	120.5	53. Québec	87.6
24. Nebraska	120.3	54. Montana	87.0
25. Ohio	117.7	55. Mississippi	87.0
26. Pennsylvania	116.9	56. West Virginia	85.3
27. Missouri	116.5	57. New Brunswick	75.9
28. Iowa	115.7	58. Nova Scotia	74.0
29. Michigan	115.5	59. Prince Edward Island	69.8
30. Wisconsin	115.2	60. Newfoundland and Labrador	64.6

Table B12: Ranking of Canadian Provinces and United States Standard of Living for 1998(Canada=100)			
1. Connecticut	168.4	31. Tennessee	115.0
2. Delaware	167.1	32. Iowa	113.0
3. Alaska	161.9	33. New Mexico	112.5
4. New York	152.8	34. Kansas	112.5
5. Massachusetts	151.8	35. Arizona	111.1
6. New Jersey	150.5	36. Louisiana	111.1
7. Nevada	140.1	37. South Dakota	109.5
8. Wyoming	136.6	38. Ontario	108.9
9. Colorado	136.3	39. Utah	108.5
10. Illinois	135.6	40. Florida	107.4
11. California	133.5	41. Vermont	107.1
12. Minnesota	133.4	42. Kentucky	105.3
13. New Hampshire	133.3	43. North Dakota	104.3
14. Washington	130.0	44. South Carolina	101.7
15. Virginia	128.6	45. Maine	99.2
16. Georgia	128.4	46. Idaho	99.0
17. Texas	127.8	47. Saskatchewan	97.6
18. Alberta	127.6	48. Alabama	97.3
19. Hawaii	126.7	49. Oklahoma	96.4
20. Oregon	123.8	50. British Columbia	95.4
21. Maryland	122.9	51. Arkansas	93.5
22. North Carolina	122.5	52. Manitoba	89.7
23. Rhode Island	119.8	53. Montana	87.9
24. Nebraska	119.5	54. Québec	87.4
25. Ohio	119.4	55. Mississippi	86.7
26. Pennsylvania	117.1	56. West Virginia	83.1
27. Wisconsin	117.0	57. New Brunswick	76.3
28. Missouri	115.8	58. Nova Scotia	74.3
29. Michigan	115.4	59. Prince Edward Island	70.4
30. Indiana	115.2	60. Newfoundland and Labrador	67.1

Table B13: Ranking of Canadian Provinces and United States Standard of Living for 1999(Canada=100)			
1. Connecticut	165.9	31. Missouri	112.4
2. Delaware	164.9	32. Arizona	112.3
3. Alaska	154.7	33. Indiana	111.9
4. Massachusetts	152.8	34. Kansas	110.8
5. New York	150.6	35. Ontario	110.8
6. New Jersey	148.4	36. Iowa	110.5
7. Nevada	137.4	37. South Dakota	110.2
8. Colorado	136.9	38. New Mexico	108.9
9. California	134.4	39 Utah	107.1
10. New Hampshire	134.0	40. Vermont	107.1
11. Wyoming	133.9	41. Florida	106.2
12. Illinois	133.3	42. Idaho	104.1
13. Minnesota	131.7	43. Kentucky	102.2
14. Washington	131.4	44. North Dakota	100.1
15. Georgia	128.0	45. South Carolina	100.0
16. Oregon	126.5	46. Maine	98.5
17. Texas	125.8	47. Alabama	96.2
18. Virginia	124.9	48. Oklahoma	94.2
19. Hawaii	123.1	49. Arkansas	93.8
20. Maryland	121.4	50. Saskatchewan	93.2
21. North Carolina	121.0	51. British Columbia	93.1
22. Alberta	120.9	52. Québec	88.2
23. Nebraska	118.0	53. Manitoba	87.1
24. Ohio	116.5	54. Montana	85.8
25. Rhode Island	116.3	55. Mississippi	85.1
26. Pennsylvania	115.4	56. West Virginia	82.5
27. Wisconsin	115.4	57. New Brunswick	77.4
28. Michigan	115.3	58. Nova Scotia	74.5
29. Louisiana	113.7	59. Prince Edward Island	69.6
30. Tennessee	113.1	60. Newfoundland and Labrador	68.4

Table B14: Ranking of Canadian Provinces and United States Standard of Living for 2000 (Canada=100)			
1. Connecticut	164.3	31. Missouri	109.5
2. Delaware	159.9	32. Indiana	109.3
3. Massachusetts	154.7	33. Kansas	108.9
4. New York	147.0	34. Iowa	108.3
5. New Jersey	146.0	35. Tennessee	107.8
6. Alaska	145.5	36. Arizona	106.3
7. California	136.5	37. Utah	105.0
8. New Hampshire	136.2	38. Vermont	104.7
9. Colorado	135.4	39. New Mexico	104.6
10. Oregon	132.5	40. Louisiana	104.2
11. Minnesota	131.7	41. Idaho	104.0
12. Illinois	130.7	42. Florida	101.2
13. Wyoming	130.5	43. North Dakota	100.8
14. Nevada	127.2	44. Kentucky	99.4
15. Washington	126.7	45. Maine	97.2
16. Virginia	123.6	46. South Carolina	96.9
17. Georgia	123.6	47. British Columbia	93.0
18. Texas	121.6	48. Saskatchewan	92.8
19. Alberta	121.4	49. Alabama	92.8
20. Maryland	119.1	50. Oklahoma	90.7
21. Hawaii	118.7	51. Québec	88.8
22. Rhode Island	117.7	52. Arkansas	87.5
23. North Carolina	114.1	53. Manitoba	85.9
24. Nebraska	114.0	54. Montana	83.4
25. Ohio	113.9	55. Mississippi	80.5
26. Michigan	113.0	56. West Virginia	78.6
27. Wisconsin	113.0	57. New Brunswick	75.6
28. Pennsylvania	112.3	58. Nova Scotia	73.2
29. South Dakota	110.5	59. Newfoundland and Labrador	70.4
30. Ontario	110.3	60. Prince Edward Island	69.8

Table B15: Ranking of Canadian Provinces and United States Standard of Living for 2001 (Canada=100)			
1. Delaware	167.6	31. Missouri	108.6
2. Connecticut	163.2	32. New Mexico	108.5
3. Massachusetts	152.1	33. Michigan	108.4
4. New York	147.4	34. Vermont	107.5
5. New Jersey	143.7	35. Tennessee	107.3
6. Alaska	142.0	36. Iowa	107.0
7. Wyoming	135.3	37. Indiana	106.0
8. California	133.2	38. Arizona	105.6
9. Colorado	131.8	39. Louisiana	103.3
10. New Hampshire	130.6	40. Utah	103.0
11. Oregon	130.0	41. North Dakota	101.0
12. Illinois	129.0	42. Idaho	100.7
13. Minnesota	128.3	43. Florida	100.1
14. Washington	123.8	44. Kentucky	99.4
15. Virginia	123.3	45. Maine	97.2
16. Nevada	123.0	46. South Carolina	95.6
17. Alberta	121.3	47. Saskatchewan	91.7
18. Texas	119.8	48. Alabama	91.7
19. Maryland	119.6	49. British Columbia	91.5
20. Georgia	119.3	50. Oklahoma	90.7
21. Hawaii	116.6	51. Québec	89.0
22. Rhode Island	116.2	52. Manitoba	86.4
23. Nebraska	112.9	53. Arkansas	85.9
24. Wisconsin	112.4	54. Montana	83.7
25. Ohio	112.0	55. West Virginia	79.3
26. Pennsylvania	111.7	56. Mississippi	78.8
27. South Dakota	110.5	57. New Brunswick	75.8
28. North Carolina	109.8	58. Nova Scotia	74.5
29. Ontario	109.7	59. Newfoundland and Labrador	71.4
30. Kansas	108.8	60. Prince Edward Island	69.0

Table B16: Ranking of Canadian Provinces and United States Productivity for 1987 (Canada=100)			
1. Alaska	264.3	31. Rhode Island	99.9
2. New York	146.3	32. New Hampshire	99.4
3. Delaware	145.9	33. Kansas	99.1
4. Connecticut	134.3	34. Kentucky	97.9
5. Hawaii	132.4	35. Utah	96.5
6. California	131.4	36. Maine	95.9
7. Massachusetts	128.1	37. Indiana	95.0
8. New Jersey	128.0	38. Alabama	94.3
9. Louisiana	124.5	39. West Virginia	94.1
10. Wyoming	124.2	40. Wisconsin	94.1
11. Nevada	118.5	41. New Mexico	93.3
12. Virginia	117.3	42. Québec	93.3
13. Illinois	116.7	43. Nebraska	92.6
14. Washington	116.0	44. Oregon	92.4
15. Maryland	113.2	45. New Brunswick	92.4
16. Georgia	111.5	46. South Carolina	92.1
17. Colorado	110.3	47. Oklahoma	90.9
18. Michigan	110.0	48. Manitoba	89.4
19. British Columbia	109.2	49. Saskatchewan	88.5
20. Texas	108.4	50. Mississippi	88.2
21. Alberta	107.7	51. Nova Scotia	88.1
22. Ohio	106.9	52. Iowa	86.1
23. Pennsylvania	106.6	53. Vermont	86.1
24. Minnesota	106.5	54. Arkansas	86.1
25. Ontario	105.2	55. North Dakota	85.9
26. Arizona	103.9	56. South Dakota	85.4
27. Florida	103.1	57. Newfoundland and Labrador	84.9
28. Missouri	101.8	58. Montana	83.2
29. Tennessee	101.7	59. Idaho	82.3
30. North Carolina	100.1	60. Prince Edward Island	71.7

Table B17: Ranking of Canadian Provinces and United States Productivity for 1988 (Canada=100)			
1. Alaska	252.0	31. North Carolina	101.8
2. New York	149.4	32. New Hampshire	100.9
3. Connecticut	141.3	33. Maine	99.2
4. Delaware	141.2	34. Kansas	98.0
5. Hawaii	136.8	35. Kentucky	97.8
6. New Jersey	135.0	36. Utah	97.3
7. California	132.5	37. Alabama	97.2
8. Massachusetts	130.3	38. West Virginia	97.2
9. Louisiana	130.2	39. Oklahoma	95.8
10. Wyoming	127.1	40. Indiana	94.2
11. Nevada	120.2	41. Québec	93.8
12. Illinois	117.9	42. Oregon	93.6
13. Maryland	117.0	43. Nebraska	93.1
14. Virginia	116.6	44. South Carolina	92.7
15. Washington	116.1	45. Wisconsin	92.5
16. Texas	111.2	46. New Mexico	91.0
17. Alberta	111.1	47. Vermont	90.2
18. Georgia	111.0	48. Mississippi	88.0
19. Michigan	110.7	49. New Brunswick	88.0
20. British Columbia	108.7	50. Manitoba	87.1
21. Colorado	108.5	51. Arkansas	85.6
22. Pennsylvania	107.0	52. Iowa	84.5
23. Ohio	106.2	53. Newfoundland and Labrador	84.3
24. Ontario	104.8	54. Nova Scotia	84.0
25. Minnesota	103.7	55. Saskatchewan	83.9
26. Florida	103.2	56. South Dakota	83.8
27. Missouri	103.1	57. Idaho	81.9
28. Arizona	103.0	58. Montana	80.6
29. Tennessee	102.9	59. North Dakota	78.3
30. Rhode Island	102.8	60. Prince Edward Island	70.9

Table B18: Ranking of Canadian Provinces and United States Productivity for 1989 (Canada=100)			
1. Alaska	245.2	31. Arizona	99.3
2. New York	147.6	32. New Hampshire	99.2
3. Delaware	146.9	33. Maine	98.5
4. Hawaii	143.1	34. Kansas	97.3
5. Connecticut	142.4	35. Kentucky	96.4
6. New Jersey	136.6	36. Nebraska	96.2
7. California	134.1	37. Alabama	95.0
8. Massachusetts	130.8	38. Utah	94.6
9. Nevada	125.5	39. Indiana	94.2
10. Louisiana	124.5	40. Oklahoma	93.8
11. Wyoming	124.5	41. South Carolina	93.8
12. Virginia	118.5	42. Oregon	93.1
13. Maryland	115.5	43. Québec	93.8
14. Washington	115.2	44. Wisconsin	92.6
15. Illinois	114.2	45. Vermont	92.5
16. Texas	111.6	46. West Virginia	92.0
17. Georgia	111.1	47. New Mexico	90.1
18. Alberta	109.7	48. Manitoba	88.0
19. Michigan	109.6	49. Saskatchewan	86.9
20. Colorado	109.4	50. Iowa	86.6
21. British Columbia	106.4	51. New Brunswick	86.6
22. Pennsylvania	106.3	52. Mississippi	85.9
23. Rhode Island	106.2	53. South Dakota	85.1
24. Minnesota	106.0	54. Arkansas	84.9
25. Ontario	105.6	55. Idaho	84.8
26. Florida	105.5	56. Newfoundland and Labrador	84.4
27. Ohio	105.3	57. Nova Scotia	83.6
28. Missouri	103.6	58. Montana	82.1
29. North Carolina	102.4	59. North Dakota	81.7
30. Tennessee	101.9	60. Prince Edward Island	72.1

Table B19: Ranking of Canadian Provinces and United States Productivity for 1990 (Canada=100)			
1. Alaska	229.6	31. Tennessee	101.1
2. Delaware	154.9	32. Nebraska	99.5
3. Hawaii	148.8	33. Indiana	98.8
4. New York	146.9	34. Alabama	97.7
5. Connecticut	139.7	35. Oregon	96.6
6. New Jersey	136.3	36. Utah	96.5
7. California	133.9	37. Kentucky	96.2
8. Wyoming	132.8	38. Wisconsin	95.9
9. Louisiana	130.7	39. Oklahoma	95.8
10. Massachusetts	127.8	40. Arizona	95.7
11. Nevada	123.0	41. Vermont	95.6
12. Illinois	118.3	42. Maine	95.4
13. Washington	117.3	43. New Hampshire	94.7
14. Virginia	116.9	44. South Carolina	94.6
15. Maryland	114.5	45. West Virginia	94.3
16. Texas	112.8	46. Saskatchewan	93.9
17. Pennsylvania	110.4	47. Iowa	93.3
18. Alberta	110.3	48. Québec	93.0
19. Rhode Island	109.9	49. South Dakota	92.6
20. Georgia	109.4	50. New Mexico	90.9
21. Michigan	109.2	51. Manitoba	90.4
22. Ohio	107.6	52. North Dakota	88.4
23. Colorado	107.5	53. Idaho	88.0
24. Minnesota	106.0	54. Arkansas	86.5
25. British Columbia	105.2	55. New Brunswick	85.5
26. Ontario	104.4	56. Mississippi	84.9
27. Missouri	103.9	57. Montana	84.7
28. Florida	103.6	58. Newfoundland and Labrador	84.5
29. North Carolina	101.2	59. Nova Scotia	82.8
30. Kansas	101.1	60. Prince Edward Island	73.0

Table B20: Ranking of Canadian Provinces and United States Productivity for 1991 (Canada=100)			
1. Alaska	207.3	31. North Carolina	102.1
2. Delaware	162.2	32. Nebraska	101.2
3. New York	147.1	33. Alabama	100.2
4. Hawaii	144.2	34. Indiana	100.1
5. New Jersey	139.5	35. New Mexico	99.4
6. Connecticut	138.7	36. Kentucky	99.2
7. Wyoming	136.1	37. Oklahoma	98.8
8. California	135.1	38. Arizona	98.8
9. Massachusetts	131.4	39. New Hampshire	98.4
10. Louisiana	126.6	40. Utah	98.2
11. Nevada	122.7	41. Wisconsin	98.0
12. Washington	122.3	42. Oregon	97.4
13. Illinois	119.9	43. South Dakota	96.7
14. Virginia	114.7	44. South Carolina	95.5
15. Maryland	113.9	45. Saskatchewan	95.4
16. Texas	113.8	46. West Virginia	94.9
17. Pennsylvania	112.5	47. Vermont	94.5
18. Georgia	112.0	48. Maine	94.3
19. Alberta	110.5	49. Iowa	93.2
20. Rhode Island	110.0	50. Québec	92.5
21. Colorado	109.9	51. Arkansas	92.1
22. Michigan	109.1	52. North Dakota	89.8
23. Ohio	107.0	53. Manitoba	89.1
24. Florida	105.9	54. Idaho	88.0
25. Minnesota	105.6	55. Mississippi	87.8
26. Tennessee	105.1	56. New Brunswick	87.4
27. British Columbia	104.6	57. Montana	87.1
28. Missouri	104.2	58. Newfoundland and Labrador	86.3
29. Ontario	104.1	59. Nova Scotia	83.6
30. Kansas	103.0	60. Prince Edward Island	75.1

