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CENTRE FOR  
THE STUDY OF  
LIVING  
STANDARDS

## THE ALBERTA PRODUCTIVITY STORY, 1997-2010

September, 2012

Prepared for the Government of Alberta  
By the Centre for the Study of Living Standards

# The Alberta Productivity Story, 1997-2010

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# The Alberta Productivity Story, 1997-2010

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## Executive Summary

This report, based on the CSLS Provincial Productivity Database which was updated to 2010, provides an overview of Alberta's productivity performance over the 1997-2010 period. The key findings are the following:

- Alberta's business sector labour productivity grew at an average annual rate of 0.6 per cent during the 1997-2010 period, well below the national average of 1.3 per cent per year. In terms of labour productivity growth, Alberta's performance ranked 10<sup>th</sup> among the provinces.
- Alberta's poor productivity performance was almost entirely explained by the 3.0 per cent per year decline in labour productivity in the mining and oil and gas sector between 1997 and 2010, as this sector accounted for almost 40 per cent of nominal business sector GDP in the province.
- Alberta enjoyed the highest labour productivity growth rates among the provinces in four industries: agriculture, forestry, fishing and hunting (8.7 per cent per year); transportation and warehousing (2.3 per cent); administration and support, waste and remediation (1.2 per cent); and other services (except public administration) (2.9 per cent). Strong performance in these and other industries meant that when industries are equally weighted, Alberta ranked fourth in terms of labour productivity growth, not last.
- Labour productivity growth in both Alberta and Canada was driven mainly by increases in capital intensity. However, capital intensity growth played a much larger role in Alberta, where it accounted for all labour productivity growth as multifactor productivity plummeted. Capital intensity growth in Alberta was the fastest among the ten provinces.
- Alberta's labour productivity level was \$45.90 (2002 dollars) in 2010, which represents 119.9 per cent of the Canadian level. The differential was caused by above average capital intensity level in Alberta, and reduced by the province's below average multifactor productivity level.
- In 2010, Alberta had a lower labour productivity level than the national average in only three of the 15 two-digit NAICS industries: construction; professional, scientific and technical services; and arts, entertainment and recreation. In every case a below average multifactor productivity level was the cause.

- Capital productivity in Alberta's business sector declined at a rate of 4.2 per cent per year during the 1997-2010 period, the worst performance among the provinces. This reflected a rapid growth in capital services and hence capital intensity.
- Alberta's multifactor productivity declined at an average rate of 2.2 per cent per year during the 1997-2010 period, well below the national average and the lowest growth rate experienced by any province. This decline was largely driven by the MFP performance of oil and gas.
- Despite Alberta's poor productivity growth, real income growth in the province advanced at a 2.2 per cent average annual rate between 1997 and 2010. This was the third best performance in the country and above the national average of 1.5 per cent.
- This disconnect between real income and labour productivity growth (2.2 per cent versus 0.6 per cent) is explained by the province's improved terms of trade due to rising oil prices.
- Higher oil prices made it very profitable for business to develop and exploit the oil sands even though the amount of labour and capital needed to extract a barrel of oil was greater, sometimes much greater, than in conventional oil production. On top of that, technological change also played a significant role in reducing oil production costs. From this perspective Alberta's poor productivity performance is not a disaster for the Canadian economy, or even evidence of a productivity problem, but a normal responses to market forces. Profits trump productivity in business decision making.

## The Alberta Productivity Story, 1997-2010

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The Alberta economy has been undergoing massive structural changes in recent years with the development of the oil sands. The importance of the mining and oil and gas industry has increased substantially from 24.9 per cent of nominal business sector GDP in 1997 to 38.6 per cent in 2008, while the share of business sector hours worked in the industry experienced a much more modest increase from 7.5 per cent in 1997 to 8.5 per cent in 2008. This development has important implications for the province's productivity performance. The objective of this report is to provide a detailed analysis of productivity developments in Alberta from a growth accounting perspective using a unique data set constructed by Statistics Canada.<sup>1</sup>

The data in this report are based on the updated CSLS Provincial Productivity Database, which now contains level and growth rate estimates of labour, capital and multifactor productivity at the two-digit NAICS level to 2010.<sup>2</sup> The estimates in this report supersede an earlier report on Alberta's productivity performance for the 1997-2007 released by the Centre for the Study of Living Standards in 2011 (Ross, 2011).

In addition to the three years of new data, there are a number of other changes to the database. First, Statistics Canada made revisions to estimates of hours worked, output, and capital services for the 1997-2007 period. These revisions can affect productivity levels and growth rate estimates.

Second, Statistics Canada changed the all-industries aggregate from a market sector definition to a business sector definition. The market sector was defined as all sectors excluding public administration, health and education. The business sector includes the for-profit components of the health and education sectors (there is no for-profit component in public administration). As there is no education and health services sector in the industry breakdown provided by Statistics Canada, private education and business services were allocated to other services (excluding public administration).

Third, Statistics Canada updated the reference year for the real estimates from 1997 to 2002. However, since a chain index number formula is used to aggregate industry real output estimates by industry into the business sector total, the weights used are not fixed, but are

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<sup>1</sup> The Centre for the Study of Living Standards would like to thank the Government of Alberta for financial support both to purchase the updated data from Statistics Canada and to prepare this report. In particular, the CSLS would like to thank Jan Reurink from the Alberta Ministry of Enterprise and Advanced Education for his support. The CSLS also thanks Wulong Gu and staff at Statistics Canada for the updating of the database.

<sup>2</sup> The CSLS Provincial Productivity Database is available at [http://www.csls.ca/data/mfp\\_new.asp](http://www.csls.ca/data/mfp_new.asp). Previous CSLS articles that used the database include Sharpe and Arsenault (2009), Sharpe (2010), Sharpe and Thomson (2010a, 2010b), and de Avillez and Ross (2001).

updated every period. This means that the relative prices used for aggregation purposes are current. Given the volatility of oil prices and the importance of oil for the Alberta economy, this is an important point.

The report is divided into ten sections. The first section provides a brief overview of basic concepts related to productivity, along with the methodology and data sources used. Section two discusses Alberta's industry composition by nominal GDP and total hours worked. Sections three through nine detail Alberta's productivity performance, focusing on the following topics: labour productivity, capital productivity, multifactor productivity, capital intensity, labour quality, sources of labour productivity growth in the business sector, and sources of labour productivity gap by industry. Section ten concludes.

## I. Basic Concepts, Methodology and Data Sources

In this section, we first define the main concepts used in this report, as well as explain important topics related to productivity analysis – such as the difference between partial and total productivity measures, and the distinction between productivity growth rates and levels. This is followed by a brief discussion on methodology and data sources. The basics of the growth accounting framework used in the report are also presented in this section

### A. Basic Concepts

Productivity is, broadly speaking, a measure of how much output is produced per unit of input used. The output and input measures used will affect the productivity estimates. In this subsection, we define the input, output and productivity measures used throughout this paper:

- Labour input is defined as total *quality adjusted* hours worked in a particular sector or in the business sector as a whole. It is the weighted sum of hours worked across different categories of workers, with the weights being equal to relative labour compensation shares.
- Labour quality (also known as labour composition) is defined, residually, as the difference between growth in labour services and growth in hours worked (*unadjusted* by quality). In Canada, the variables used to differentiate labour quality are education (four education levels), experience (proxied by seven age groups) and class of workers (paid employees versus self-employed workers). Overall, there are 56 different categories of workers.<sup>3</sup>

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<sup>3</sup> For more information on how Statistics Canada calculates labour quality, see Gu *et al* (2002).