Table B21: Ranking of Canadian Provinces and United States Productivity for 1992 (Canada=100)			
1. Alaska	197.2	31. Nebraska	102.8
2. Delaware	154.3	32. British Columbia	102.5
3. New York	151.9	33. Indiana	102.4
4. Hawaii	144.3	34. New Hampshire	101.9
5. New Jersey	143.4	35. Kentucky	101.4
6. Connecticut	139.7	36. Kansas	100.3
7. California	132.4	37. New Mexico	99.9
8. Wyoming	131.4	38. Alabama	99.8
9. Massachusetts	130.0	39. West Virginia	98.3
10. Nevada	125.1	40. South Dakota	98.1
11. Washington	120.7	41. Oregon	98.0
12. Illinois	120.5	42. Wisconsin	97.4
13. Louisiana	116.6	43. Utah	97.4
14. Georgia	115.1	44. Oklahoma	96.4
15. Texas	113.6	45. Vermont	95.1
16. Virginia	113.4	46. North Dakota	94.9
17. Pennsylvania	113.2	47. South Carolina	94.3
18. Colorado	112.5	48. Québec	92.7
19. Maryland	110.0	49. Iowa	92.5
20. Alberta	110.0	50. Arkansas	92.3
21. Minnesota	109.1	51. Maine	91.4
22. Ohio	108.7	52. Saskatchewan	91.3
23. Tennessee	108.5	53. Mississippi	89.6
24. Michigan	107.9	54. Manitoba	89.5
25. Rhode Island	107.8	55. Newfoundland and Labrador	88.5
26. Florida	106.9	56. Idaho	88.2
27. Ontario	104.8	57. New Brunswick	86.6
28. North Carolina	104.3	58. Montana	86.2
29. Arizona	103.7	59. Nova Scotia	85.8
30. Missouri	103.2	60. Prince Edward Island	75.7

Table B22: Ranking of Canadian Provinces and United States Productivity for 1993 (Canada=100)			
1. Alaska	186.8	31. Missouri	103.0
2. Delaware	150.5	32. British Columbia	101.9
3. New York	148.7	33. Kentucky	100.3
4. New Jersey	143.7	34. New Hampshire	100.0
5. Hawaii	140.1	35. Indiana	99.5
6. Connecticut	139.3	36. South Dakota	99.4
7. Wyoming	132.1	37. Kansas	99.4
8. California	129.8	38. Nebraska	98.7
9. Massachusetts	127.6	39. Alabama	98.2
10. Nevada	127.2	40. Oregon	98.0
11. Illinois	120.7	41. Wisconsin	97.4
12. Washington	119.6	42. Oklahoma	96.9
13. Louisiana	119.3	43. West Virginia	96.7
14. Alberta	115.1	44. South Carolina	95.6
15. Virginia	114.1	45. Saskatchewan	95.3
16. Texas	113.7	46. Maine	94.2
17. Georgia	112.9	47. Utah	93.9
18. Pennsylvania	112.8	48. Québec	93.1
19. Colorado	111.6	49. Vermont	92.6
20. Maryland	109.7	50. Arkansas	91.7
21. Tennessee	108.5	51. Idaho	91.3
22. Rhode Island	108.2	52. North Dakota	89.7
23. Ohio	107.9	53. Newfoundland and Labrador	88.6
24. New Mexico	107.6	54. Mississippi	88.2
25. Michigan	107.6	55. Iowa	87.8
26. Florida	106.1	56. Manitoba	87.7
27. Minnesota	105.1	57. Montana	86.6
28. Arizona	105.0	58. New Brunswick	86.5
29. North Carolina	104.8	59. Nova Scotia	85.9
30. Ontario	103.7	60. Prince Edward Island	74.2

Table B23: Ranking of Canadian Provinces and United States Productivity for 1994 (Canada=100)			
1. Alaska	176.3	31. Arizona	101.7
2. New York	147.1	32. Kentucky	101.2
3. Delaware	146.4	33. Kansas	100.6
4. New Jersey	140.7	34. Nebraska	99.8
5. Connecticut	140.3	35. New Hampshire	98.3
6. Hawaii	138.5	36. Indiana	98.0
7. Massachusetts	128.2	37. British Columbia	97.4
8. Nevada	127.2	38. West Virginia	97.4
9. California	126.2	39. South Carolina	96.5
10. Wyoming	125.3	40. Wisconsin	95.9
11. Louisiana	122.0	41. Alabama	95.9
12. Illinois	121.3	42. South Dakota	95.9
13. Washington	117.8	43. Saskatchewan	95.7
14. Alberta	115.7	44. Maine	95.3
15. Virginia	113.4	45. Oregon	95.2
16. Georgia	112.8	46. Oklahoma	94.3
17. Texas	112.3	47. Québec	92.7
18. Pennsylvania	112.0	48. Utah	92.0
19. New Mexico	111.8	49. Vermont	91.8
20. Michigan	109.9	50. Iowa	91.5
21. Colorado	108.2	51. Arkansas	90.0
22. Ohio	108.1	52. Newfoundland and Labrador	89.8
23. Maryland	107.8	53. Mississippi	88.7
24. Rhode Island	107.4	54. Manitoba	88.1
25. North Carolina	107.3	55. North Dakota	87.6
26. Ontario	105.4	56. Idaho	87.5
27. Florida	104.5	57. New Brunswick	86.3
28. Tennessee	103.7	58. Montana	82.9
29. Missouri	102.9	59. Nova Scotia	82.7
30. Minnesota	102.6	60. Prince Edward Island	74.3

Table B24: Ranking of Canadian Provinces and United States Productivity for 1995 (Canada=100)			
1. Alaska	182.6	31. Missouri	101.9
2. Delaware	152.9	32. Kentucky	101.9
3. New York	148.5	33. Nebraska	99.4
4. Connecticut	145.1	34. Kansas	99.1
5. New Jersey	140.7	35. Oregon	99.1
6. Hawaii	136.5	36. West Virginia	98.0
7. Massachusetts	130.0	37. Arizona	97.9
8. Nevada	129.6	38. Indiana	97.2
9. California	128.5	39. British Columbia	96.7
10. Louisiana	125.1	40. Alabama	96.5
11. Wyoming	124.5	41. Utah	96.0
12. Illinois	121.6	42. South Carolina	95.8
13. Georgia	116.4	43. South Dakota	95.7
14. Alberta	115.0	44. Saskatchewan	95.1
15. Pennsylvania	114.2	45. Wisconsin	95.0
16. Texas	113.7	46. Oklahoma	94.5
17. Washington	113.6	47. Iowa	92.9
18. Virginia	112.7	48. Idaho	92.2
19. Rhode Island	112.6	49. Québec	92.0
20. New Mexico	110.4	50. Mississippi	91.1
21. North Carolina	110.2	51. Arkansas	90.8
22. Michigan	109.5	52. Maine	90.7
23. Ohio	108.8	53. Newfoundland and Labrador	90.0
24. Colorado	108.0	54. Vermont	89.5
25. Maryland	107.4	55. North Dakota	88.6
26. Ontario	106.2	56. Manitoba	85.9
27. Florida	105.2	57. New Brunswick	85.5
28. Tennessee	105.0	58. Montana	84.1
29. Minnesota	103.5	59. Nova Scotia	82.5
30. New Hampshire	103.3	60. Prince Edward Island	75.7

Table B25: Ranking of Canadian Provinces and United States Productivity for 1996 (Canada=100)			
1. Alaska	172.4	31. Tennessee	105.0
2. Delaware	156.7	32. Kentucky	104.1
3. New York	151.3	33. Arizona	103.6
4. Connecticut	147.6	34. Nebraska	103.1
5. New Jersey	142.2	35. Utah	101.8
6. Nevada	133.9	36. Missouri	101.6
7. Massachusetts	133.3	37. Kansas	101.4
8. Hawaii	130.6	38. Indiana	101.0
9. California	130.0	39. South Carolina	98.2
10. Wyoming	125.5	40. Saskatchewan	97.5
11. Illinois	123.6	41. South Dakota	97.0
12. Louisiana	121.5	42. British Columbia	96.8
13. Virginia	119.1	43. West Virginia	96.1
14. Georgia	118.4	44. Alabama	95.8
15. Texas	116.7	45. Wisconsin	95.3
16. Washington	115.7	46. Oklahoma	95.3
17. New Mexico	114.3	47. Iowa	95.2
18. Pennsylvania	113.7	48. Arkansas	93.2
19. Alberta	113.2	49. Québec	92.2
20. Colorado	112.5	50. Mississippi	92.2
21. New Hampshire	112.1	51. Idaho	91.1
22. Rhode Island	110.1	52. Vermont	91.0
23. Ohio	109.5	53. North Dakota	90.4
24. Michigan	109.1	54. Newfoundland and Labrador	88.5
25. North Carolina	108.6	55. Manitoba	87.9
26. Minnesota	108.5	56. Maine	87.9
27. Oregon	107.8	57. New Brunswick	86.4
28. Florida	107.0	58. Montana	82.2
29. Maryland	105.7	59. Nova Scotia	82.1
30. Ontario	105.5	60. Prince Edward Island	75.3

Table B26: Ranking of Canadian Provinces and United States Productivity for 1997 (Canada=100)			
1. Alaska	170.4	31. Florida	106.7
2. Delaware	158.8	32. Ontario	105.5
3. Connecticut	153.4	33. Missouri	104.5
4. New York	148.9	34. Kentucky	104.0
5. New Jersey	140.1	35. Nebraska	103.8
6. Massachusetts	132.7	36. Kansas	102.2
7. Nevada	130.0	37. Indiana	101.6
8. California	129.9	38. Utah	101.6
9. Hawaii	128.6	39. Iowa	99.3
10. Wyoming	126.5	40. South Dakota	98.1
11. Illinois	125.8	41. Wisconsin	96.9
12. Louisiana	121.5	42. Saskatchewan	96.8
13. Texas	121.4	43. Oklahoma	96.5
14. Virginia	120.4	44. South Carolina	96.2
15. Georgia	117.5	45. Arkansas	95.7
16. New Mexico	116.4	46. British Columbia	95.5
17. Colorado	115.7	47. West Virginia	95.1
18. Rhode Island	114.8	48. Alabama	94.1
19. Washington	114.6	49. Québec	92.0
20. Alberta	114.6	50. Vermont	91.7
21. Pennsylvania	113.9	51. Mississippi	91.7
22. Minnesota	111.5	52. Idaho	90.9
23. Oregon	111.3	53. Maine	90.3
24. New Hampshire	111.3	54. Manitoba	88.3
25. Ohio	111.2	55. North Dakota	87.3
26. North Carolina	111.2	56. Newfoundland and Labrador	86.8
27. Tennessee	109.9	57. New Brunswick	84.6
28. Michigan	109.3	58. Nova Scotia	82.7
29. Arizona	109.2	59. Montana	81.6
30. Maryland	108.8	60. Prince Edward Island	73.8

Table B27: Ranking of Canadian Provinces and United States Productivity for 1998 (Canada=100)			
1. Connecticut	156.2	31. Florida	108.2
2. Alaska	155.6	32. Missouri	107.6
3. New York	154.6	33. Indiana	106.3
4. Delaware	154.0	34. Ontario	105.6
5. New Jersey	144.1	35. Kentucky	105.2
6. Massachusetts	137.7	36. Nebraska	104.1
7. California	132.7	37. Utah	104.0
8. Nevada	129.7	38. Kansas	101.7
9. Illinois	128.3	39. Wisconsin	100.1
10. Hawaii	126.5	40. Iowa	99.0
11. Wyoming	125.5	41. Saskatchewan	98.2
12. Texas	122.6	42. South Dakota	97.5
13. Virginia	120.6	43. Oklahoma	97.0
14. Washington	119.5	44. South Carolina	96.6
15. Georgia	119.2	45. Arkansas	95.8
16. North Carolina	117.8	46. Alabama	95.8
17. Colorado	117.3	47. British Columbia	95.3
18. New Mexico	116.9	48. West Virginia	94.5
19. Louisiana	116.9	49. Maine	93.2
20. Rhode Island	116.8	50. Mississippi	93.0
21. New Hampshire	116.5	51. North Dakota	92.8
22. Pennsylvania	116.0	52. Vermont	92.6
23. Ohio	115.1	53. Idaho	91.8
24. Alberta	114.4	54. Québec	91.2
25. Oregon	114.0	55. Manitoba	89.1
26. Minnesota	112.8	56. Newfoundland and Labrador	88.0
27. Arizona	112.2	57. New Brunswick	84.6
28. Maryland	112.2	58. Nova Scotia	82.7
29. Tennessee	110.5	59. Montana	81.1
30. Michigan	109.5	60. Prince Edward Island	74.6

Table B28: Ranking of Canadian Provinces and United States Productivity for 1999 (Canada=100)			
1. Delaware	157.5	31. Florida	108.1
2. Connecticut	156.8	32. Ontario	106.96
3. New York	155.1	33. Missouri	106.7
4. Alaska	152.9	34. Indiana	106.3
5. New Jersey	143.5	35. Nebraska	105.7
6. Massachusetts	141.4	36. Utah	104.0
7. California	134.9	37. Wisconsin	103.0
8. Nevada	131.6	38. Kentucky	102.7
9. Illinois	126.1	39. Kansas	100.7
10. Hawaii	124.3	40. Idaho	100.6
11. Texas	123.2	41. South Dakota	99.2
12. Washington	123.0	42. South Carolina	98.7
13. Wyoming	122.7	43. Iowa	98.5
14. Louisiana	121.6	44. Alabama	98.2
15. Georgia	121.3	45. Arkansas	97.1
16. Colorado	120.4	46. Saskatchewan	94.8
17. Oregon	120.3	47. Oklahoma	94.3
18. Virginia	119.3	48. British Columbia	93.8
19. New Mexico	118.2	49. Mississippi	93.3
20. New Hampshire	117.9	50. West Virginia	93.1
21. North Carolina	117.7	51. North Dakota	92.9
22. Pennsylvania	115.5	52. Vermont	92.4
23. Minnesota	114.0	53. Québec	92.0
24. Rhode Island	113.5	54. Maine	91.5
25. Ohio	113.4	55. Manitoba	87.4
26. Arizona	113.4	56. Newfoundland and Labrador	86.0
27. Maryland	111.7	57. New Brunswick	84.7
28. Alberta	109.8	58. Nova Scotia	81.7
29. Michigan	109.5	59. Montana	80.3
30. Tennessee	109.3	60. Prince Edward Island	74.6

Table B29: Ranking of Canadian Provinces and United States Productivity for 2000 (Canada=100)			
1. Connecticut	155.6	31. Indiana	106.6
2. New York	154.0	32. Ontario	106.4
3. Delaware	151.8	33. Kansas	104.5
4. Alaska	148.6	34. Idaho	104.3
5. Massachusetts	147.4	35. Florida	104.2
6. New Jersey	144.2	36. Missouri	103.5
7. California	139.6	37. Nebraska	103.1
8. Oregon	126.8	38. Utah	102.8
9. Illinois	125.9	39. Wisconsin	102.6
10. Washington	125.1	40. Kentucky	102.0
11. Texas	123.5	41. South Dakota	101.6
12. Colorado	123.5	42. Iowa	99.3
13. Hawaii	123.1	43. South Carolina	99.1
14. Nevada	121.2	44. Alabama	97.9
15. New Hampshire	121.2	45. Vermont	95.3
16. Wyoming	121.2	46. Saskatchewan	94.8
17. Virginia	120.3	47. Oklahoma	94.7
18. Georgia	119.7	48. Arkansas	93.9
19. Louisiana	117.6	49. British Columbia	93.8
20. Minnesota	116.1	50. North Dakota	93.7
21. Rhode Island	114.8	51. Québec	92.3
22. Pennsylvania	114.5	52. Maine	90.4
23. Maryland	113.9	53. West Virginia	90.0
24. New Mexico	113.5	54. Newfoundland and Labrador	89.5
25. Ohio	113.3	55. Mississippi	88.1
26. Alberta	111.4	56. Manitoba	86.1
27. North Carolina	111.4	57. New Brunswick	82.7
28. Arizona	110.9	58. Montana	80.5
29. Tennessee	109.2	59. Nova Scotia	79.5
30. Michigan	109.1	60. Prince Edward Island	72.3