- Capital services input represents the flow of services provided by the capital stock. The difference between capital stock and capital services stems from the fact that not all forms of capital assets provide services at the same rate. Short-lived assets, such as a car or a computer, must provide all of their services in just a few years before they completely depreciate. Office buildings provide their services over decades. As a consequence, over a single year, a dollar's worth of a car provides relatively more capital services than a dollar's worth of a building. Thus, capital services growth is driven by: 1) increases in the level of capital stock; and 2) shifts in the capital composition caused by more investment in assets that provide relatively more services per dollar of capital stock (i.e. short lived assets).
- Capital intensity is defined as capital services per hour worked.
- Gross Domestic Product (GDP) measures the value of all *final* goods and services produced in a defined geographic region during a certain time period, typically a year or a quarter. It can be measured in both nominal and real (or inflation-adjusted terms).
- Labour productivity is defined as real GDP per hour worked.
- Capital productivity is real GDP per unit of capital services.
- Multifactor Productivity (MFP)<sup>4</sup> growth is measured as the difference between real output growth and combined input growth. In other words, MFP reflects output growth that is not accounted for by input growth. The inputs that are taken into account to construct a combined input aggregate vary whether we are calculating MFP using a gross output basis or a value added basis. The gross output basis takes into consideration labour, capital, and intermediate inputs, while the value added basis takes into account only capital and labour (because intermediate consumption is already subtracted from value added). Thus, MFP captures the residual effects of several elements of the production process, such as improvements in technology and organizations, capacity utilization, increasing returns to scale, mismeasurement, etc. In this report, MFP growth is calculated on a value added basis.

When discussing productivity, there are two important dimensions to consider. The first is whether productivity is measured using a partial productivity approach or a multifactor productivity approach. The second is whether the focus is on growth rates, levels, or both.

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<sup>4</sup> Also known as total factor productivity (TFP).



There is a fundamental distinction between partial and multifactor productivity (MFP). Partial productivity measures refer to the relationship between output and a single input, such as labour or capital. Multifactor productivity, on the other hand, attempts to measure how efficiently all factors of production are used in the production process. This report provides estimates for two partial productivity measures – labour productivity (the most commonly used measure of productivity) and capital productivity, – as well as multifactor productivity.

Productivity can be expressed either in growth rates or in levels. The economics literature largely focuses on productivity growth rates, which reflect increases in *real* output per hour or per unit of capital. In this report we are also interested in making level comparisons between provinces. This report presents level comparisons in both current and chained dollars. Regardless of whether nominal or real GDP figures are used for productivity level comparisons, it is important to note that these comparisons should be used with caution, due not only to differences in industry composition between provinces, but also due to the lack of industry purchasing power parities (PPPs) estimates at the provincial level. Furthermore, when real labour productivity levels are discussed, the reader should bear in mind that the choice of the base year can affect results.

As mentioned above, this report makes provincial comparisons of both productivity levels and growth rates. These comparisons are done both at the business sector level and at the two-digit NAICS industry level.<sup>5</sup> The North American Industry Classification System (NAICS) breaks down the economy into 20 sectors (Exhibit A).

NAICS industries often include both business and non-business establishments. Output of non-business establishments (e.g. public hospitals, public universities, government departments) is notoriously hard to estimate accurately, which has a significant impact on productivity estimates for non-business sector industries and for the total economy aggregate. While marketed goods and services can be valued at the prices they are actually sold at, most government services are either provided free of charge or at subsidized prices. Due to lack of reliable price data, output of non-business sector industries is valued based on the cost of inputs (labour, capital, and intermediate inputs). Furthermore, nominal outputs and nominal inputs for those industries are deflated using the same price index (based on input prices). As a consequence, real output growth of non-business sector industries equals real-input growth, which implies that there is no MFP growth. Even though partial productivity measures like labour and capital productivity will still experience changes, the inclusion of non-business sector industries in an industry aggregate tends to distort productivity data.

As a consequence, the productivity estimates calculated by Statistics Canada take into account only the business component of each of the twenty NAICS sectors. This means that there

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<sup>5</sup> The words *industry* and *sector* are used interchangeably in this report.

are no data for public administration and a significant share (the non-business share) of the education sector (approximately 95 per cent) and of the health care and social assistance sectors (about 60.0 per cent) are excluded.

**Exhibit A: The North American Industry Classification System (NAICS) at the Two-Digit Level**

Sector Number	Description
11	Agriculture, Forestry, Fishing and Hunting
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Education Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (except Public Administration)
92	Public Administration

Because of the small size of the business components of education and health care and social assistance, these industries have been included in other services (except public administration). For practical purposes, we have grouped the finance and insurance, real estate, rental and leasing, and management of companies and enterprises sectors into only one sector, which will be referred to as the finance, insurance, real estate, rental and leasing (FIRE) sector. Since this change is only a slight departure from the standard NAICS breakdown, we will still refer to these 15 sectors as NAICS sectors.

The provincial comparisons are done by ranking the productivity growth rates and levels of different provinces from 1 (highest) to 10 (lowest).<sup>6</sup> Each province has two business sector ranks: an equally-weighted rank and an industry composition weighted rank. The industry composition weighted business sector rank, which will be referred throughout this report simply as the business sector rank, takes into account the province's business sector output, labour input and capital input, which are basically a sum of the outputs and inputs of the 15 two-digit NAICS industries in the province. Thus, it gives more weight to the sectors that comprise a more significant part of the province's economy. The equally-weighted business sector rank, as the name implies, attributes equal weights to all industries. Comparing the two ranks allows for

<sup>6</sup> See Appendix Tables for the detailed rankings.

important characteristics of the province's productivity performance to be identified. For instance, a province with a high business sector rank and a low equally-weighted business sector rank in labour productivity growth will most likely have strong labour productivity growth in its largest industries, but low productivity growth in most of the 15 two-digit NAICS industries.

Lastly, we also perform growth accounting exercises in order to measure how different factors contributed to labour productivity growth. Contributions to labour productivity growth were broken down into three factors: 1) capital intensity<sup>7</sup>; 2) labour quality; and 3) multifactor productivity. Formally, this decomposition is a consequence of the growth accounting framework adopted in this report. However, it is also quite intuitive:

- Workers that have access to more capital (i.e. higher capital intensity) tend to have, *ceteris paribus*, higher labour productivity. Imagine, for example, two teams with two workers each. In the first team, one worker has a shovel and the other has a snow blower. In the second team, both workers have snow blowers. The second team uses capital more intensively than the first, and thus is able to clear much more snow in the same period of time.
- Improvements in labour quality tend to increase the amount of output a worker can produce in a given time period. Thus, an experienced coal miner will normally be able to extract more coal than a novice miner during a given timeframe.
- Technological progress can substantially increase output per worker. A logger with a chainsaw, for instance, is much more productive than one with an axe. This is an example of productivity growth driven by MFP. It should be noted, however, that technological progress is only one of the several possible factors to drive MFP growth.