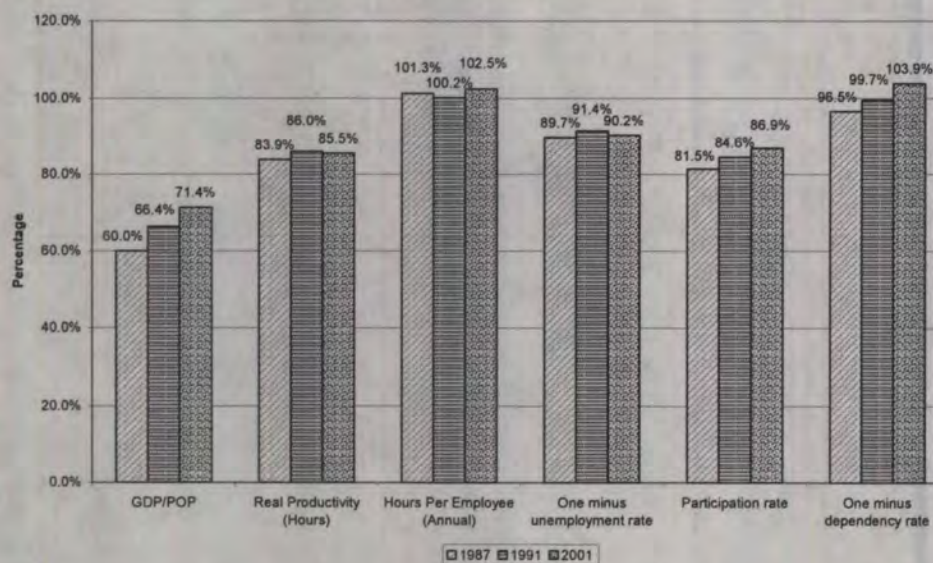
Table B30: Ranking of Canadian Provinces and United States Productivity for 2001 (Canada=100)			
1. Connecticut	160.2	31. Michigan	107.7
2. New York	157.0	32. Ontario	105.9
3. Delaware	156.3	33. Indiana	105.0
4. Alaska	145.9	34. Florida	104.0
5. Massachusetts	144.5	35. Kentucky	103.7
6. New Jersey	143.8	36. Missouri	103.1
7. California	137.5	37. Utah	102.6
8. Oregon	128.7	38. South Dakota	102.2
9. Illinois	127.9	39. Nebraska	102.0
10. Washington	127.5	40. Wisconsin	102.0
11. Wyoming	123.8	41. South Carolina	101.9
12. Colorado	123.8	42. Idaho	99.7
13. Texas	123.6	43. Alabama	98.2
14. Hawaii	123.0	44. Vermont	97.5
15. Virginia	121.1	45. Iowa	96.8
16. Georgia	120.0	46. Saskatchewan	95.7
17. Nevada	119.7	47. Oklahoma	95.0
18. New Hampshire	118.1	48. Arkansas	94.8
19. New Mexico	117.6	49. British Columbia	93.6
20. Louisiana	116.0	50. North Dakota	92.9
21. Maryland	114.6	51. Québec	92.0
22. Rhode Island	114.4	52. Maine	91.6
23. Pennsylvania	112.6	53. West Virginia	88.6
24. Minnesota	111.5	54. Mississippi	88.5
25. Arizona	110.6	55. Newfoundland and Labrador	87.5
26. Ohio	110.5	56. Manitoba	86.4
27. Alberta	110.5	57. New Brunswick	83.2
28. North Carolina	110.1	58. Montana	83.1
29. Tennessee	109.4	59. Nova Scotia	80.5
30. Kansas	107.8	60. Prince Edward Island	70.6

Appendix C: The Impact on Labour Productivity When Hours Worked is Used

It is also interesting to consider whether these results are contingent on the choice of employees to measure labour productivity, rather than hours worked. Since hours worked per employee is available from 1987 onward, the above analysis is repeated for labour productivity defined in terms of hours worked.³⁶

Figures C1 and C2 reproduce the levels analysis undertaken previously with labour productivity defined in terms of employees being replaced by labour productivity being defined in terms actual hours worked in their main job. Based on these diagrams, it is possible to infer that switching to labour productivity defined in terms of hours instead being defined in terms of employees is not a significant difference for Newfoundland and Labrador for the period 1987 to 2001. Specifically, per employee labour productivity in Newfoundland and Labrador was 85.0% of the Canadian estimate in 1987, while the per hour labour productivity for the same year was 83.9% of the Canadian average. In 2001 the difference in these measures was approximately the same - the per employee labour productivity was 87.6% of the Canadian estimate and the per hour labour productivity was 85.5% of the corresponding Canadian estimate. In other words, in the context of measuring the level of the standard of living, it does not really matter whether hours or employees are utilized for Newfoundland and Labrador. Similarly, the switch from employees to hours does not have a significant impact on the relative estimates of labour productivity derived for Atlantic Canada as a whole. For instance, the labour productivity in Atlantic Canada in 1987 was 87.8% of the Canadian average in 1987 when employees are used and 87.6% when hours were used. In 2001 the corresponding estimates were 82.4% and 80.8%, respectively.

Figure C1: Decomposition of GDP Per Capita - Newfoundland and Labrador Relative to Canada (Based on Hours Worked Not Employees)



³⁶ The detailed relationship between productivity defined in terms of employees versus hours is provided in Appendix A.

Figure C2: Decomposition of GDP Per Capita - Atlantic Canada Relative to Canada
(Based on Hours Worked Not Employees)

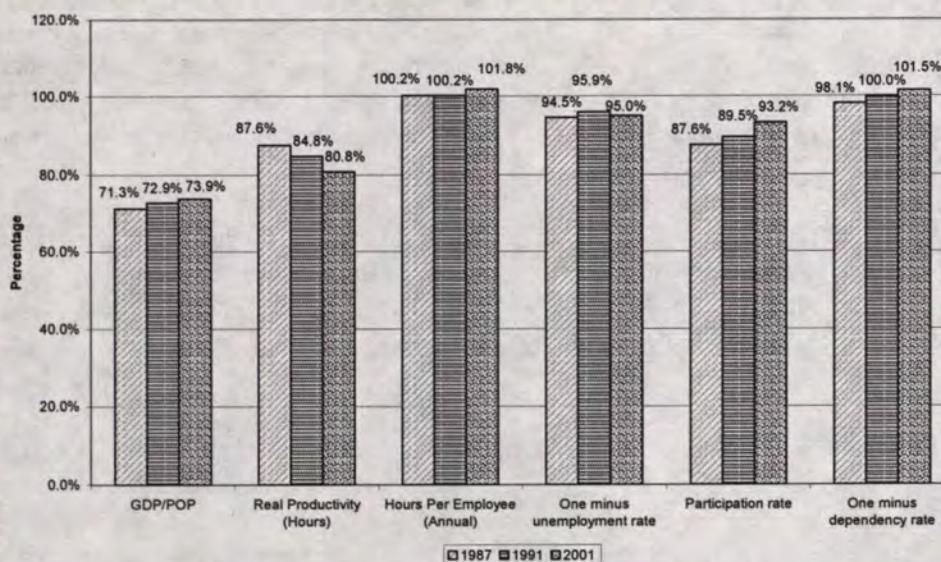


Table C1 replicates the growth analysis in Table 1, but it substitutes hours for employees in calculating labour productivity and incorporates hours worked per employee.

**Table C1: Average Annual Growth Rates (Geometric Averages) –
Newfoundland and Labrador, Atlantic Canada and Canada for Select
Periods – Using Per Hour Worked Labour Productivity**

Area	Annual Growth Rate in Real GDP Per Capita	Annual Growth Rate in Real GDP Per Hour Worked	Annual Growth Rate in Hours Worked Per Employed Person	Annual Growth Rate in One Minus the Unemployment Rate	Annual Growth Rate in the Participation Rate	Annual Growth Rate in One Minus the Dependency Ratio
Time period – 1987 – 2001						
N.L.	2.78%	1.42%	0.01%	0.17%	0.42%	0.73%
A. Canada	1.77%	0.70%	0.04%	0.16%	0.40%	0.45%
Canada	1.51%	1.28%	-0.07%	0.13%	-0.04%	0.21%
Time period – 1987 – 1991						
N.L.	2.51%	1.11%	-0.44%	0.06%	0.99%	0.77%
A. Canada	0.48%	-0.32%	-0.17%	-0.06%	0.59%	0.44%
Canada	-0.07%	0.49%	-0.16%	-0.42%	0.05%	-0.03%
Time period – 1991 – 2001						
N.L.	2.88%	1.54%	0.20%	0.21%	0.19%	0.72%
A. Canada	2.29%	1.12%	0.13%	0.25%	0.32%	0.45%
Canada	2.15%	1.60%	-0.03%	0.34%	-0.08%	0.30%

Interestingly, when the growth rate in per hour labour productivity is substituted for the per employee labour productivity estimate, the productivity per hour worked in Canada between 1991 and 2001 is the highest (1.60%) and hours worked per employee went down slightly in Canada (-0.03%). This replaced Newfoundland and Labrador in terms of the highest labour productivity during this period when employees were used. This results from the fact that part of Newfoundland and Labrador's per employee labour productivity comes from each employee working more hours, while the opposite was true for Canada.

From 1991 to 2001, the growth in Newfoundland and Labrador's labour productivity per employee (1.74%) consists of growth in output per hour (1.54% per annum) and growth in hours worked per employee (0.20%). This increase in hours worked exceeded that exhibited in either regionally or nationally.

Appendix D: Labour Productivity and Industrial Decomposition

Table D1: Labour Productivity (Real GDP per Hour Worked) by Industry – Newfoundland and Labrador

	All Industries	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accom & Food	Other	Public	Residual
1987	\$26.07	\$91.11	\$33.03	\$22.31	\$15.28	\$114.15	\$22.91	\$11.31	\$34.79	\$25.50	\$10.54	\$8.27	\$29.83	\$21.14
1988	\$25.88	\$88.38	\$31.94	\$21.41	\$15.37	\$105.34	\$16.57	\$12.29	\$29.70	\$25.86	\$11.26	\$8.87	\$31.34	\$23.74
1989	\$25.62	\$69.12	\$31.03	\$21.84	\$14.61	\$96.85	\$16.66	\$11.22	\$30.76	\$23.99	\$10.90	\$9.54	\$33.46	\$24.18
1990	\$25.41	\$63.88	\$33.41	\$22.42	\$14.74	\$97.59	\$16.02	\$12.17	\$29.91	\$22.78	\$10.37	\$9.14	\$32.57	\$23.44
1991	\$25.44	\$67.69	\$28.91	\$23.50	\$14.52	\$103.72	\$15.62	\$16.14	\$29.37	\$23.66	\$10.39	\$8.48	\$31.08	\$22.79
1992	\$27.01	\$64.54	\$29.52	\$23.27	\$14.30	\$111.13	\$18.31	\$13.79	\$29.72	\$25.92	\$10.79	\$9.74	\$33.88	\$26.47
1993	\$27.71	\$96.11	\$31.73	\$25.57	\$14.66	\$109.61	\$17.78	\$13.54	\$31.12	\$25.64	\$12.51	\$9.34	\$34.61	\$26.25
1994	\$28.39	\$116.47	\$33.36	\$29.36	\$15.97	X	\$21.93	\$16.07	\$28.90	\$21.40	\$12.12	\$11.07	\$34.58	X
1995	\$28.34	\$123.03	\$31.23	\$31.77	\$18.26	X	\$24.72	\$13.60	\$27.56	\$19.72	\$11.69	\$13.35	\$34.50	X
1996	\$28.04	\$114.80	\$34.06	\$25.24	\$16.17	X	\$19.88	\$17.79	\$28.65	\$19.17	\$13.59	\$11.79	\$36.09	X
1997	\$28.06	\$104.52	\$29.75	\$21.83	\$16.41	\$125.59	\$22.16	\$17.77	\$28.89	\$20.54	\$12.81	\$12.14	\$33.42	\$27.86
1998	\$29.34	\$144.38	\$27.54	\$21.54	\$16.37	\$118.49	\$24.76	\$15.81	\$26.83	\$20.39	\$11.75	\$11.54	\$39.61	\$36.49
1999	\$28.76	\$104.95	\$26.77	\$21.82	\$16.88	\$123.49	\$25.16	\$15.21	\$27.23	\$19.59	\$12.80	\$10.64	\$32.40	\$38.31
2000	\$30.14	\$139.33	\$24.84	\$25.44	\$17.79	\$121.79	\$22.58	\$14.73	\$28.07	\$19.09	\$12.52	\$12.51	\$35.73	\$40.77
2001	\$29.93	\$80.81	\$24.13	\$22.97	\$17.34	\$137.88	\$21.63	\$11.31	\$29.45	\$19.09	\$13.08	\$15.27	\$38.49	\$40.93
Percent Change 1987-01	14.8%	-11.3%	-27.0%	3.0%	13.5%	20.8%	-5.6%	0%	-15.3%	-25.1%	24.1%	84.6%	29.0%	93.6%

Table D2: Contribution to Labour Productivity (Real GDP per Hour Worked) by Industry – Newfoundland and Labrador

	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accomm & Food	Other	Public	Residual
1987	4.8%	9.3%	9.2%	9.8%	14.5%	2.0%	0.7%	9.7%	10.3%	2.1%	1.7%	10.3%	15.7%
1988	4.6%	8.6%	10.0%	10.0%	14.4%	1.8%	0.7%	8.9%	9.6%	2.2%	1.8%	10.2%	17.1%
1989	4.4%	8.5%	10.1%	9.8%	14.3%	1.9%	0.7%	8.9%	10.0%	2.2%	1.7%	10.4%	17.0%
1990	4.3%	8.5%	9.2%	10.2%	15.0%	1.8%	0.8%	8.7%	10.3%	2.2%	1.7%	10.8%	16.4%
1991	4.3%	7.9%	8.9%	9.7%	15.8%	1.9%	0.9%	8.7%	10.9%	2.1%	1.8%	11.6%	15.6%
1992	4.2%	7.5%	7.4%	9.5%	16.4%	2.0%	0.9%	8.7%	11.6%	2.1%	1.8%	12.1%	15.5%
1993	4.8%	7.2%	7.9%	9.9%	16.3%	2.1%	0.9%	8.8%	11.1%	2.1%	2.0%	11.9%	15.1%
1994	4.6%	8.3%	7.5%	10.3%	X	2.3%	0.9%	8.2%	10.2%	2.1%	2.1%	11.4%	X
1995	4.5%	8.1%	7.4%	10.5%	X	2.6%	0.9%	7.9%	9.8%	2.2%	2.4%	11.3%	X
1996	4.7%	7.3%	7.0%	9.9%	X	2.1%	1.0%	8.0%	9.8%	2.3%	2.4%	11.2%	X
1997	4.9%	6.2%	6.9%	10.1%	18.0%	2.4%	0.9%	8.0%	9.6%	2.3%	2.4%	10.8%	17.6%
1998	4.8%	5.6%	6.6%	9.9%	17.3%	2.6%	1.0%	7.3%	9.1%	2.2%	2.4%	10.3%	20.9%
1999	4.3%	6.3%	7.2%	10.1%	16.5%	2.7%	1.1%	7.0%	8.8%	2.2%	2.3%	9.6%	22.0%
2000	4.2%	5.4%	6.9%	10.1%	16.0%	2.8%	1.1%	6.8%	8.5%	2.2%	2.2%	9.2%	24.6%
2001	3.9%	5.2%	6.4%	10.6%	16.3%	2.8%	1.2%	6.8%	8.6%	2.2%	2.3%	9.4%	24.4%

Table D3: Labour Productivity (Real GDP per Hour Worked) by Industry – Atlantic Canada

	All Industries	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accom & Food	Other	Public	Residual
1987	\$25.96	\$81.61	\$27.67	\$22.95	\$15.96	\$92.04	\$19.96	\$14.11	\$29.56	\$23.04	\$13.08	\$11.41	\$38.00	\$20.79
1988	\$25.36	\$83.49	\$25.01	\$20.26	\$16.14	\$90.62	\$16.86	\$15.09	\$27.01	\$23.65	\$12.61	\$12.28	\$36.75	\$22.15
1989	\$24.91	\$77.14	\$25.13	\$20.83	\$15.43	\$85.20	\$16.47	\$13.60	\$26.47	\$23.21	\$11.96	\$11.23	\$37.40	\$22.20
1990	\$24.98	\$78.59	\$26.84	\$20.98	\$14.76	\$86.72	\$17.30	\$13.94	\$26.10	\$23.01	\$11.57	\$11.18	\$38.59	\$21.72
1991	\$25.75	\$74.46	\$27.34	\$23.86	\$14.82	\$92.85	\$16.51	\$14.14	\$26.49	\$22.79	\$11.65	\$11.08	\$39.38	\$21.76
1992	\$26.54	\$66.12	\$26.44	\$24.78	\$15.18	\$92.63	\$16.78	\$13.09	\$26.95	\$23.78	\$11.91	\$12.38	\$39.38	\$23.47
1993	\$26.59	\$78.37	\$25.99	\$25.37	\$16.14	\$98.12	\$16.81	\$12.44	\$26.16	\$22.01	\$12.24	\$11.83	\$39.22	\$23.26
1994	\$26.65	\$89.57	\$26.10	\$26.48	\$16.78	X	X	\$12.51	\$25.09	\$20.60	\$11.90	\$12.10	\$38.52	X
1995	\$26.87	\$92.67	\$25.34	\$25.97	\$17.99	X	X	\$12.17	\$25.80	\$19.56	\$12.03	\$12.67	\$39.08	X
1996	\$26.93	\$105.04	\$25.70	\$26.28	\$16.57	X	X	\$12.73	\$27.02	\$19.24	\$12.12	\$12.57	\$38.96	X
1997	\$26.93	X	\$22.68	\$26.69	\$17.17	\$109.59	\$19.29	\$11.41	\$26.43	\$19.63	\$12.56	\$12.30	\$37.31	X
1998	\$27.48	X	\$24.25	\$26.56	\$17.97	\$109.54	\$19.22	\$12.87	\$25.36	\$19.51	\$12.28	\$12.18	\$39.99	X
1999	\$27.93	X	\$27.10	\$26.36	\$18.51	\$114.17	\$21.71	\$12.70	\$25.35	\$20.02	\$12.03	\$11.63	\$40.11	X
2000	\$27.98	X	\$23.97	\$27.17	\$18.49	\$116.89	\$21.09	\$11.21	\$23.84	\$19.04	\$12.68	\$12.76	\$41.46	X
2001	\$28.46	\$85.36	\$22.15	\$27.42	\$18.40	\$131.26	\$20.63	\$10.80	\$24.08	\$19.43	\$12.18	\$15.28	\$44.63	\$30.61
Percent Change 1987-01	9.6%	4.6%	-19.9%	19.5%	15.3%	42.6%	3.4%	-23.5%	-18.5%	-15.7%	-6.9%	33.9%	17.4%	47.2%

Table D4: Contribution to Labour Productivity (Real GDP per Hour Worked) by Industry – Atlantic Canada

	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accomm & Food	Other	Public	Residual
1987	3.6%	7.7%	11.2%	10.5%	16.5%	1.8%	0.9%	7.3%	8.8%	2.6%	2.3%	12.1%	14.7%
1988	3.7%	7.4%	10.7%	10.7%	16.2%	1.8%	0.9%	7.0%	9.0%	2.5%	2.4%	12.0%	15.5%
1989	3.8%	7.6%	10.8%	10.6%	16.2%	1.9%	1.0%	7.0%	9.1%	2.6%	2.3%	12.1%	15.3%
1990	3.7%	7.8%	10.1%	10.3%	16.6%	1.9%	1.0%	6.9%	9.4%	2.5%	2.3%	12.3%	15.2%
1991	3.6%	7.3%	10.4%	9.8%	17.2%	2.0%	1.0%	6.9%	9.6%	2.3%	2.3%	12.7%	14.8%
1992	3.5%	6.5%	10.3%	9.8%	17.5%	1.9%	1.0%	7.0%	9.9%	2.3%	2.3%	12.8%	15.0%
1993	3.6%	6.3%	10.4%	10.3%	18.0%	2.1%	1.0%	6.9%	9.3%	2.4%	2.4%	12.8%	14.5%
1994	3.5%	6.3%	10.3%	10.5%	X	X	1.0%	6.6%	8.8%	2.5%	2.4%	12.4%	X
1995	3.1%	6.3%	10.8%	10.7%	X	X	1.0%	6.4%	8.4%	2.6%	2.5%	12.1%	X
1996	3.4%	6.2%	10.6%	10.2%	X	X	1.1%	6.5%	8.3%	2.6%	2.5%	11.6%	X
1997	X	5.5%	10.9%	10.5%	19.6%	2.7%	1.1%	6.6%	8.2%	2.6%	2.5%	11.0%	X
1998	X	5.7%	11.0%	10.7%	19.3%	2.7%	1.2%	6.2%	8.1%	2.6%	2.4%	10.7%	X
1999	X	6.4%	11.3%	10.9%	18.6%	2.9%	1.3%	5.9%	8.0%	2.6%	2.3%	10.3%	X
2000	X	5.7%	11.2%	10.9%	18.5%	2.9%	1.4%	5.7%	7.8%	2.6%	2.3%	10.1%	X
2001	3.1%	5.3%	10.8%	11.0%	18.8%	3.0%	1.5%	5.7%	7.8%	2.6%	2.3%	10.2%	17.7%

Table D5: Labour Productivity (Real GDP per Hour Worked) by Industry – Canada

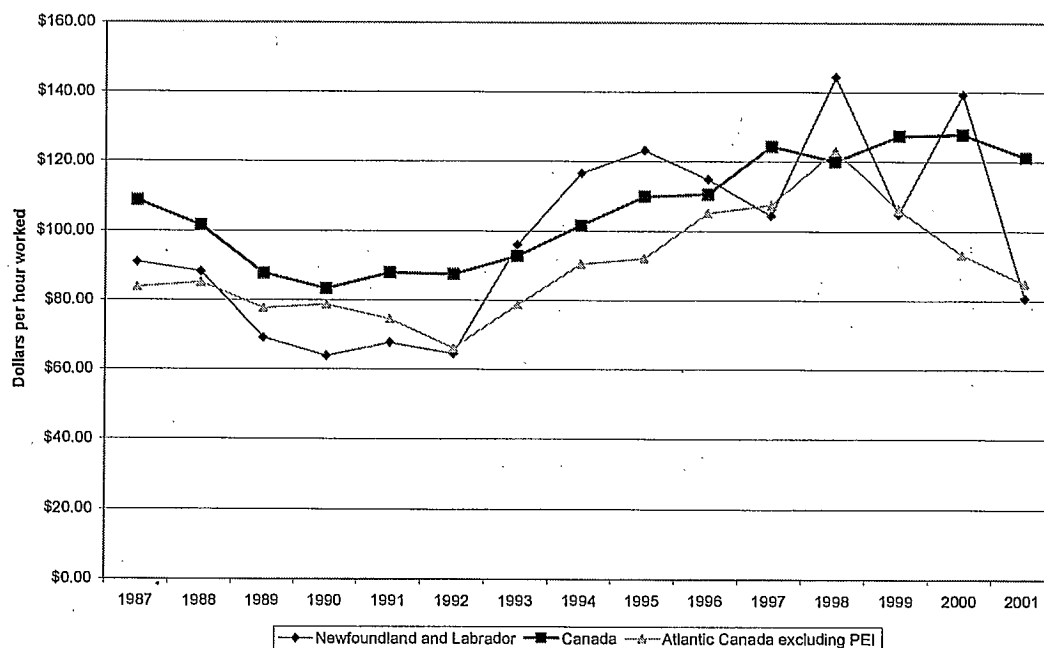
	All Industries	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accom & Food	Other	Public	Residual
1987	\$30.14	\$108.75	\$31.36	\$29.26	\$20.40	\$85.75	\$20.11	\$28.90	\$34.16	\$25.43	\$15.63	\$12.89	\$33.45	\$26.65
1988	\$30.04	\$101.61	\$29.81	\$29.36	\$20.57	\$82.32	\$19.74	\$28.93	\$31.91	\$24.90	\$15.76	\$13.96	\$33.02	\$28.19
1989	\$29.72	\$87.83	\$29.57	\$29.20	\$20.97	\$80.61	\$19.12	\$28.28	\$30.88	\$24.75	\$16.08	\$13.44	\$32.59	\$27.81
1990	\$30.10	\$83.33	\$30.53	\$29.81	\$20.34	\$82.34	\$18.62	\$29.50	\$31.48	\$24.43	\$15.92	\$13.92	\$32.51	\$28.86
1991	\$30.82	\$88.04	\$32.18	\$30.45	\$20.17	\$87.54	\$18.12	\$29.19	\$31.74	\$24.91	\$14.38	\$13.93	\$33.49	\$29.61
1992	\$31.81	\$87.62	\$31.59	\$32.39	\$21.04	\$91.19	\$18.23	\$28.16	\$31.92	\$25.34	\$14.37	\$14.25	\$33.70	\$31.51
1993	\$31.91	\$92.98	\$30.47	\$33.76	\$21.39	\$93.28	\$18.24	\$27.46	\$31.55	\$24.54	\$14.33	\$13.62	\$33.73	\$31.62
1994	\$32.29	\$101.65	\$28.87	\$35.28	\$22.37	\$98.17	\$18.38	\$26.34	\$30.10	\$24.45	\$14.30	\$13.21	\$34.58	\$31.49
1995	\$32.77	\$109.90	\$28.48	\$35.70	\$22.76	\$99.60	\$18.76	\$26.02	\$30.41	\$24.05	\$14.86	\$13.83	\$35.04	\$32.18
1996	\$32.77	\$110.60	\$29.66	\$35.40	\$23.34	\$99.03	\$18.19	\$26.14	\$31.12	\$23.59	\$14.17	\$13.53	\$34.80	\$32.20
1997	\$33.35	\$124.32	\$30.14	\$35.93	\$23.47	\$102.99	\$20.56	\$20.81	\$29.94	\$23.72	\$14.48	\$15.99	\$36.02	\$33.00
1998	\$34.06	\$119.90	\$30.91	\$36.50	\$25.25	\$109.74	\$21.55	\$20.54	\$30.13	\$23.64	\$14.17	\$16.06	\$37.92	\$33.74
1999	\$34.58	\$127.32	\$30.66	\$36.70	\$25.83	\$114.27	\$21.89	\$21.11	\$28.42	\$23.11	\$14.82	\$16.34	\$38.28	\$35.72
2000	\$35.02	\$127.68	\$29.99	\$37.41	\$26.12	\$115.91	\$23.10	\$21.21	\$28.54	\$22.06	\$14.86	\$17.03	\$39.02	\$37.17
2001	\$35.81	\$121.09	\$30.68	\$36.62	\$26.77	\$122.45	\$24.11	\$22.08	\$29.93	\$22.68	\$15.27	\$18.05	\$41.09	\$38.06
Percent Change 1987-01	18.8%	11.3%	-2.2%	25.1%	31.2%	42.8%	19.9%	-23.6%	-12.4%	-10.8%	-2.3%	40.0%	22.8%	42.8%

Table D6: Contribution to Labour Productivity (Real GDP per Hour Worked) by Industry – Canada

	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accomm & Food	Other	Public	Residual
1987	3.5%	6.7%	17.1%	10.5%	17.7%	2.8%	1.9%	6.2%	6.9%	2.7%	2.1%	6.7%	15.1%
1988	3.5%	6.6%	17.5%	10.6%	17.2%	2.9%	2.1%	6.0%	6.8%	2.7%	2.2%	6.6%	15.5%
1989	3.2%	6.8%	17.3%	10.7%	17.3%	2.9%	2.2%	5.8%	6.8%	2.8%	2.1%	6.6%	15.3%
1990	3.2%	6.8%	16.6%	10.3%	17.9%	2.9%	2.3%	5.8%	7.0%	2.8%	2.1%	6.7%	15.5%
1991	3.4%	6.4%	15.7%	10.1%	18.9%	3.0%	2.2%	6.0%	7.3%	2.5%	2.1%	7.1%	15.5%
1992	3.3%	5.8%	15.8%	10.3%	19.2%	2.8%	2.1%	6.1%	7.4%	2.5%	2.1%	7.1%	15.6%
1993	3.3%	5.5%	16.2%	10.3%	19.2%	2.9%	2.2%	6.0%	7.2%	2.5%	2.1%	6.9%	15.7%
1994	3.2%	5.4%	16.7%	10.5%	19.7%	3.0%	2.2%	5.8%	6.9%	2.4%	2.0%	6.7%	15.9%
1995	3.2%	5.1%	17.1%	10.6%	20.0%	3.1%	2.3%	5.7%	6.7%	2.5%	2.0%	6.5%	16.2%
1996	3.2%	5.2%	17.0%	10.7%	20.2%	3.1%	2.4%	5.6%	6.5%	2.4%	2.0%	6.3%	16.2%
1997	3.3%	5.3%	17.4%	10.5%	19.7%	3.7%	1.9%	5.2%	6.3%	2.4%	2.3%	6.1%	15.9%
1998	3.1%	5.2%	17.6%	10.9%	19.6%	4.0%	1.9%	5.0%	6.1%	2.4%	2.3%	5.9%	15.9%
1999	3.0%	5.2%	17.9%	11.0%	19.5%	4.2%	2.0%	4.8%	6.0%	2.4%	2.3%	5.7%	15.9%
2000	3.0%	5.2%	18.0%	11.1%	19.3%	4.4%	2.1%	4.7%	5.8%	2.4%	2.2%	5.6%	16.2%
2001	2.9%	5.3%	17.0%	11.3%	19.7%	4.7%	2.1%	4.6%	5.8%	2.4%	2.3%	5.7%	16.2%

While Table D1 to D6, include all the data on the levels of labour productivity experienced by each industry from 1987 to 2001, it is also informative to consider each industry separately. Graphical analyses have been chosen for this purpose. Figure D1 presents the levels of productivity in the utilities sector for Newfoundland and Labrador, Atlantic Canada and Canada as a whole. Labour productivity in the utilities sector in Newfoundland and Labrador is characterized by huge year over year fluctuations, much more so than is observed in Atlantic Canada³⁷ or Canada as a whole. Up until 1992, labour productivity in the utilities sector in Atlantic Canada more or less mirrored the national numbers. Between 1992 and 1998, labour productivity in Atlantic Canada's utilities sector converged on the levels observed Canada-wide. After 1998, the Atlantic Canadian estimates started to diverge from those observed nationally.

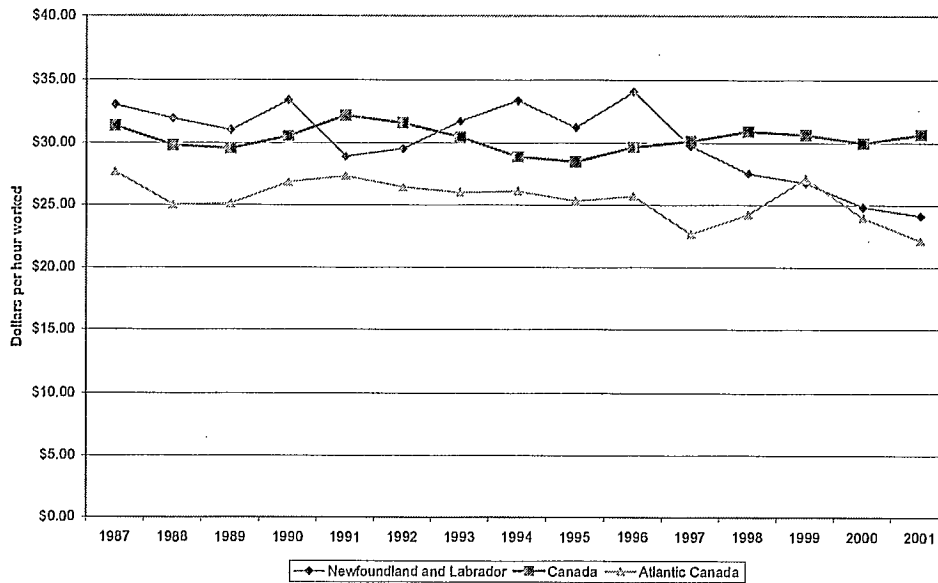
Figure D1: Real GDP per Hour Worked - Utilities Sector (1997 Constant Dollars)



Productivity levels experienced in the construction sector in Newfoundland and Labrador, Atlantic Canada and Canada are illustrated in Figure D2. The construction sector's labour productivity levels were comparable between Newfoundland and Labrador and Canada up to 1997. After that period, labour productivity in the construction industry went into a noticeable decline in Newfoundland and Labrador that was not observed in the rest of Canada. Labour productivity in Atlantic Canada was significantly below that observed on average in Canada – over the period Atlantic Canada labour productivity in the construction industry lagged that observed in Canada by \$4.88 per hour. After 1999, labour productivity in Newfoundland and Labrador's construction sector was similar to that experienced in Atlantic Canada.

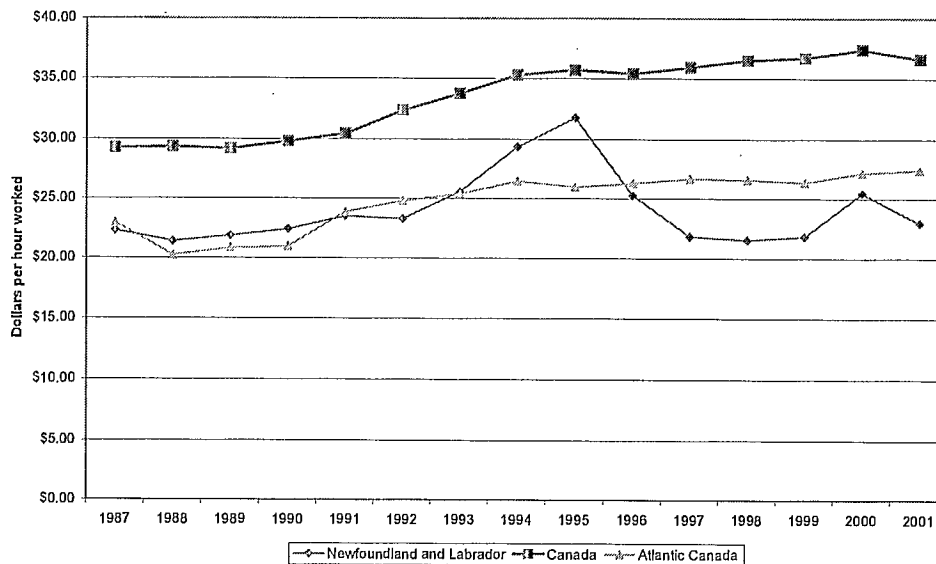
³⁷ For the Utilities industry, Prince Edward Island had to be omitted because some of the data was suppressed for confidentiality reasons for certain years.