## B. Methodology and Data Sources

Statistics Canada has detailed the methodologies and data sources used in the preparation of its estimates of multifactor productivity (MFP) at the national level in Baldwin *et al.* (2007). The provincial estimates used in this report have been prepared by Statistics Canada for the Centre for the Study of Living Standards (CSLS) and largely follow the methodologies used for the national estimates. There are, however, certain differences between the national and provincial estimates which are discussed in detail in Sharpe and Arsenault (2009). CSLS supplemented Statistics Canada data by calculating multifactor productivity level estimates for the provinces relative to the Canadian average.

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<sup>7</sup> Note, once again, that capital intensity has been defined here as capital services per hour worked, *not* capital stock per hour worked.

The growth accounting framework used in this report is the same as the one used in Sharpe and Thomson (2010a). It assumes a Cobb-Douglas production function such that:

where  $Y$  is real output,  $K$  stands for capital services,  $L$  for labour input (quality adjusted hours),  $A$  for multifactor productivity and  $\alpha$  is the share of output that takes the form of capital compensation.

## II. Industry Composition by Nominal GDP and Total Hours Worked

In order to understand Alberta's overall productivity performance, it is essential to understand how each of the 15 two-digit NAICS industries contributed to the province's business sector in terms of nominal GDP and actual hours worked. Table 1 details these shares for 1997 and 2008. In Alberta, the industry that had the highest GDP share in 2008 was mining and oil and gas extraction (38.6 per cent of the province's nominal GDP in the business sector), followed by construction (11.4 per cent), and FIRE (8.3 per cent). In terms of total hours worked, the three industries that had the highest contributions in 2008 were construction (17.1 per cent of total hours worked), retail trade (11.8 per cent), and mining and oil and gas extraction (8.5).

**Table 1: Industry Share of Nominal GDP and Total Hours Worked in Alberta**

Business Sector	1997				2008			
	Value Added Canada	Value Added Alberta	Hours Worked Canada	Hours Worked Alberta	Value Added Canada	Value Added Alberta	Hours Worked Canada	Hours Worked Alberta
<b>Business Sector</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Agriculture, Forestry, Fishing and Hunting	3.2	3.5	5.5	8.5	2.4	2.1	3.1	3.0
Mining, and Oil and Gas Extraction	5.5	24.9	1.7	7.5	13.2	38.6	1.9	8.5
Utilities	4.2	3.1	0.8	0.5	3.0	1.6	0.8	0.7
Construction	7.0	8.5	8.7	12.0	9.3	11.4	10.9	17.1
Manufacturing	23.3	13.0	18.4	9.7	15.1	7.5	13.1	8.1
Wholesale Trade	7.2	6.0	7.4	6.8	6.8	4.4	6.7	6.1
Retail Trade	6.9	5.2	12.9	11.3	7.2	4.8	13.2	11.8
Transportation and Warehousing	6.2	6.7	6.3	7.2	5.4	4.9	6.2	6.3
Information and Cultural Industries	4.3	3.2	2.4	2.0	4.3	2.6	2.9	1.8
FIRE*	15.0	10.7	7.4	5.9	14.2	8.3	8.1	6.9
Professional, Scientific and Technical Services	4.9	5.0	6.2	7.0	6.3	5.3	8.1	8.3
ASWMR**	2.5	2.0	4.0	3.5	3.2	2.2	5.9	4.6
Arts, Entertainment and Recreation	0.9	0.7	1.5	1.4	0.9	0.5	1.9	1.7
Accommodation and Food Services	3.2	3.1	7.4	7.9	2.8	2.2	7.2	6.9
Other Services (Except Public Administration)	5.7	4.4	9.4	8.8	5.8	1.5	9.9	6.6

Source: Shares calculated by the CSLS, based on Statistics Canada data (Cansim Table 383-0011)

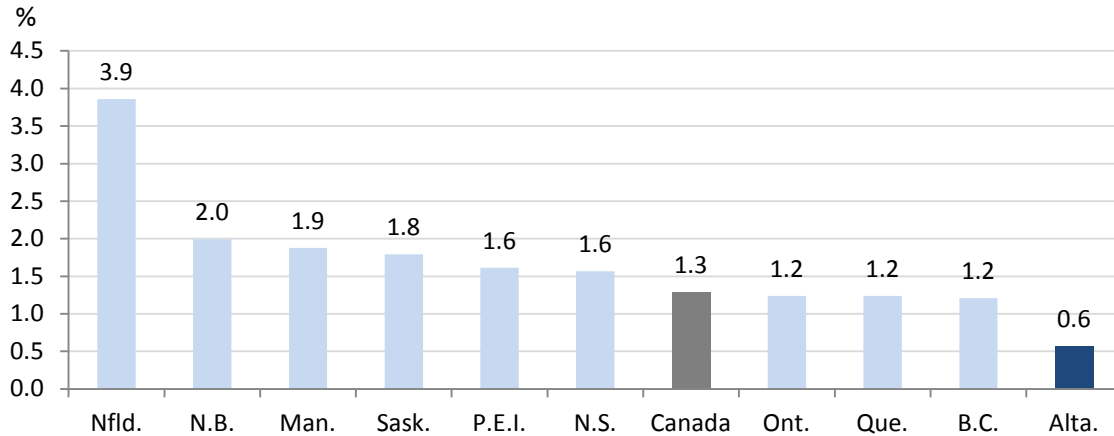
\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

## III. Labour Productivity

Labour productivity, defined as real GDP per hour worked, grew at an average rate of 0.6 per cent per year in Alberta's business sector during the 1997-2010 period, significantly below

the national average 1.3 per cent per year. Alberta ranked last among provinces in terms of labour productivity growth (Chart 1).

**Chart 1: Labour Productivity Growth in Canada and the Provinces, Business Sector, 1997-2010**  
(Average Annual Growth Rates)

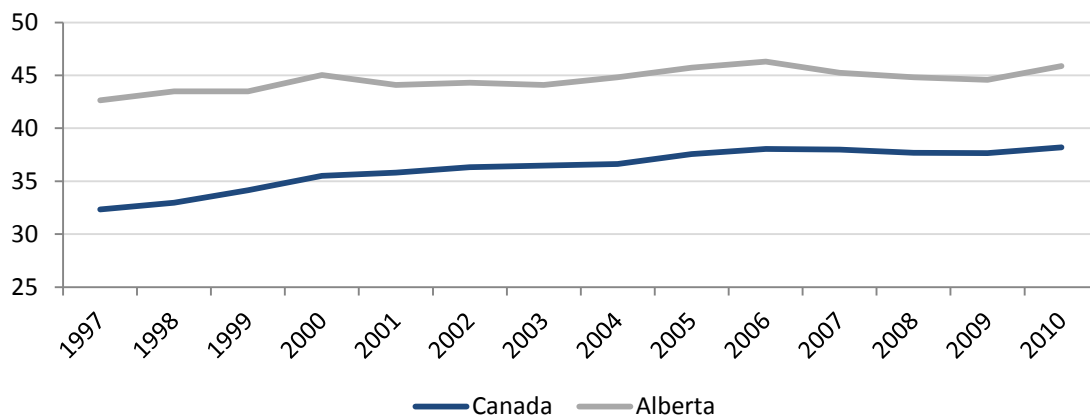


Source: CSLS Provincial Productivity Database, Appendix Tables

Table 2 provides estimates of Alberta's labour productivity level in both nominal and real (\$2002) terms for 2008. Expressed in current dollar terms, Alberta's business sector output per hour was 153.4 per cent of the national average, but expressed in real terms it was only 118.2 per cent. This difference appears to be due to the much higher prices of oil and gas in 2008 compared to 2002.

Chart 2 depicts the time profile for labour productivity expressed in chained 2002 dollars in both Alberta and Canada. It is immediately noticeable that Alberta has had a much higher labour productivity level historically than Canada, with this gap decreasing between 1997 and 2010. The most recent data suggests labour productivity in Alberta increased more between 2009 and 2010 than it did for the country as a whole.

**Chart 2: Labour Productivity (\$2002 per Hour Worked), Alberta and Canada, 1997-2010**



Source: CSLS Provincial Productivity Database, Appendix Tables

**Table 2: Labour Productivity (\$Current per Hour Worked), Alberta and Canada**

	Alberta		Canada		Alberta's Labour Productivity Level as a Share of Canada's		
	1997	2008	1997	2008	1997	2008	2008 (\$2002)
<b>Business Sector</b>	<b>35.0</b>	<b>72.4</b>	<b>30.0</b>	<b>47.2</b>	<b>116.8</b>	<b>153.4</b>	<b>118.9</b>
Agriculture, Forestry, Fishing and Hunting	14.5	46.4	17.8	35.9	81.5	129.3	143.6
Mining, and Oil and Gas Extraction	116.8	321.2	98.3	305.5	118.8	105.1	107.9
Utilities	225.4	214.2	149.6	184.3	150.7	116.2	112.3
Construction	24.8	48.2	24.0	40.7	103.7	118.3	107.9
Manufacturing	47.0	63.2	37.9	50.3	123.9	125.7	113.5
Wholesale Trade	31.0	51.0	29.1	45.7	106.5	111.7	114.0
Retail Trade	16.0	30.9	16.0	26.6	99.9	116.1	112.5
Transportation and Warehousing	32.7	52.5	29.6	40.0	110.4	131.3	119.7
Information and Cultural Industries	54.3	101.5	53.4	72.5	101.6	140.0	127.3
FIRE*	63.1	92.7	60.5	84.9	104.3	109.1	105.3
Professional, Scientific and Technical Services	24.9	45.7	24.0	38.4	103.9	118.9	111.9
ASWMR**	20.2	34.3	18.8	26.3	107.1	130.5	121.8
Arts, Entertainment and Recreation	16.3	20.1	18.0	23.2	90.8	86.7	82.6
Accommodation and Food Services	13.7	23.3	12.9	18.2	106.5	128.0	123.1
Other Services (Except Public Administration)	17.6	34.3	18.3	29.1	96.5	117.9	113.8

Source: CSLS Provincial Productivity Database, Appendix Tables

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Between 1997 and 2010, the industry that had the highest labour productivity growth rate in Alberta was agriculture, forestry, fishing and hunting (8.7 per cent per year), followed by information and cultural industries (4.3 per cent) and retail trade (3.4 per cent) (Table 3). The industry that had the worst labour productivity performance was utilities (-3.3 per cent), closely followed by mining, and oil and gas extraction (-3.0 per cent) and arts, entertainment and recreation (-2.2 per cent).

In terms of labour productivity growth, Alberta ranked seventh or below in six of the 15 two-digit NAICS industries, with utilities and construction each ranking tenth amongst provinces. Alberta ranked 1<sup>st</sup> of the 15 two-digit NAICS industries in agriculture, forestry, fishing and hunting, transportation and warehousing, administrative and support, waste and remediation and other services (except public administration).

While Alberta ranked last in labour productivity growth among the provinces when the province's actual output and employment shares are used to aggregate the different industries into the business sector total, the province ranked fourth when the industries are given equal weights. This discrepancy is due to the very large weight given to the mining and oil and gas industry in Canada, combined with its negative productivity growth.

**Table 3: Labour Productivity Levels and Growth Rates in Alberta, 1997-2010**

Business Sector	Compound Annual Growth Rate, 1997-2010	Provincial Ranking	Alberta's Labour Productivity Level Relative to Canada's, 1997	Alberta's Labour Productivity Level Relative to Canada's, 2010	Labour Productivity Level, 2010	Provincial Ranking, 2010
	(per cent)		(Canada=100)	(Canada=100)	(2002 Dollars)	
<b>Business Sector</b>	<b>0.6</b>	<b>10</b>	<b>131.5</b>	<b>119.9</b>	<b>45.9</b>	<b>2</b>
Agriculture, Forestry, Fishing and Hunting	8.7	1	98.0	163.4	59.9	1
Mining, and Oil and Gas Extraction	-3.0	8	133.7	110.6	130.3	3
Utilities	-3.3	10	166.0	113.9	172.4	5
Construction	-0.6	10	107.2	91.1	25.1	7
Manufacturing	0.8	8	124.3	111.3	55.8	1
Wholesale Trade	2.5	9	126.1	114.5	49.4	3
Retail Trade	3.4	6	98.8	107.2	25.7	1
Transportation and Warehousing	2.3	1	110.7	127.5	47.1	1
Information and Cultural Industries	4.3	3	98.0	136.1	85.9	2
FIRE*	1.2	7	147.9	142.1	43.5	1
Professional, Scientific and Technical Services	2.3	3	75.6	88.3	67.6	9
ASWMR**	1.2	1	123.9	145.2	26.5	1
Arts, Entertainment and Recreation	-2.2	4	87.7	77.1	14.7	6
Accommodation and Food Services	1.3	3	92.6	101.5	18.1	1
Other Services (Except Public Administration)	2.9	1	117.2	147.7	35.1	1
Absolute Equally Weighted Average Rank		5.0				2.9
<b>Equally Weighted Business Sector Rank</b>		<b>4</b>				<b>1</b>

Source: CSLs Provincial Productivity Database, Appendix Tables

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Alberta's labour productivity level in 2010 was \$45.90 (2002 dollars) per hour, which represents 119.9 per cent of the Canadian level, having fallen from 131.5 per cent in 1997. This placed Alberta second among the provinces, below only Newfoundland and Labrador.