Figure D2: Real GDP per Hour Worked - Construction Sector (1997 Constant Dollars)



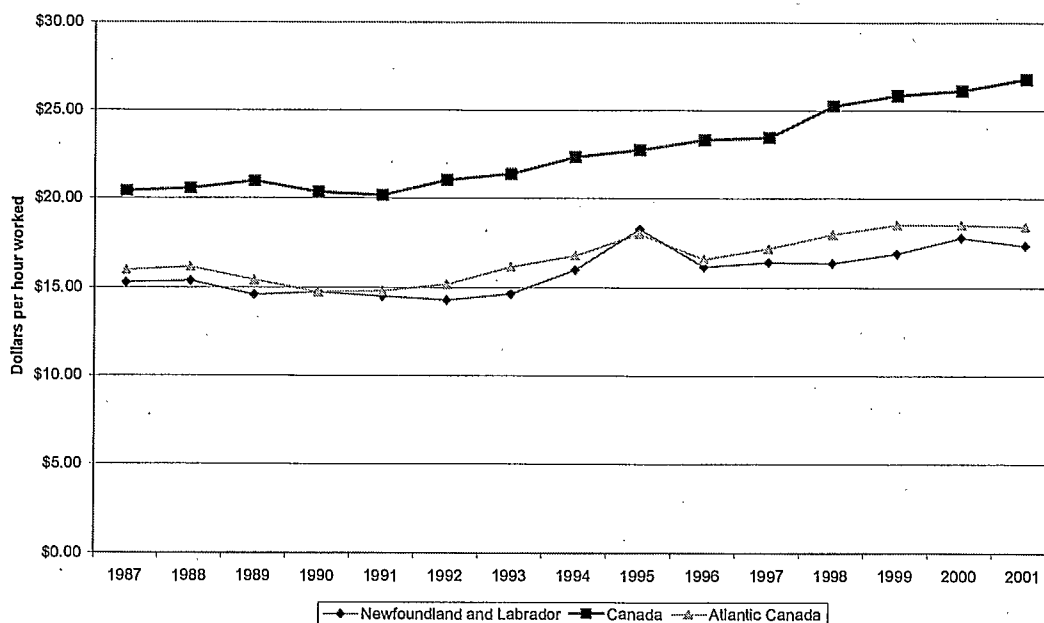
As shown in Figure D3, there is a significant productivity gap between Atlantic Canadian and Canadian manufacturing sectors that was maintained over the whole period – this gap averaged \$8.79 per hour. Up until 1993, labour productivity in Newfoundland and Labrador’s manufacturing sector mirrored that experienced in Atlantic Canada. There was a significant growth in labour productivity in Newfoundland and Labrador’s manufacturing sector between 1993 and 1995, which was followed by a significant decline between 1995 and 1997 in Newfoundland and Labrador.

Figure D3: Real GDP per Hour Worked - Manufacturing Sector (1997 Constant Dollars)



The trade sector is another sector where the productivity gap appears to be increasing over time. Figure D4 illustrates the labour productivity levels achieved in retail and wholesale trade sector in Newfoundland and Labrador, Atlantic Canada and Canada. The gaps between the national trade sector and both the provincial and regional sectors were relatively constant up until 1991. Thereafter, the Canadian labour productivity levels exhibited a positive trend, creating larger gaps.

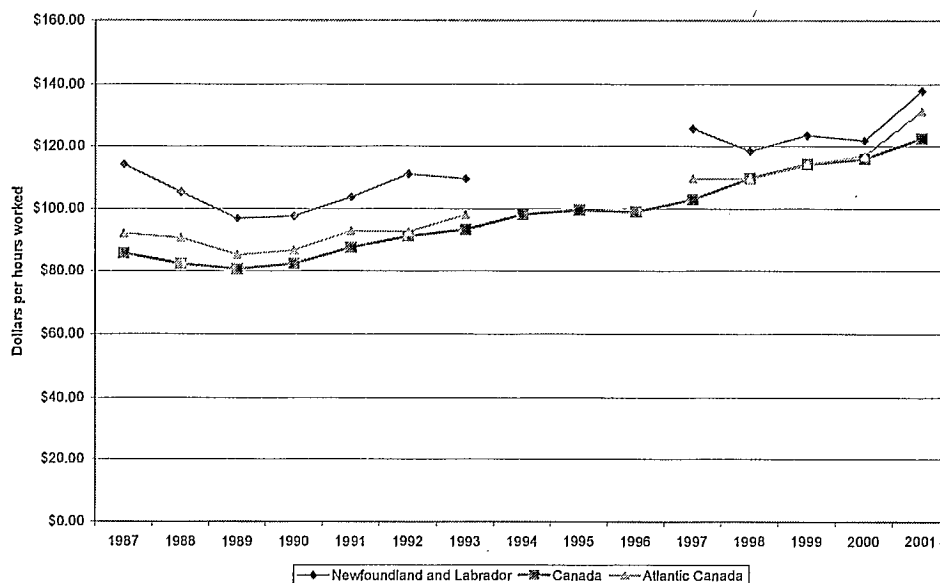
Figure D4: Real GDP per Hour Worked - Retail and Wholesale Trade Sector
(1997 Constant Dollars)



The F.I.R.E. sector is the only sector where the productivity numbers are consistently higher in Newfoundland and Labrador than in both the rest of Canada and the region. Labour productivity in the F.I.R.E. sector within the region was comparable to that observed nationally. Figure D5 presents the levels labour productivity recorded in Newfoundland and Labrador, Atlantic Canada and Canada for the F.I.R.E. sector.³⁸ An upward trend in the labour productivity for this sector occurred within the province, the region and the nation. Canada appears to be catching-up as the gap between the province and the country and the region is getting smaller.

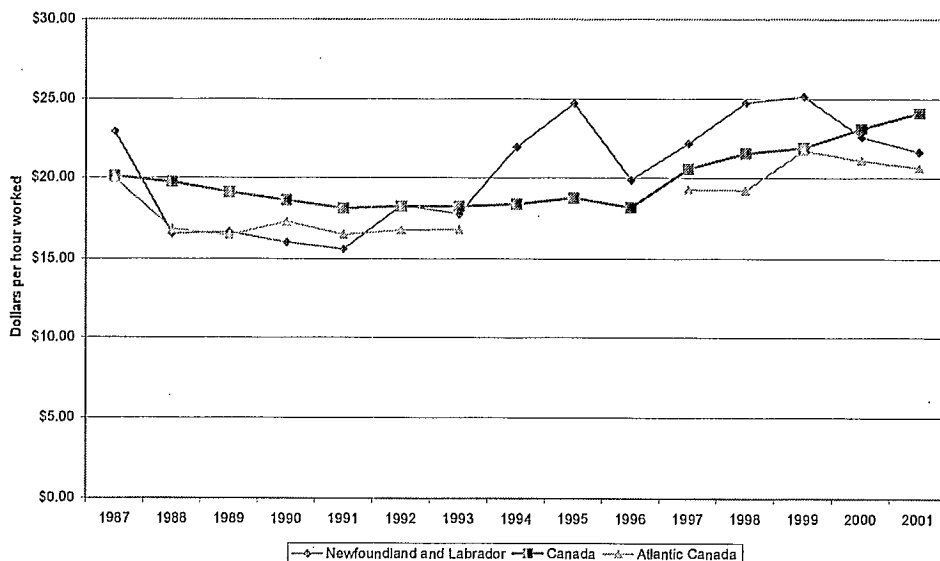
³⁸ The numbers that appear to be zero in the years 1994, 1995 and 1996 reflect problems in data confidentiality.

Figure D5: Real GDP per Hour Worked - F.I.R.E. Sector (1997 Constant Dollars)



As indicated in Figure D6, the productivity levels for the professional and technical services sector are comparable between the province, the region and the country.

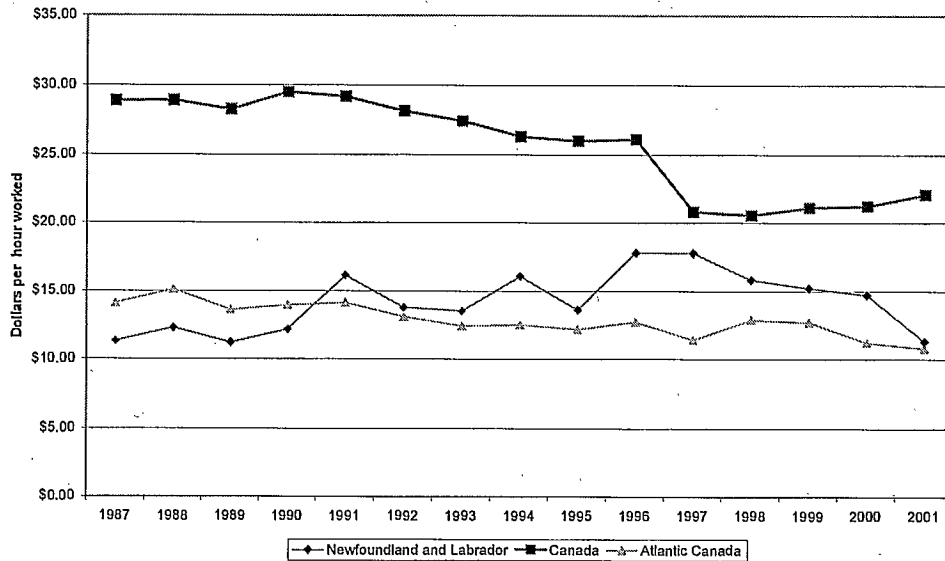
Figure D6: Real GDP per Hour Worked - Professional and Technical Services Sector (1997 Constant Dollars)



Labour productivity in the administrative and waste management sector is declining for Canada, but remained relatively constant in Newfoundland and Labrador and Atlantic Canada, see Figure D7. The region and the province fell short of the country as whole in terms of the levels of labour productivity achieved in this sector. Productivity levels

were converging because national productivity levels in this sector had fallen dramatically over this period.

Figure D7: Real GDP per Hour Worked - Administration and Waste Management Sector (1997 Constant Dollars)



The labour productivity numbers for Newfoundland and Labrador's education sector, as illustrated in Figure D8, mirrored the Canadian numbers and the Atlantic Canadian estimates were consistently below those observed nationally or provincially. There is a slight negative trend in the levels for the province, the region and the country.

Figure D8: Real GDP per Hour Worked - Education Services Sector (1997 Constant Dollars)

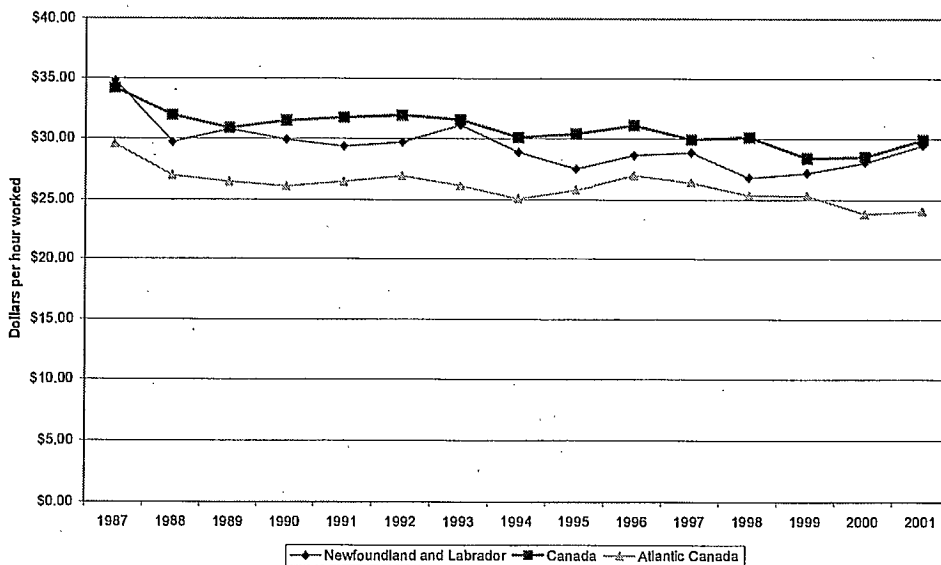
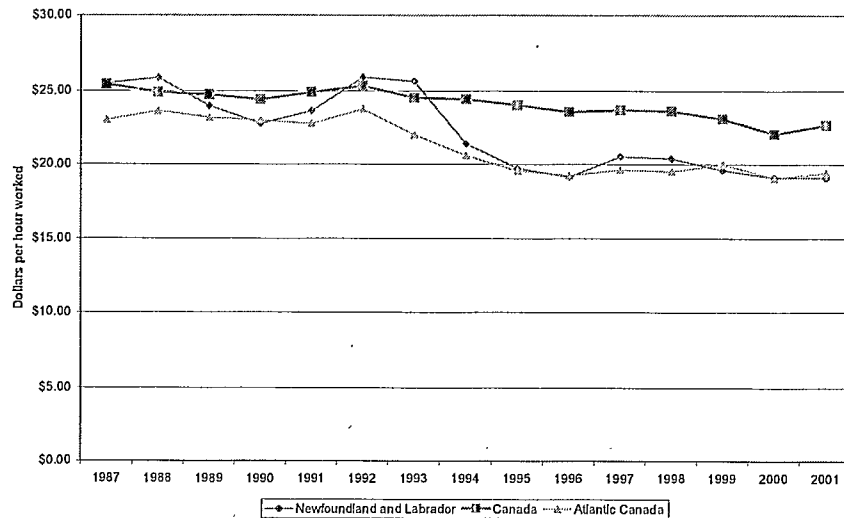


Figure D9 presents labour productivity levels for the health services sector in Newfoundland and Labrador, Atlantic Canada and Canada. In the late 1980s, labour productivity in the province and the region was similar to that observed nationally. However, after 1992, there was a noticeable drop in the labour productivity reported for the health services sector in Newfoundland and Labrador and Atlantic Canada that was not found nationally. There was, however, a slight negative trend for the labour productivity in the health services sector Canada-wide.

Figure D9: Real GDP per Hour Worked - Health Services Sector (1997 Constant Dollars)



Labour productivity in Newfoundland and Labrador and in Atlantic Canada, as shown in Figure D10, appears to be catching-up to that achieved nationally in the accommodation and food services sector. Over the period the productivity gap has narrowed. Newfoundland and Labrador and Atlantic Canada recorded a positive mean growth rate for the period whereas, the growth rate for Canada as a whole was slightly negative.

Figure D10: Real GDP per Hour Worked - Accommodation and Food Services Sector (1997 Constant Dollars)

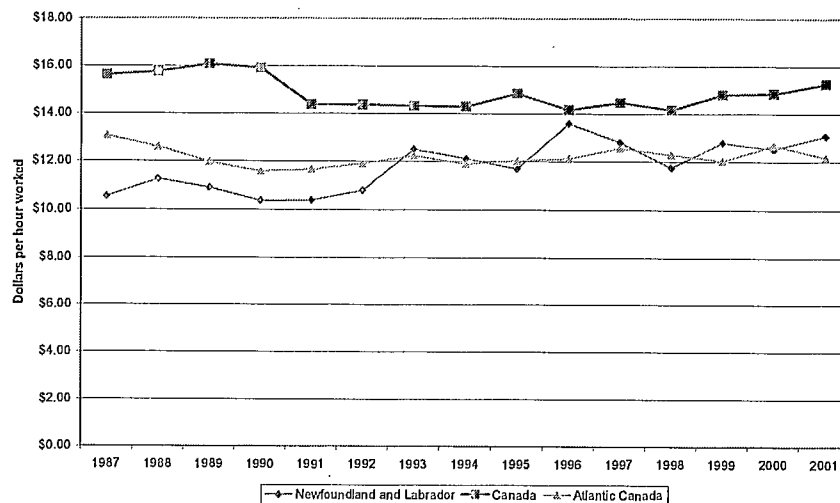
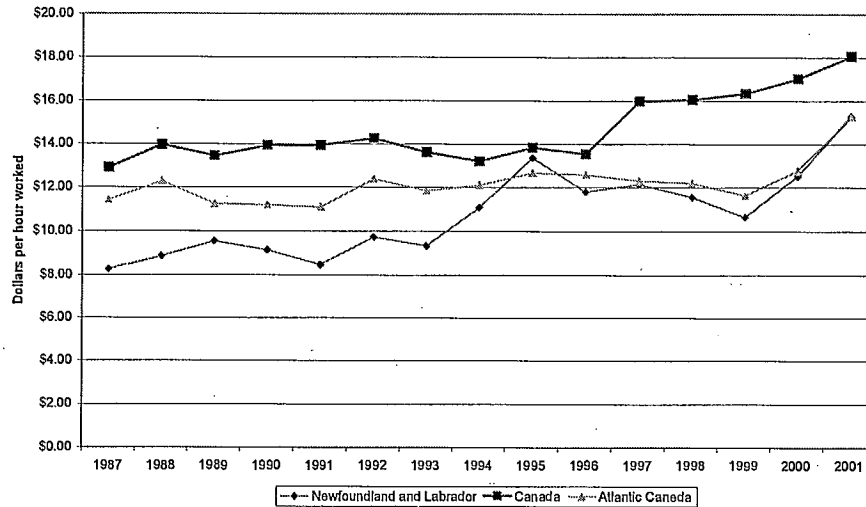


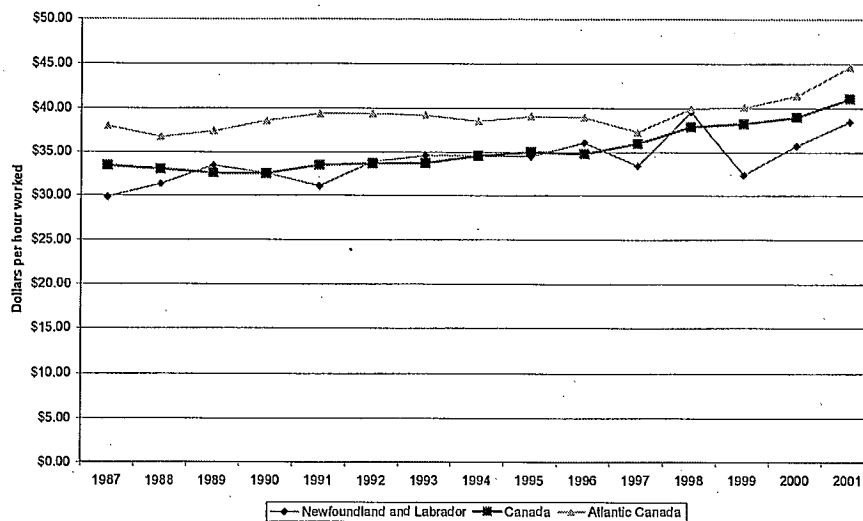
Figure D11 presents labour productivity levels for the other services sector in Newfoundland and Labrador, Atlantic Canada and Canada. Since 1993, Newfoundland and Labrador experienced much faster growth in this sector than both the rest of Canada and Atlantic Canada. The gap has become smaller, with Newfoundland and Labrador and Atlantic Canada catching-up.

Figure 11: Real GDP per Hour Worked - Other Services Sector
(1997 Constant Dollars)



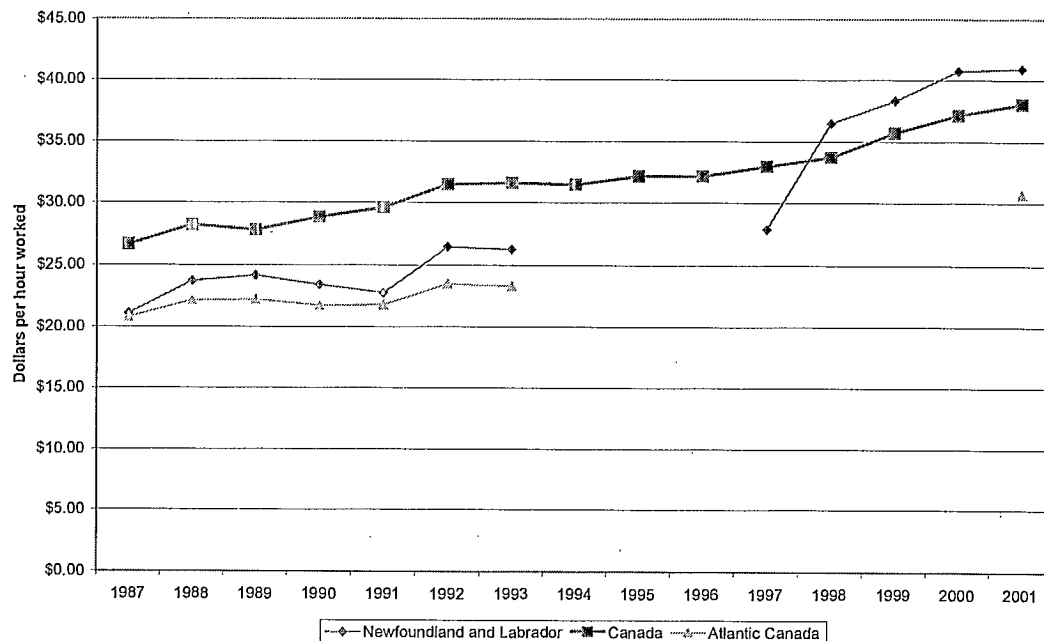
Productivity levels for the public services sector, see Figure D12, for both Newfoundland and Labrador and Canada in the public service sector are very similar – slightly trending up and moving closely together. These levels are below those observed in Atlantic Canada.

Figure D12: Real GDP per Hour Worked - Public Services Sector
(1997 Constant Dollars)



The final sector that will be examined is the residual sector, which includes: agriculture, forestry, fishing and hunting, oil and gas, mining, transportation and warehousing, information and arts. As such, a discussion of productivity for such a diverse group is meaningless. However, this group is very significant for understanding Newfoundland and Labrador's economy. As illustrated in Figure D13, labour productivity in the province and the region fell short of that exhibited Canada-wide in this category for all years, except the last four. The increase in productivity in Newfoundland and Labrador is explained by the fact that offshore oil started production in 1997.

Figure D13: Real GDP per Hour Worked - Residual Sector (1997 Constant Dollars)



The following graphical analyses compare the annual growth rates in labour productivity at the industry level. Tables D7, D8 and D9 present the annual productivity growth rates for each industry in Newfoundland and Labrador, Atlantic Canada and Canada from 1988 to 2001. Figure D14 displays the growth rates for all industries for the province, the region and the country. There is a greater degree of variability in the growth rates for Newfoundland and Labrador when compared to the region or the country. Over the period, Newfoundland and Labrador's growth rate in labour productivity ranged from -1.97% in 1999 to 6.16% in 1992. Productivity growth was particularly strong in the years 1992, 1998 and 2000. In the last four years, Newfoundland and Labrador experienced large swings in productivity growth, alternating from relatively large productivity growth to negative growth. This pattern was not evident in Atlantic Canada or in Canada.

Figure 14: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for All Industries - Newfoundland and Labrador, Atlantic Canada and Canada

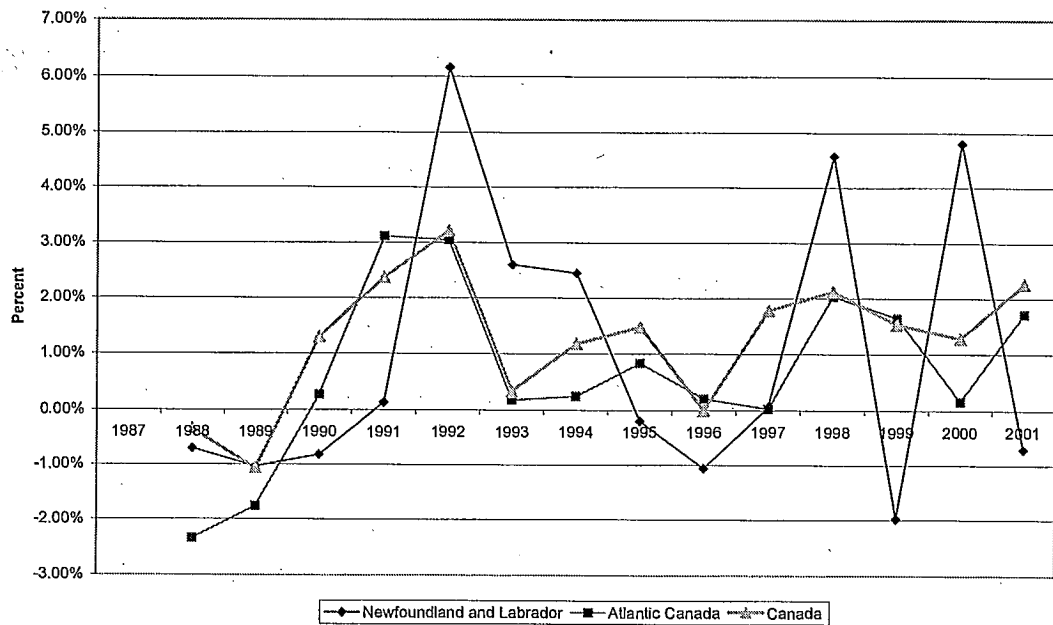


Table D7: Annual Growth in Labour Productivity (Real GDP per Hour Worked) by Industry – Newfoundland and Labrador

	All Industries	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accom & Food	Other	Public	Residual
1987														
1988	-0.70%	-3.01%	-3.31%	-4.01%	0.60%	-7.72%	-27.66%	8.60%	-14.63%	1.42%	6.82%	7.26%	5.07%	12.27%
1989	-1.04%	-21.79%	-2.86%	2.02%	-4.93%	-8.06%	0.52%	-8.67%	3.58%	-7.24%	-3.18%	7.56%	6.75%	1.87%
1990	-0.81%	-7.57%	7.68%	2.64%	0.90%	0.76%	-3.84%	8.47%	-2.76%	-5.06%	-4.83%	-4.26%	-2.67%	-3.07%
1991	0.13%	5.96%	-13.48%	4.82%	-1.52%	6.28%	-2.52%	32.62%	-1.82%	3.87%	0.20%	-7.24%	-4.57%	-2.77%
1992	6.16%	-4.65%	2.13%	-0.98%	-1.48%	7.14%	17.21%	-14.59%	1.19%	9.56%	3.83%	14.91%	9.02%	16.13%
1993	2.60%	48.91%	7.48%	9.90%	2.51%	-1.37%	-2.87%	-1.78%	4.72%	-1.09%	15.95%	-4.13%	2.14%	-0.82%
1994	2.45%	21.18%	5.13%	14.82%	8.93%	X	23.33%	18.69%	-7.13%	-16.52%	-3.14%	18.62%	-0.08%	X
1995	-0.19%	5.63%	-6.38%	8.21%	14.30%	X	12.72%	-15.37%	-4.64%	-7.85%	-3.53%	20.57%	-0.22%	X
1996	-1.06%	-6.69%	9.06%	-20.55%	-11.45%	X	-19.57%	30.80%	3.94%	-2.82%	16.25%	-11.66%	4.60%	X
1997	0.06%	-8.95%	-12.67%	-13.51%	1.52%	X	11.47%	-0.11%	0.86%	7.15%	-5.75%	2.96%	-7.39%	X
1998	4.57%	38.13%	-7.42%	-1.34%	-0.28%	-5.66%	11.72%	-11.02%	-7.13%	-0.73%	-8.24%	-4.96%	18.51%	30.96%
1999	-1.97%	-27.31%	-2.81%	1.33%	3.15%	4.22%	1.60%	-3.81%	1.46%	-3.90%	8.88%	-7.82%	-18.22%	5.00%
2000	4.81%	32.76%	-7.22%	16.55%	5.36%	-1.38%	-10.22%	-3.19%	3.10%	-2.59%	-2.15%	17.60%	10.30%	6.40%
2001	-0.71%	-42.01%	-2.85%	-9.71%	-2.52%	13.21%	-4.23%	-23.21%	4.92%	0.04%	4.42%	22.07%	7.71%	0.40%

Table D8: Annual Growth in Labour Productivity (Real GDP per Hour Worked) by Industry – Atlantic Canada

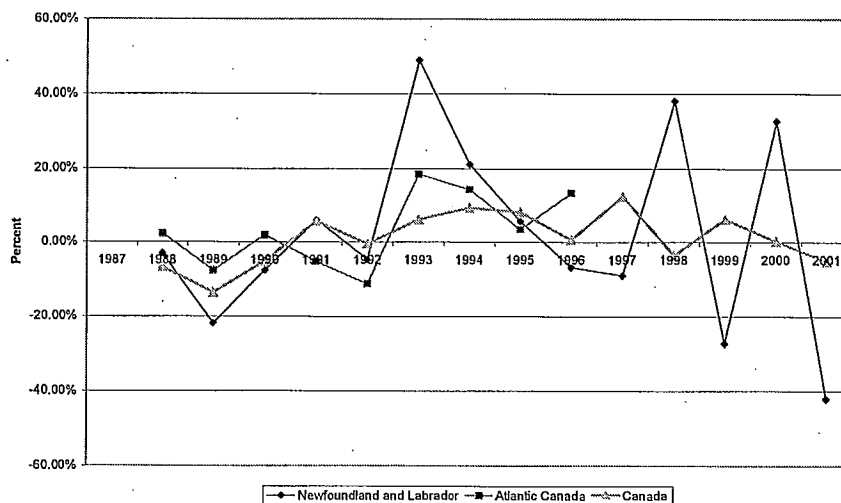
	All Industries	Utilities	Const	Man	Trade	Fire	Prof &Tech	Admin & Waste	Educ	Health	Accom & Food	Other	Public	Residual
1987														
1988	-2.34%	2.31%	-9.59%	-11.72%	1.14%	-1.54%	-15.53%	7.00%	-8.62%	2.62%	-3.58%	7.59%	-3.30%	6.51%
1989	-1.76%	-7.61%	0.47%	2.82%	-4.43%	-5.98%	-2.27%	-9.90%	-2.02%	-1.86%	-5.12%	-8.53%	1.78%	0.21%
1990	0.27%	1.88%	6.81%	0.73%	-4.35%	1.78%	5.02%	2.51%	-1.37%	-0.86%	-3.26%	-0.50%	3.19%	-2.16%
1991	3.12%	-5.26%	1.85%	13.75%	0.46%	7.07%	-4.56%	1.45%	1.48%	-0.95%	0.70%	-0.84%	2.04%	0.21%
1992	3.05%	-11.20%	-3.30%	3.83%	2.37%	-0.24%	1.64%	-7.46%	1.74%	4.36%	2.17%	11.71%	0.00%	7.84%
1993	0.18%	18.53%	-1.67%	2.41%	6.37%	5.93%	0.18%	-4.99%	-2.95%	-7.43%	2.81%	-4.43%	-0.40%	-0.88%
1994	0.25%	14.29%	0.42%	4.36%	3.97%	X	X	0.57%	-4.09%	-6.44%	-2.77%	2.30%	-1.80%	X
1995	0.83%	3.45%	-2.94%	-1.94%	7.19%	X	X	-2.68%	2.85%	-5.05%	1.09%	4.70%	1.47%	X
1996	0.20%	13.35%	1.44%	1.21%	-7.87%	X	X	4.62%	4.71%	-1.62%	0.78%	-0.78%	-0.32%	X
1997	0.02%	X	-11.76%	1.55%	3.57%	X	X	-10.43%	-2.17%	2.04%	3.57%	-2.18%	-4.23%	X
1998	2.03%	X	6.94%	-0.49%	4.69%	-0.05%	-0.36%	12.86%	-4.03%	-0.61%	-2.21%	-0.95%	7.18%	X
1999	1.64%	X	11.74%	-0.73%	3.02%	4.22%	12.93%	-1.33%	-0.07%	2.58%	-2.03%	-4.56%	0.29%	X
2000	0.16%	X	-11.55%	3.05%	-0.11%	2.38%	-2.83%	-11.75%	-5.95%	-4.85%	5.41%	9.75%	3.35%	X
2001	1.71%	X	-7.60%	0.93%	-0.50%	12.29%	-2.18%	-3.69%	1.01%	2.03%	-3.99%	19.77%	7.64%	X

Table D9: Annual Growth in Labour Productivity (Real GDP per Hour Worked) by Industry – Canada

	All Industries	Utilities	Const	Man	Trade	Fire	Prof & Tech	Admin & Waste	Educ	Health	Accom & Food	Other	Public	Residual
1987														
1988	-0.35%	-6.56%	-4.94%	0.35%	0.81%	-4.00%	-1.83%	0.10%	-6.57%	-2.08%	0.86%	8.28%	-1.29%	5.79%
1989	-1.07%	-13.56%	-0.83%	-0.57%	1.98%	-2.07%	-3.14%	-2.25%	-3.25%	-0.62%	2.04%	-3.68%	-1.31%	-1.37%
1990	1.30%	-5.13%	3.26%	2.11%	-3.00%	2.14%	-2.60%	4.33%	1.95%	-1.28%	-1.01%	3.55%	-0.24%	3.77%
1991	2.38%	5.65%	5.42%	2.15%	-0.85%	6.32%	-2.69%	-1.07%	0.83%	1.98%	-9.67%	0.08%	3.03%	2.62%
1992	3.22%	-0.47%	-1.85%	6.36%	4.30%	4.17%	0.62%	-3.52%	0.56%	1.72%	-0.04%	2.30%	0.60%	6.41%
1993	0.33%	6.12%	-3.55%	4.23%	1.65%	2.29%	0.03%	-2.47%	-1.15%	-3.16%	-0.28%	-4.46%	0.09%	0.35%
1994	1.18%	9.31%	-5.23%	4.52%	4.59%	5.25%	0.77%	-4.10%	-4.59%	-0.38%	-0.25%	-3.01%	2.55%	-0.41%
1995	1.48%	8.12%	-1.37%	1.19%	1.76%	1.46%	2.08%	-1.21%	1.02%	-1.63%	3.91%	4.75%	1.31%	2.18%
1996	0.00%	0.64%	4.15%	-0.85%	2.52%	-0.57%	-3.06%	0.45%	2.34%	-1.91%	-4.62%	-2.20%	-0.67%	0.06%
1997	1.78%	12.41%	1.63%	1.48%	0.59%	4.00%	13.06%	-20.40%	-3.80%	0.54%	2.15%	18.16%	3.49%	2.51%
1998	2.12%	-3.56%	2.56%	1.58%	7.58%	6.55%	4.78%	-1.29%	0.65%	-0.34%	-2.13%	0.46%	5.28%	2.23%
1999	1.52%	6.19%	-0.81%	0.55%	2.30%	4.13%	1.59%	2.78%	-5.67%	-2.23%	4.60%	1.75%	0.94%	5.87%
2000	1.28%	0.28%	-2.18%	1.94%	1.12%	1.44%	5.54%	0.48%	0.40%	-4.54%	0.25%	4.22%	1.94%	4.05%
2001	2.27%	-5.16%	2.30%	-2.11%	2.48%	5.64%	4.35%	4.09%	4.88%	2.79%	2.82%	5.98%	5.31%	2.40%

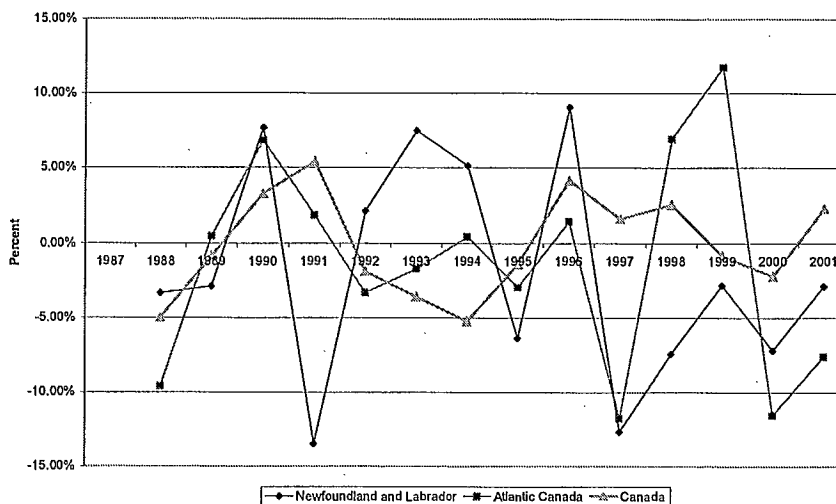
The labour productivity growth rates for the utilities sector for Newfoundland and Labrador, Atlantic Canada and Canada are illustrated by Figure D15. The growth patterns in all three regions were very similar in the years 1988 to 1992. After this period, the pattern in Newfoundland and Labrador changed, becoming more volatile and exhibiting a slight negative trend in productivity growth. The Canadian numbers were relatively stable, with no trend evident.