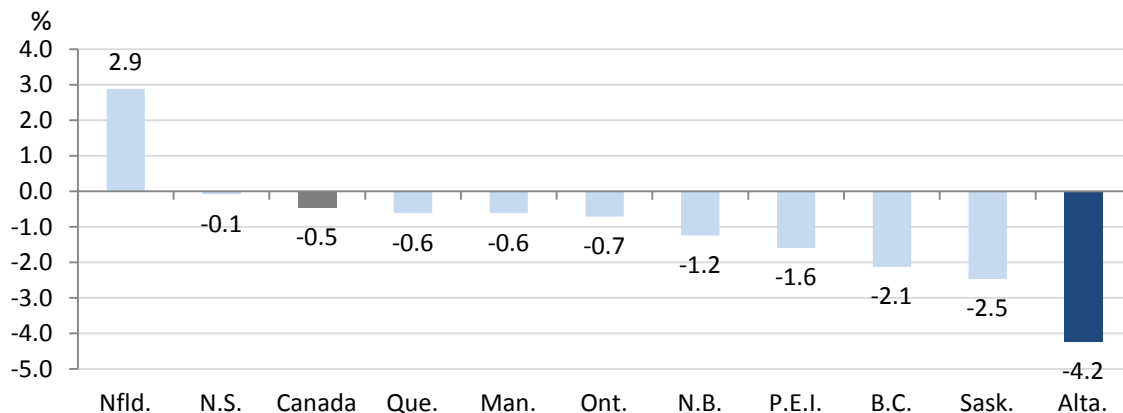
In 2010, twelve of the 15 two-digit NAICS industries in Alberta had labour productivity levels above the Canadian average. The highest relative productivity levels belonged to agriculture, forestry, fishing and hunting (163.4 per cent of the Canadian level), other services (except public administration) (147.7 per cent) and administrative and support, waste and remediation and other services (145.2 per cent). The industries with the lowest levels in the province were arts, entertainment and recreation (77.1 per cent of the Canadian level), professional, scientific and technical services (88.3 per cent), and construction (91.1 per cent).

In terms of labour productivity levels, the province ranked third or above in 11 of the 15 two-digit NAICS industries. Of these, eight ranked first among all the provinces: agriculture, forestry, fishing and hunting; manufacturing; retail trade; transportation and warehousing; finance, insurance, real estate, rental and leasing; administrative and support, waste and remediation; accommodation and food services; and other services (except public administration). On an equally weighted basis, Alberta's business sector had the highest productivity level in Canada.

## IV. Capital Productivity

Capital productivity, defined as real GDP per unit of capital services, declined at a rate of 4.2 per cent per year in Alberta's business sector during the 1997-2010 period, over four times the rate of decline experienced at the national average (-0.5 per cent). This decline was greater than in every other province (Chart 3).

**Chart 3: Capital Productivity Growth Rates in Canada and the Provinces, Business Sector, 1997-2010**  
(Average Annual Growth Rates)



Source: CSLs Provincial Productivity Database, Appendix Tables

In Alberta, twelve of the 15 two-digit NAICS industries had negative capital productivity growth rates during the period (Table 4). The industries that experienced the worst performances were: other services (except public administration) (-9.3 per cent per year), mining and oil and gas extraction (-6.9 per cent) and arts, entertainment and recreation (-6.3 per cent). The industries that had the best performances were: agriculture, forestry, fishing and hunting (2.8 per cent per year), retail trade (0.7 per cent) and information and cultural industries (0.5 per cent per year).

At the industry level, most industries in Alberta fared poorly compared to their counterparts in other provinces. In fact, only two industries in Alberta ranked above seventh out of 10 provinces in terms of capital productivity growth. These were agriculture, forestry, fishing and hunting (in which Alberta ranked third) and retail trade (in which Alberta ranked second). Four industries in Alberta ranked tenth in terms of capital productivity in Canada in comparison to their provincial peers. These were: utilities; manufacturing; administrative and support, waste and remediation; and other services (except public administration).

Alberta's capital productivity level in the business sector in 2010 was 65.6 per cent of the Canadian level, down from 108.0 per cent in 1997. Only three of the 15 two-digit NAICS industries had capital productivity levels above the Canadian average: agriculture, forestry,



fishing and hunting (118.1 per cent of the Canadian level), retail trade (128.1 per cent), and finance, insurance, real estate and renting and leasing (123.9 per cent). The industries with the lowest relative capital productivity levels in the province were professional, scientific and technical services (43.0 per cent of the Canadian average), construction (43.3 per cent) and manufacturing (50.3 per cent).

**Table 4: Capital Productivity Levels and Growth Rates in Alberta, 1997-2010**

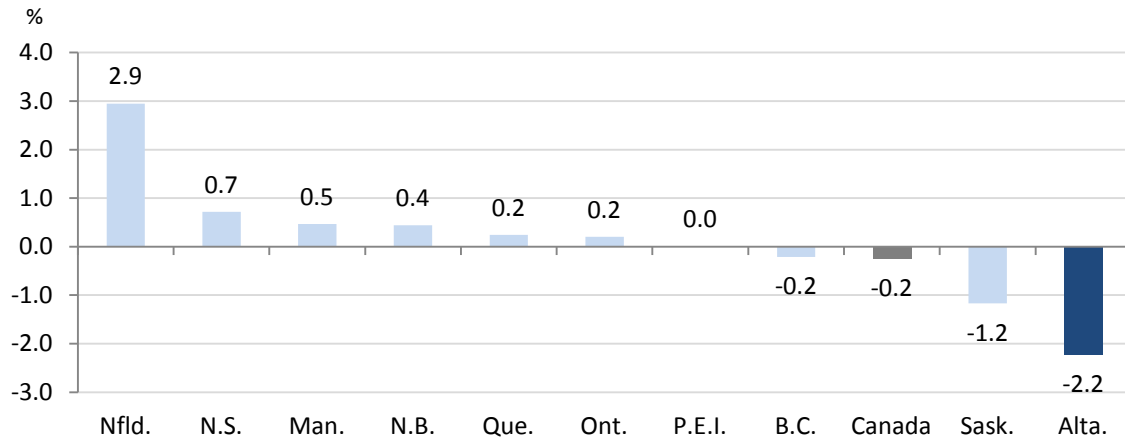
Business Sector	Compound Annual Growth Rate, 1997-2010	Provincial Ranking	Alberta's Capital Productivity Level Relative to Canada's, 1997	Alberta's Capital Productivity Level Relative to Canada's, 2010	Capital Productivity Level, 2010	Provincial Ranking, 2010
	(per cent)		(Canada=100)	(Canada=100)	(2002 Dollars)	
<b>Business Sector</b>	<b>-4.2</b>	<b>10</b>	<b>108.0</b>	<b>65.6</b>	<b>1.37</b>	<b>9</b>
Agriculture, Forestry, Fishing and Hunting	2.8	3	105.4	118.1	2.46	2
Mining, and Oil and Gas Extraction	-6.9	9	124.4	97.0	0.75	8
Utilities	-4.3	10	115.2	68.2	0.80	10
Construction	-3.9	9	65.8	47.7	1.83	10
Manufacturing	-1.8	10	72.4	50.3	5.15	7
Wholesale Trade	-3.5	9	120.7	85.4	2.35	10
Retail Trade	0.7	2	102.3	128.1	3.98	2
Transportation and Warehousing	-3.6	7	85.6	60.2	1.65	9
Information and Cultural Industries	0.5	8	111.8	91.8	2.20	4
FIRE*	-2.0	7	163.2	123.9	0.90	1
Professional, Scientific and Technical Services	-5.5	7	65.7	43.0	4.75	10
ASWMR**	-4.0	10	131.9	82.3	1.89	8
Arts, Entertainment and Recreation	-6.3	9	149.1	66.8	2.09	8
Accommodation and Food Services	-0.3	8	88.9	76.3	2.84	9
Other Services (Except Public Administration)	-9.3	10	201.3	78.6	1.98	7
Absolute Equally Weighted Average Rank		7.9				7.0
<b>Equally Weighted Business Sector Rank</b>		<b>10</b>				<b>10</b>

Source: CSLS Provincial Productivity Database, Appendix Tables

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

## V. Multifactor Productivity

Multifactor productivity (MFP) represents output growth not accounted for by input growth. In this report, it reflects GDP growth that is not explained by joint labour and capital input growth. Alberta's MFP in the business sector declined at a rate of 2.2 per cent per year during the 1997-2010 period, a growth rate far worse than the national average which declined at an average annual rate of 0.2 per cent. Alberta ranked last compared to the other Canadian provinces in terms of multifactor productivity growth (Chart 4).