Figure D15: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Utilities - Newfoundland and Labrador, Atlantic Canada and Canada



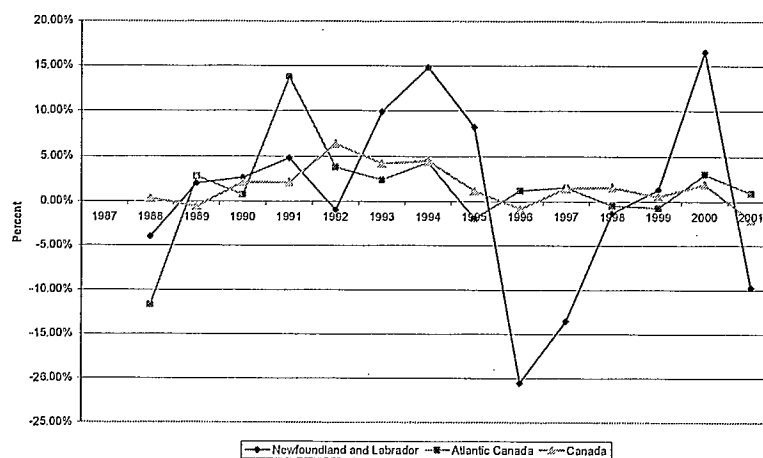
From Figure D16, there is clearly a cycle in productivity growth for the construction sector in Atlantic Canada and Canada. However, after 1993 a negative trend in productivity growth appears in the Newfoundland and Labrador numbers and, as Table D7 illustrates, productivity growth is consistently negative after 1996. This pattern does not exist regionally or nationally.

Figure D16: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Construction - Newfoundland and Labrador, Atlantic Canada and Canada



As Figure D17 demonstrates, with the exception of 1991, the growth pattern for the manufacturing sector is very similar in Atlantic Canada and Canada. However, this is not the case for Newfoundland and Labrador. After 1992, manufacturing sector labour productivity growth was subject to significant and increasing swings. Productivity growth, as shown in Table D7, was relatively high in 1993 (9.90%), 1994 (14.82%) and 2000 (16.55%) and relatively low in 1996 (-20.55%) and 1997 (-13.51%). These numbers are much higher and lower than the corresponding growth rates in the region and the country for the same years.

Figure D17: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Manufacturing - Newfoundland and Labrador, Atlantic Canada and Canada



There is significant co-movement in growth in all three regions in the trade sector with the exception of 1995 and 1996. Retail and wholesale trade labour productivity growth in Newfoundland and Labrador and Atlantic Canada increased from 1994 to 1995, see Figure D18. In Canada, labour productivity growth decreased over the same period. The opposite was true for 1996. From 1995 to 1996, retail and wholesale trade labour productivity growth increased in Canada, but exhibited significant decreases in both Atlantic Canada and Newfoundland and Labrador.

Figure D18: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Retail and Wholesale Trade - Newfoundland and Labrador, Atlantic Canada and Canada

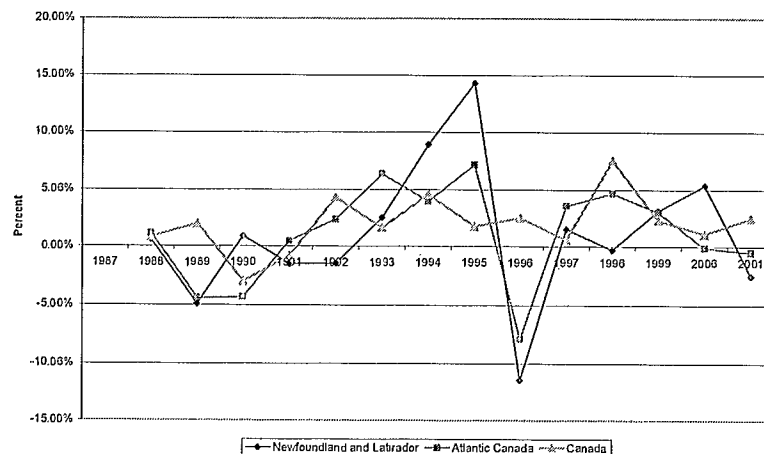
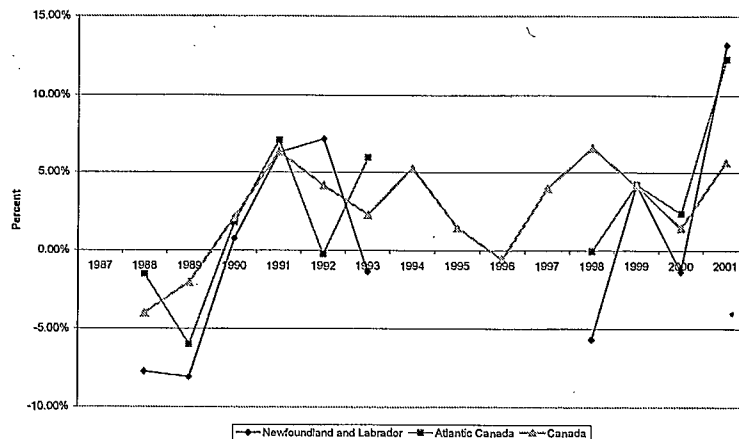


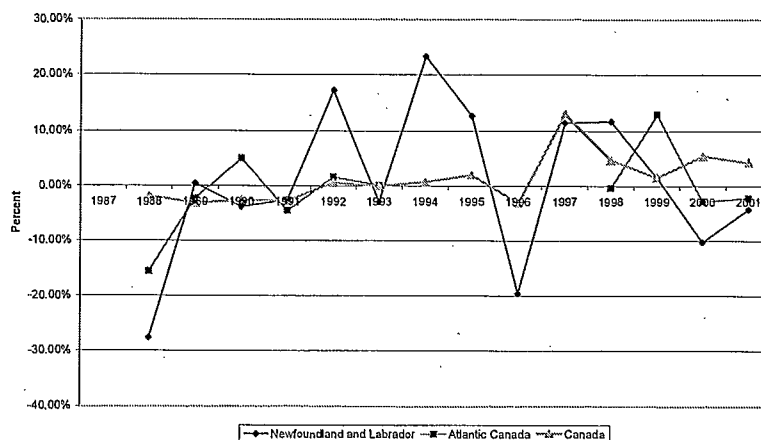
Figure D19 illustrates the growth rates for the F.I.R.E. sector for Newfoundland and Labrador, Atlantic Canada and Canada. F.I.R.E. productivity growth is relatively stable in Canada and is subject to greater variability in both Newfoundland and Labrador and Atlantic Canada. There was a significant difference between the growth rates in Canada, the province and the region in 2001. As shown by Tables D7, D8 and D9, F.I.R.E. productivity grew by 13.21% in Newfoundland and Labrador and 12.29% in Atlantic Canada. The corresponding growth rate for Canada in 2001 was 5.64%.

Figure D19: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for FIRE - Newfoundland and Labrador, Atlantic Canada and Canada



The growth rates for the professional and technical service sector for Newfoundland and Labrador, Atlantic Canada and Canada is provided in Figure D20. From 1988 to 1995 a positive trend in the annual growth rate occurred in Newfoundland and Labrador. After 1995, however, no trend was obvious. Examining the whole period, there was a significant difference in the variation in growth between Newfoundland and Labrador and both Atlantic Canada and Canada. For example, the growth rates ranged from -27.66% (1988) to 23.33% (1994). A much smaller variation was observed in both Canada (-3.14% in 1989 to 13.06% in 1997) and Atlantic Canada (-15.53% in 1988 to 12.93% in 1999).

Figure D20: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Professional and Technical Services - Newfoundland and Labrador, Atlantic Canada and Canada



With the exception of 1997, annual growth in the administration and waste management sector's labour productivity in Canada was very low and relatively stable, see Figure D21. As well, there was a significant variation in the growth rates observed in Newfoundland and Labrador over this period. For example, there were two years (1991 and 1996) where growth exceeded 30% in Newfoundland and Labrador. The highest growth rates in Atlantic Canada and Canada were 12.86% (1998) and 4.33% (1990), respectively.

Figure D21: Annual Growth Rate In Labour Productivity (Real GDP per Hour Worked) for Administration and Waste Management - Newfoundland and Labrador, Atlantic Canada and Canada

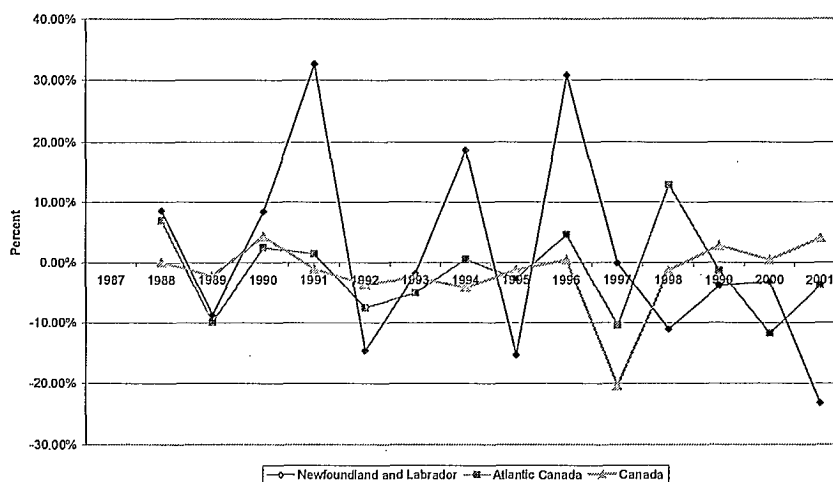
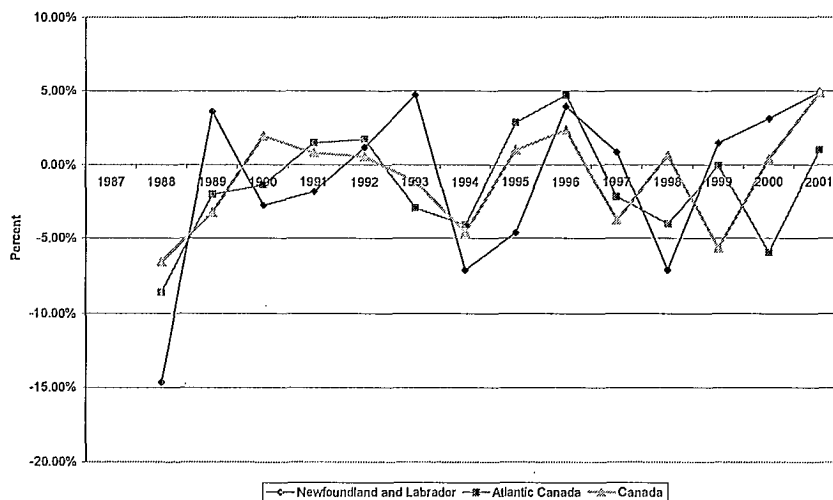


Figure D22 presents the growth rates for the education sector for Newfoundland and Labrador, Atlantic Canada and Canada. There was considerable co-movement in growth for all three regions. From Table D7, productivity growth ranged from -14.63% in 1988 to 4.92% in 2001.

Figure D22: Annual Growth Rate In Labour Productivity (Real GDP per Hour Worked) for Education Services - Newfoundland and Labrador, Atlantic Canada and Canada



Annual labour productivity growth rates in the health services sector in all three regions, as illustrated in Figure D23, were negative for most of the years in the period of study. The pattern of growth was very similar in all three areas, with a larger variation observed in Newfoundland and Labrador.

Figure D23: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Health Services - Newfoundland and Labrador, Atlantic Canada and Canada

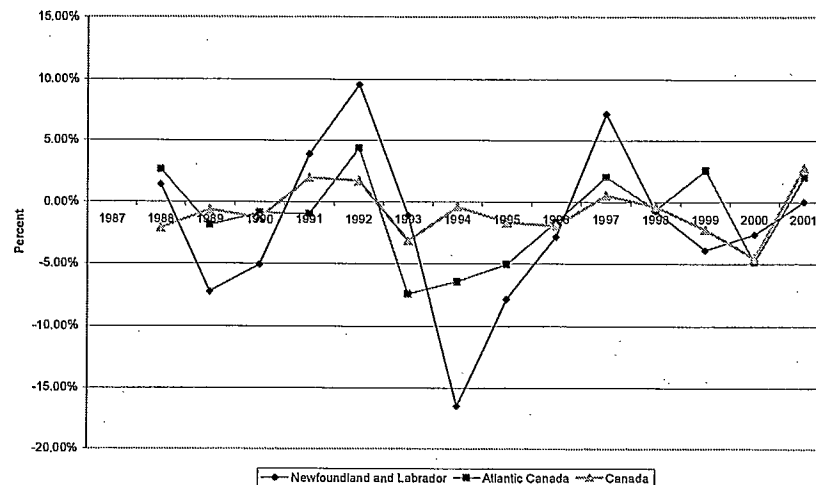
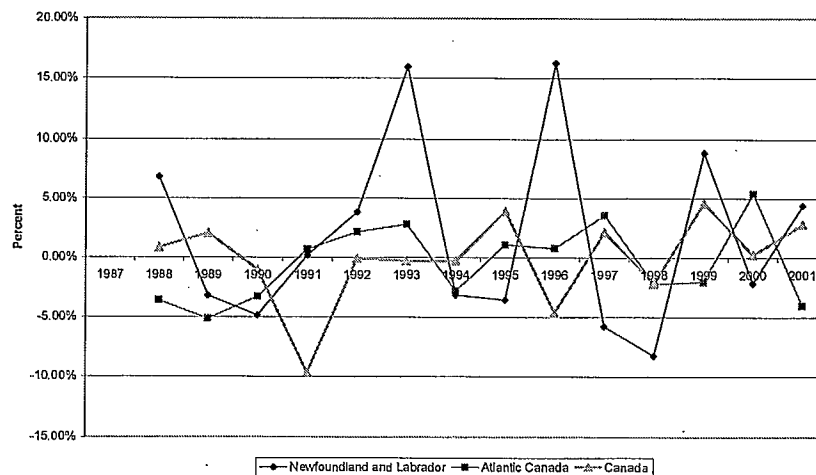


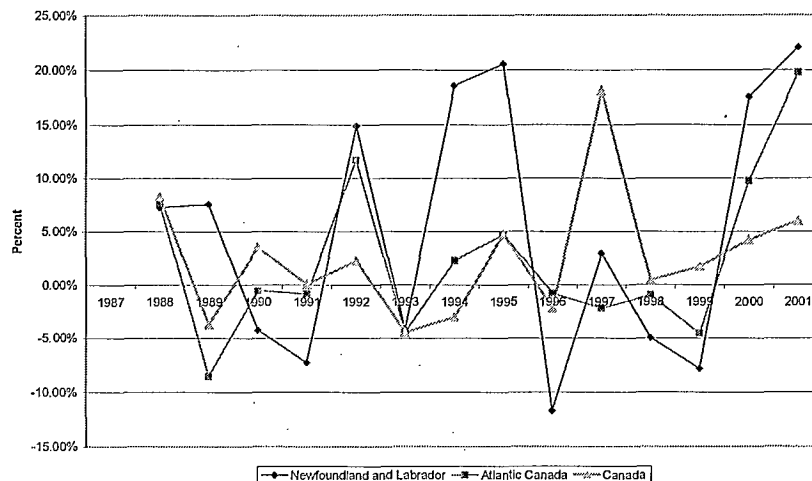
Figure D24 provides the growth rates for the accommodation and food service sector for Newfoundland and Labrador, Atlantic Canada and Canada. All series appear to be without a trend. And again, the variation in productivity growth over the period was much higher in Newfoundland and Labrador. For instance, the growth rate ranged from -8.24% in 1998 to 16.25% in 1996. A much smaller variation was observed in both Canada (-9.67% in 1991 to 4.60% in 1999) and Atlantic Canada (-5.12% in 1989 to 5.41% in 2000).

Figure D24: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Accommodations and Food Services - Newfoundland and Labrador, Atlantic Canada and Canada



The growth rates for labour productivity in the other service sector for Newfoundland and Labrador, Atlantic Canada and Canada is provided in Figure D25. Productivity growth rates in all three regions were subject to significant changes over the period. In the latter part of the period, 2000 and 2001, productivity growth in both Newfoundland and Labrador and Atlantic Canada was much higher than in Canada (Newfoundland and Labrador 17.60% and 22.07% - Atlantic Canada 9.75% and 19.77% - Canada 4.22% and 5.98%).