**Chart 4: Multifactor Productivity Growth in Canada and the Provinces, 1997-2010 (Average Annual Growth Rates)**

Source: CSLS Provincial Productivity Database, Appendix Tables

The industry that experienced the highest multifactor productivity growth rate in Alberta was agriculture, forestry, fishing and hunting (4.1 per cent per year), followed by retail trade (2.8 per cent), and information and cultural industries (2.1 per cent) (Table 5). The industries with the lowest multifactor productivity growth were mining, oil and gas extraction (-6.1 per cent per year), followed by utilities (-4.1 per cent), and arts, entertainment and recreation (-3.4 per cent).

Alberta's equally weighted business sector rank was seventh in terms of multifactor productivity growth. Of the 15 two-digit NAICS industries, ten ranked 6<sup>th</sup> or higher in terms of multifactor productivity growth, with agriculture, forestry, fishing and hunting and retail trade both ranking 2<sup>nd</sup>. Three industries ranked last, however. These were utilities, construction and wholesale trade. For the most part, the poor overall performance was driven by the significant decline of multifactor productivity seen in the mining and oil and gas extraction.

The province's multifactor productivity level was 92.7 per cent of the Canadian level in 2010, down from 120.3 per cent in 1997. Of the 15 two-digit NAICS industries, nine had multifactor productivity levels higher than the Canadian level in 2010. The highest relative multifactor productivity levels were in administrative and support, waste and remediation (141.1 per cent of the Canadian level), agriculture, forestry, fishing and hunting (131.4 per cent), and other services (except public administration) (128.5 per cent). In contrast, the industries with the lowest relative multifactor productivity levels were professional, scientific, and technical services (75.9 per cent of the Canadian level), followed by arts, entertainment and recreation (79.1 per cent), and utilities (80.1 per cent).

Despite the seventh relative multifactor productivity level, Alberta fared quite well using the equally weighted business sector ranking, in which it ranked first. At the industry level, four of the 15 two-digit NAICS industries ranked 1<sup>st</sup>. These were: agriculture, forestry, fishing and

hunting; manufacturing; retail trade; information and cultural industries; finance, insurance, real estate and renting and leasing; and accommodation and food services.

**Table 5: Multifactor Productivity Levels and Growth Rates in Alberta, 1997-2010**

Business Sector	Compound Annual Growth Rate, 1997-2010	Provincial Ranking	Alberta's Multifactor Productivity Level Relative to Canada's, 1997	Alberta's Multifactor Productivity Level Relative to Canada's, 2010	Provincial Ranking, 2010
	(per cent)		(Canada=100)	(Canada=100)	
<b>Business Sector</b>	<b>-2.2</b>	<b>10</b>	<b>120.3</b>	<b>92.7</b>	<b>7</b>
Agriculture, Forestry, Fishing and Hunting	4.1	2	107.0	131.4	1
Mining, and Oil and Gas Extraction	-6.1	8	128.4	105.1	6
Utilities	-4.1	10	125.8	80.1	10
Construction	-1.5	10	98.0	80.5	9
Manufacturing	-0.5	9	127.3	110.0	1
Wholesale Trade	0.3	10	122.8	105.2	6
Retail Trade	2.8	2	97.1	115.5	1
Transportation and Warehousing	-0.4	6	100.3	98.2	4
Information and Cultural Industries	2.1	5	104.2	114.9	1
FIRE*	-0.5	6	144.0	136.4	1
Professional, Scientific and Technical Services	0.3	4	71.9	75.9	9
ASWMR**	0.2	3	128.7	141.1	2
Arts, Entertainment and Recreation	-3.4	6	100.4	79.1	6
Accommodation and Food Services	0.6	4	89.2	92.1	1
Other Services (Except Public Administration)	-0.9	5	116.2	128.5	7
Absolute Equally Weighted Average Rank		6.0			4.3
<b>Equally Weighted Business Sector Rank</b>		<b>7</b>			<b>1</b>

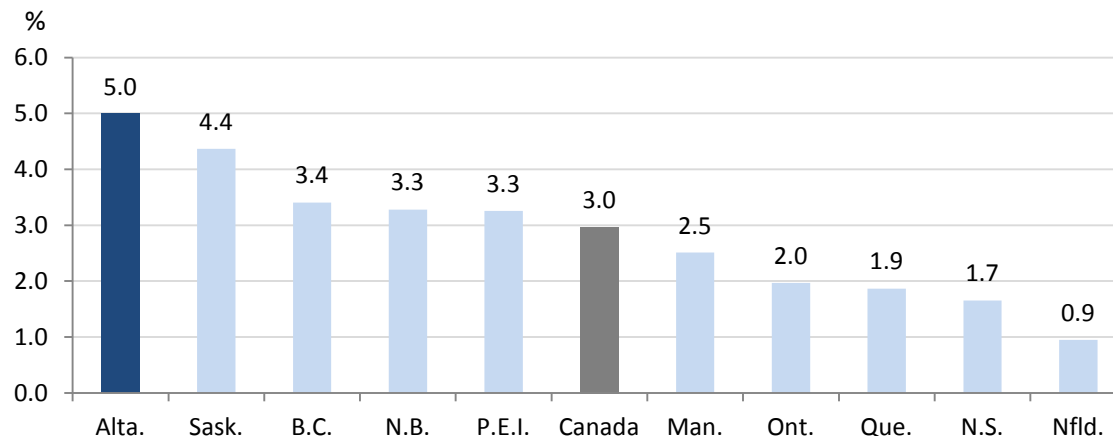
Source: CSLs Provincial Productivity Database, Appendix Tables

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

## VI. Capital Intensity

Capital intensity, defined as capital services per hour worked (unadjusted for labour quality), grew at an average rate of 5.0 per cent per year in Alberta's business sector during the 1997-2010 period, well above the national average of 3.0 per cent per year. Alberta ranked first among the ten provinces in terms of capital intensity growth (Chart 5).