Figure D25: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Other Services - Newfoundland and Labrador, Atlantic Canada and Canada



There is considerable co-movement in public services labour productivity between Atlantic Canada and Canada, see Figure D26. Again, as with other productivity growth patterns, the variations were much higher in Newfoundland and Labrador than the other two areas. Newfoundland and Labrador experienced wide swings in productivity from 1998 to 2000. As Table D7, illustrates productivity growth went from 18.51% in 1998 to -18.22% in 1999 and then increased by 10.30% in 2000.

Figure D26: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for Public Services - Newfoundland and Labrador, Atlantic Canada and Canada

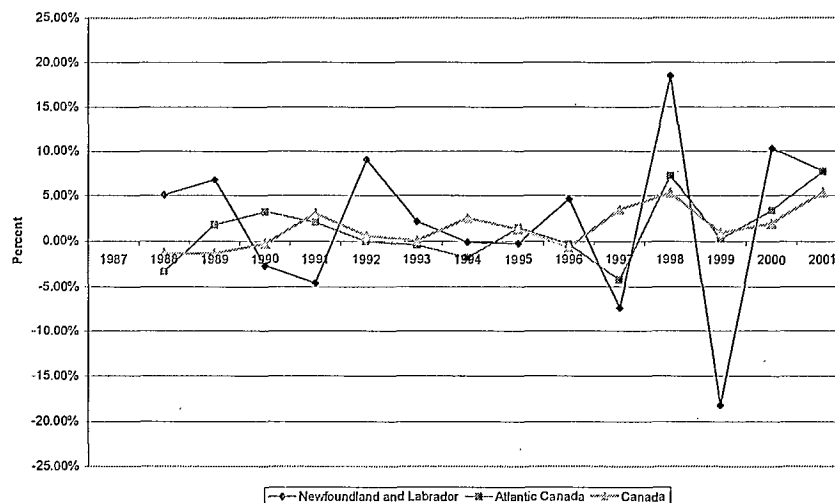
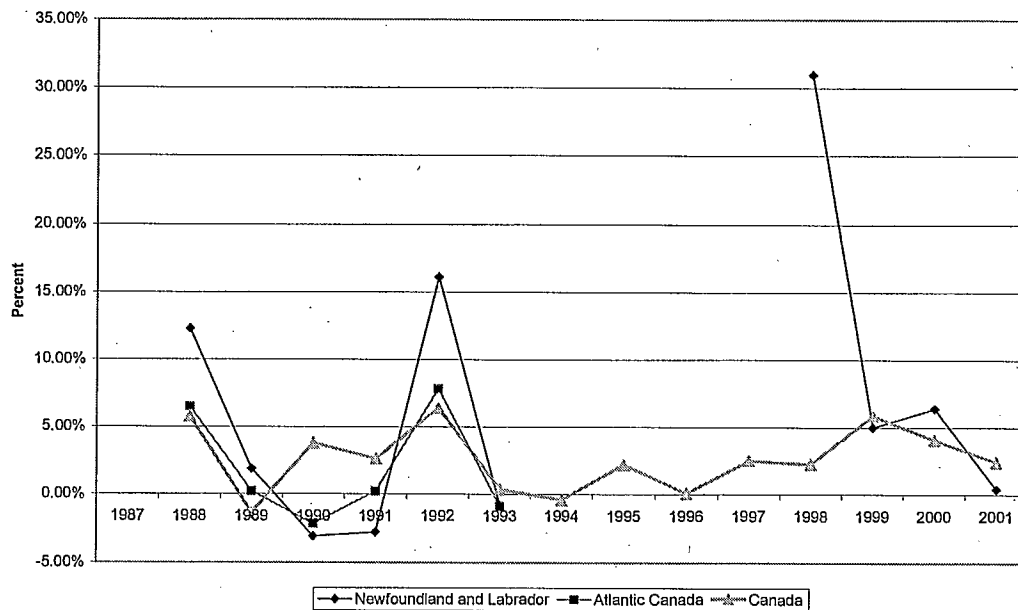


Figure D27 displays the productivity growth rates for the residual sector for Newfoundland and Labrador, Atlantic Canada and Canada. This sector is characterized by data problems, which prevent any detailed analysis for both Newfoundland and Labrador and Atlantic Canada. Still, from 1988 to 1993, there is a similar growth pattern for both Newfoundland and Labrador and Atlantic Canada. The offshore development in Newfoundland and Labrador appears to be a plausible explanation for a 30.90% increase in growth in 1998.

Figure D27: Annual Growth Rate in Labour Productivity (Real GDP per Hour Worked) for the Residual Sector - Newfoundland and Labrador, Atlantic Canada and Canada



Appendix E: Standard of Living and Employment to Population Ratio – Canada and the United States

Figure E1: Employment to Population Ratio vs Standard of Living Index
Ten Provinces: 1987

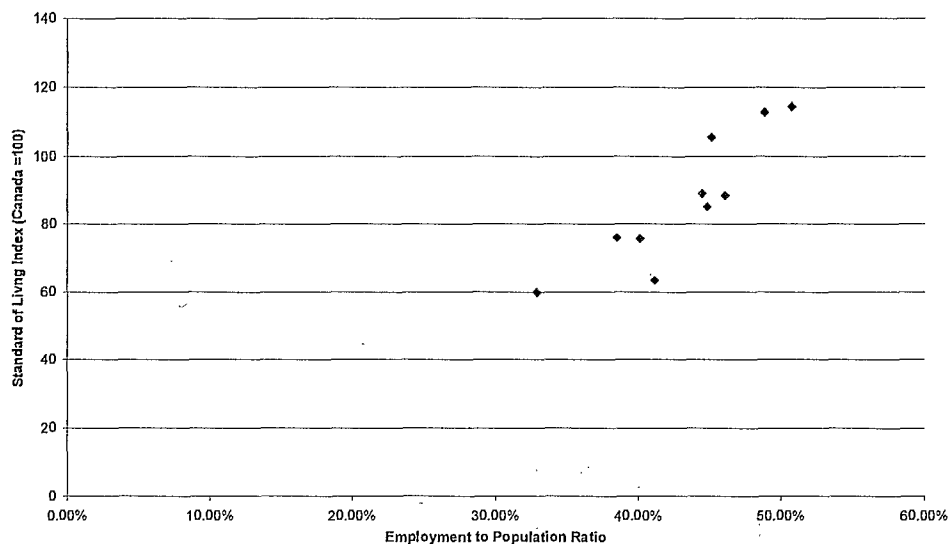


Figure E2: Employment to Population Ratio vs Standard of Living Index
Fifty States: 1987

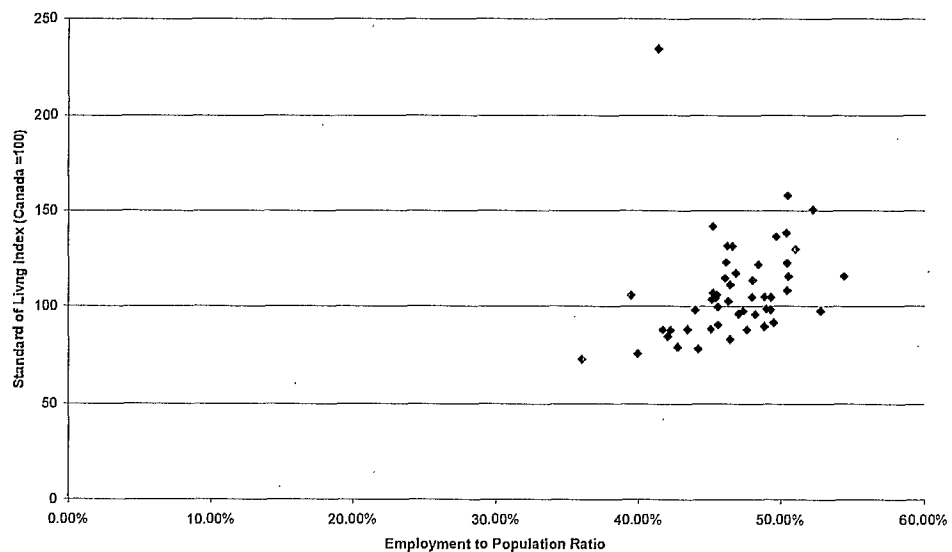


Figure E3: Employment to Population Ratio vs Standard of Living Index
Ten Provinces: 1994

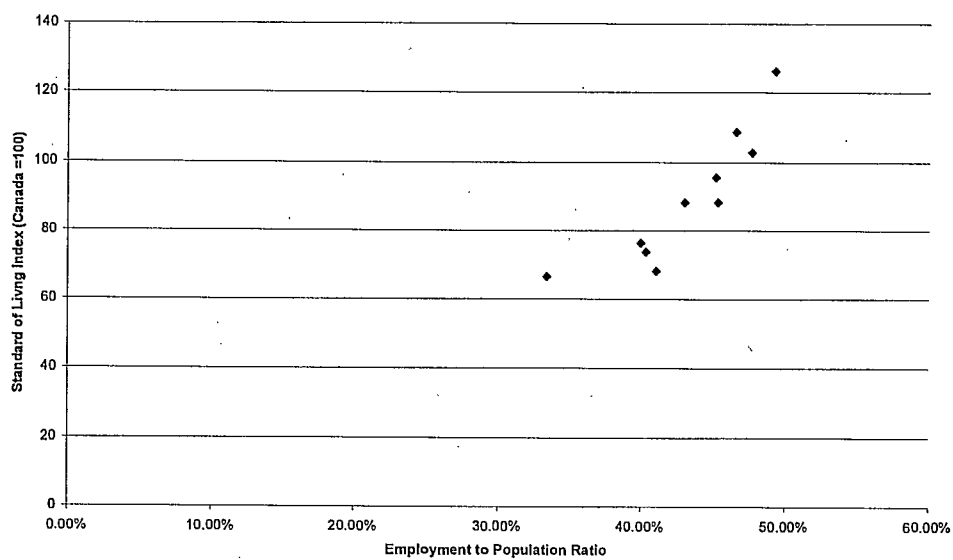


Figure E4: Employment to Population Ratio vs Standard of Living Index
Fifty States: 1994

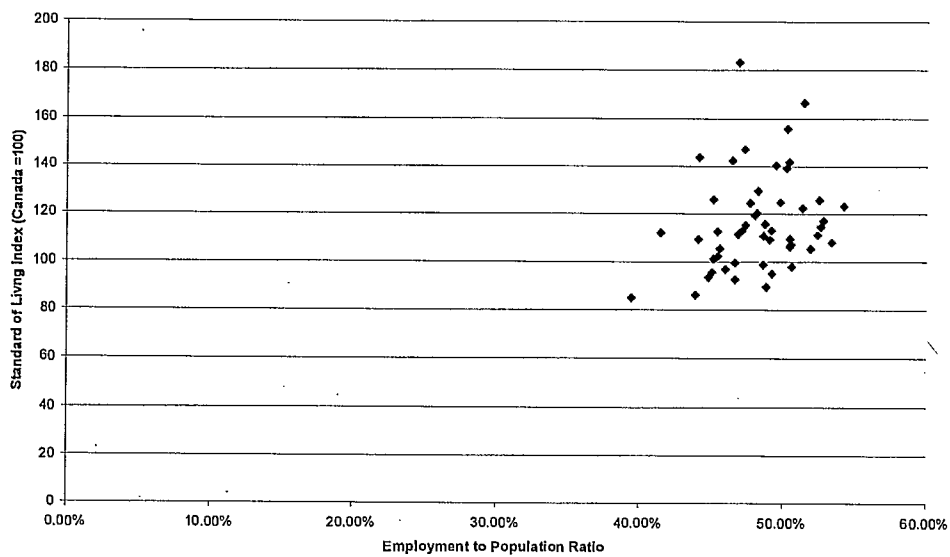


Figure E5: Employment to Population Ratio vs Standard of Living Index
Ten Provinces: 2001

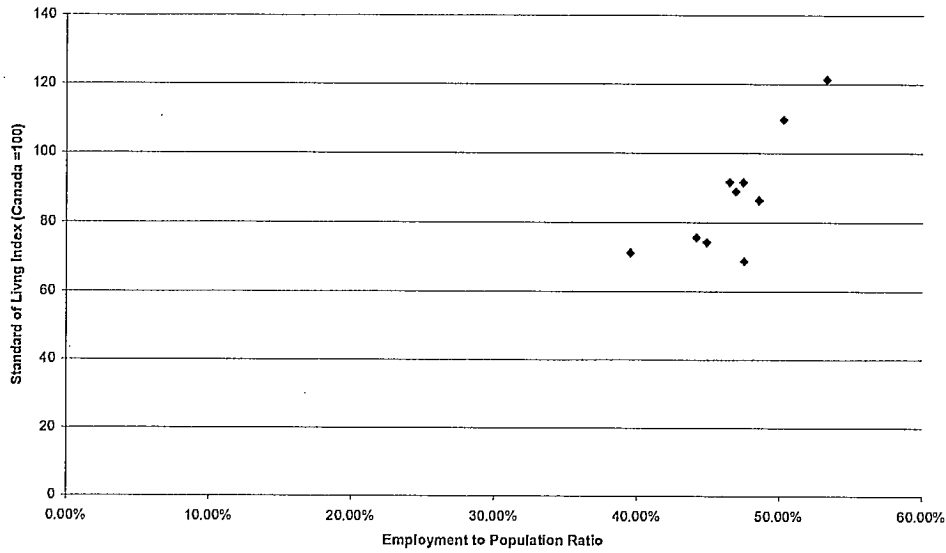


Figure E6: Employment to Population Ratio vs Standard of Living Index
Fifty States: 2001

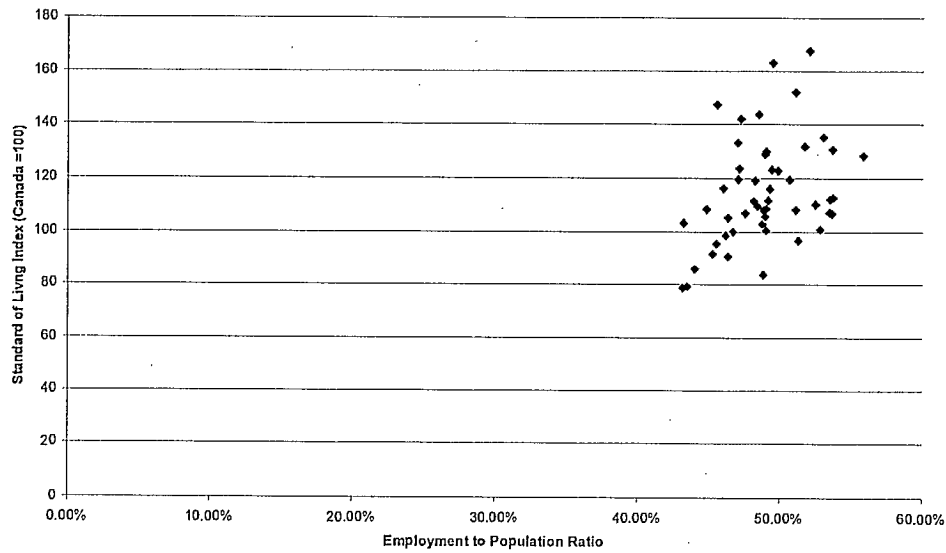
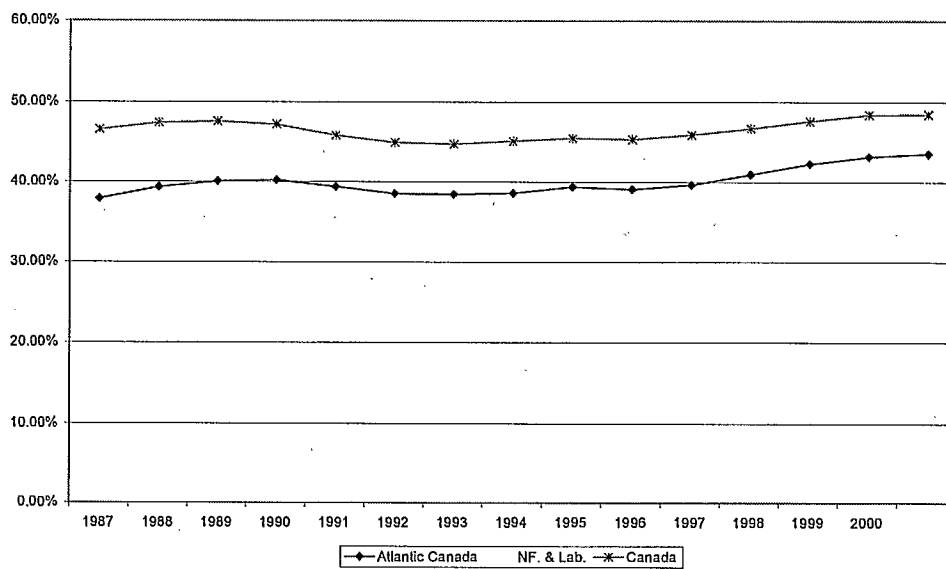


Figure E7: Employment to Population Ratio
Various Regions (1987-2001)



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