**Chart 5: Capital Intensity Growth in Canada and the Provinces, Business Sector, 1997-2010  
(Average Annual Growth Rates)**



Source: CSLS Provincial Productivity Database, Appendix Tables

During the period, the industries that experienced the highest capital intensity growth rates were other services (except public administration) (13.4 per cent per year), professional, scientific and technical services (8.3 per cent), and transportation and warehousing (6.2 per cent) (Table 6). Conversely, the industries that had the lowest growth rates in the province were utilities (1.0 per cent per year), accommodation and food services (1.7 per cent), manufacturing (2.6 per cent) and retail trade (2.6 per cent).

Alberta's top business sector ranking manifested itself at the industry level with ten of the 15 two-digit NAICS industries ranking third or higher among the ten provinces, three of which ranked first. These were: agriculture, forestry, fishing and hunting; administrative and support, waste and remediation; and other services (except public administration). Similarly, three industries ranked second across provinces: manufacturing; wholesale trade; and transportation and warehousing.

Alberta's capital intensity level was 169.3 per cent of the Canadian level in 2010, having increased from 131.4 per cent in 1997. Of the 15 two-digit NAICS industries, only retail trade was below the Canadian average in 2010. The industries with the highest relative capital intensity levels in the province were transportation and warehousing (199.2 per cent of the Canadian level), professional, scientific and technical services (193.4 per cent), and construction (170.5 per cent).

In terms of capital intensity levels, the province ranked first in Canada in 2010. Additionally, it ranked first in terms of equally weighted business sector rank. Nine of the 15 two-digit NAICS industries ranked third or higher, with six of these industries ranking first among the ten provinces. These were: utilities; construction; transportation and warehousing; professional, scientific and technical services; administrative and support, waste and

remediation; and accommodation and food services. The lowest ranking industry was construction, which ranked seventh.

**Table 6: Capital Intensity Levels and Growth Rates in Alberta, 1997-2010**

Business Sector	Compound Annual Growth Rate, 1997-2010	Provincial Ranking	Alberta's Capital Intensity Level Relative to Canada's, 1997	Alberta's Capital Intensity Level Relative to Canada's, 2010	Capital Intensity Level, 2010	Provincial Ranking, 2010
	(per cent)		(Canada=100)	(Canada=100)	(2002 Dollars)	
<b>Business Sector</b>	<b>5.0</b>	<b>1</b>	<b>131.4</b>	<b>169.3</b>	<b>33.5</b>	<b>1</b>
Agriculture, Forestry, Fishing and Hunting	5.8	1	92.4	132.4	24.3	3
Mining, and Oil and Gas Extraction	4.2	4	111.4	112.2	174.5	4
Utilities	1.0	5	148.5	162.8	215.4	1
Construction	3.4	3	158.0	170.5	13.7	1
Manufacturing	2.6	2	99.5	107.6	28.5	2
Wholesale Trade	6.1	2	110.0	131.3	21.1	2
Retail Trade	2.6	9	100.9	81.6	6.4	7
Transportation and Warehousing	6.2	2	143.9	199.2	28.6	1
Information and Cultural Industries	3.8	3	92.3	139.7	39.1	6
FIRE*	3.2	7	100.6	109.5	48.4	2
Professional, Scientific and Technical Services	8.3	3	121.5	193.4	14.2	1
ASWMR**	5.4	1	84.7	131.3	14.0	1
Arts, Entertainment and Recreation	4.4	3	70.3	100.2	7.0	5
Accommodation and Food Services	1.7	4	121.3	143.6	6.4	1
Other Services (Except Public Administration)	13.4	1	68.6	121.9	14.3	2
Absolute Equally Weighted Average Rank		3.3				2.6
<b>Equally Weighted Business Sector Rank</b>		<b>1</b>				<b>1</b>

Source: CSLs Provincial Productivity Database, Appendix Tables

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

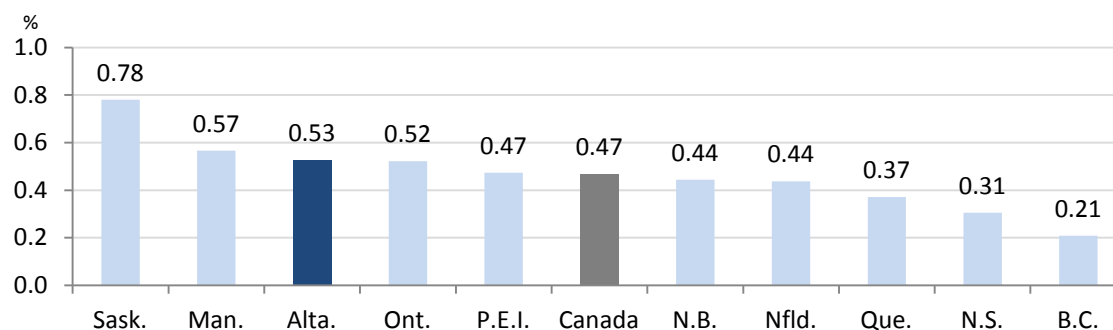
## VII. Labour Quality

Alberta's labour quality (see Section I for a definition) grew at an average rate of 0.53 per cent per year during the 1997-2010 period, slightly higher than the national average, which grew at 0.47 per cent per year (Chart 6). During the period in question, the industries that experienced the highest labour quality growth were agriculture, forestry, fishing and hunting (1.6 per cent per year), mining and oil and gas extraction (0.5 per cent), professional, scientific and technical services (0.5 per cent), and arts, entertainment and recreation (0.5 per cent). The industries with the lowest labour quality growth rates were: administrative and support, waste and remediation (-0.3 per cent per year); retail trade (-0.1 per cent); information and cultural industries (no change); and finance, insurance, real estate, and renting and leasing (no change).

Alberta's business sector ranked third in terms of labour quality growth between 1997 and 2010. Similarly, Alberta also ranked third on an equally weighted business sector ranking. Nine of the 15 two-digit NAICS industries ranked fifth or higher in Alberta in terms of labour quality growth. Agriculture, forestry, fishing and hunting as well as accommodation and food

services each ranked first. The weakest performances belonged to manufacturing, retail trade, finance, insurance, real estate and renting and leasing, and administrative and support, waste and remediation.

**Chart 6: Labour Quality Growth in Canada and the Provinces, Business Sector, 1997-2010**  
(Average Annual Growth Rates)



Source: CSLS Provincial Productivity Database, Appendix Tables

**Table 7: Labour Quality Levels and Growth Rates in Alberta, 1997-2010<sup>8</sup>**

Business Sector	Compound Annual Growth Rate, 1997-2007	Provincial Ranking	Alberta's Labour Quality Level Relative to Canada's, 1997	Alberta's Labour Quality Level Relative to Canada's, 2007	Rank, 2007
	(per cent)		(Canada=100)	(Canada=100)	
<b>Business Sector</b>	<b>0.53</b>	<b>3</b>	<b>100.0</b>	<b>100.8</b>	<b>6</b>
Agriculture, Forestry, Fishing and Hunting	1.57	1	100.0	110.4	1
Mining, and Oil and Gas Extraction	0.50	2	100.0	102.9	1
Utilities	0.42	3	100.0	102.8	4
Construction	0.10	2	100.0	100.2	6
Manufacturing	0.22	8	100.0	97.2	7
Wholesale Trade	0.18	2	100.0	99.8	6
Retail Trade	-0.07	9	100.0	96.3	10
Transportation and Warehousing	0.34	5	100.0	99.9	7
Information and Cultural Industries	0.01	9	100.0	96.2	3
FIRE*	-0.04	8	100.0	94.7	10
Professional, Scientific and Technical Services	0.47	4	100.0	99.6	6
ASWMR**	-0.34	10	100.0	95.2	10
Arts, Entertainment and Recreation	0.46	4	100.0	106.4	5
Accommodation and Food Services	0.35	1	100.0	101.6	5
Other Services (Except Public Administration)	0.38	6	100.0	99.7	7
Absolute Equally Weighted Average Rank		4.9			5.9
<b>Equally Weighted Business Sector Rank</b>		<b>3</b>			<b>7</b>

Source: CSLS Provincial Productivity Database, Appendix Tables

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

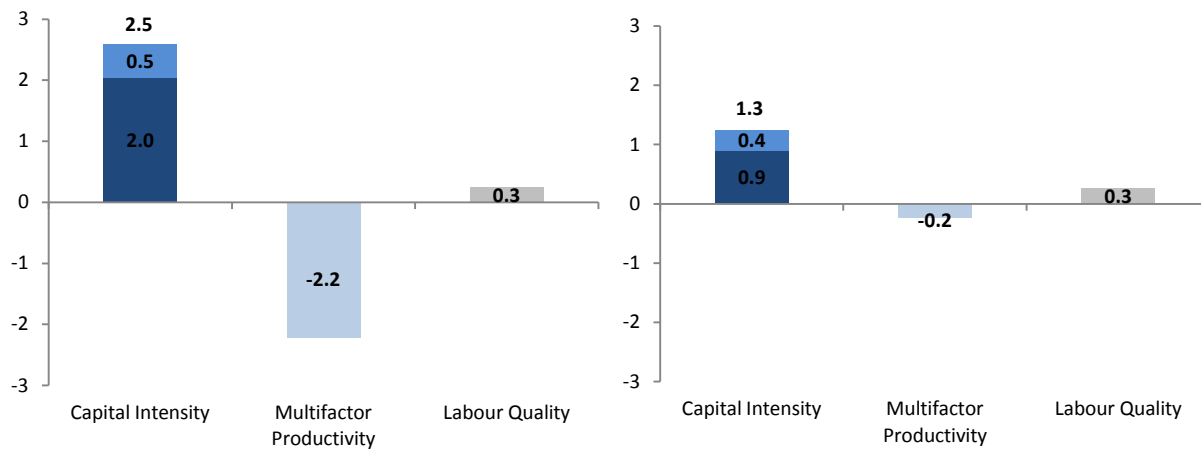
<sup>8</sup> Labour quality levels are not shown here because they are assumed to be the same (and equal to 100.0) across all provinces and in Canada in the base year, 1997 (Sharpe and Thomson, 2010a). They differ after 1997, incorporating the different labour quality growth rates experienced by the provinces and Canada. For example, labour quality in Alberta's market sector grew at an average annual rate of 0.49 per cent over the 1997-2007 period, while Canada's labour quality grew at an average annual rate of 0.52 per cent. As a consequence, Alberta's labour quality level was 99.72 per cent of the Canadian level in 2007.

## VIII. Sources of Labour Productivity Growth in the Business Sector

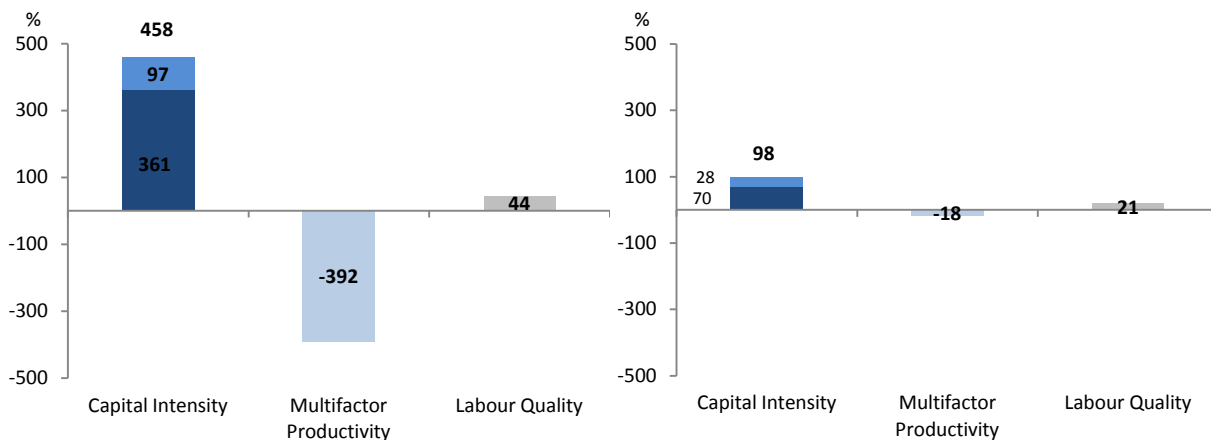
Alberta’s labour productivity growth grew at an average rate of 0.6 per cent per year during the 1997-2010 period, the lowest in the country and less than half of the national average, which grew at a rate of 1.3 per cent per year. Chart 7 shows both the absolute and per cent contributions to labour productivity growth by the sources of growth for Alberta and Canada over the 1997-2010 period.

**Chart 7: Percentage Point and Per Cent Contribution to Labour Productivity Growth by the Source of Labour Productivity Growth in the business Sector in Alberta and in Canada, 1997 to 2010**

### a) Percentage Point Contributions



### b) Per Cent Contributions



Note: Capital intensity growth is broken down into two effects: capital stock growth (dark blue) and capital composition growth (lighter blue).

Source: CSLS Provincial Productivity Database, Appendix Tables

Alberta's labour productivity growth was driven primarily by capital intensity, which accounted for 2.4 percentage points of overall labour productivity growth (or, alternatively, 458.0 per cent of total labour productivity growth) (Chart 7). The contribution of capital intensity to labour productivity growth can be broken down into two components: capital composition growth, which was responsible for 0.5 percentage points of labour productivity growth (97.0 per cent), and capital stock growth, which accounted for 2.0 percentage points (361 per cent). Labour quality growth was responsible for 0.3 percentage points of labour productivity growth (44.0 per cent). There was a large negative contribution to growth from multifactor productivity growth; multifactor productivity was responsible for -2.2 percentage points of growth (-392.0 per cent).

**Table 8: Contributions to Labour Productivity Growth at the Industry Level by Source in Alberta, 1997-2010**

Business Sector	Labour Productivity	Capital Intensity		MFP	Labour Quality	
		Total	Capital Composition			Capital Stock
Percentage Point Contributions to Labour Productivity Growth						
<b>Business Sector</b>	<b>0.6</b>	<b>2.6</b>	<b>0.5</b>	<b>2.0</b>	<b>-2.2</b>	<b>0.3</b>
Agriculture, Forestry, Fishing and Hunting	8.7	4.1	-3.2	7.2	4.1	0.5
Mining, and Oil and Gas Extraction	-3.0	3.4	0.1	3.3	-6.1	0.1
Utilities	-3.3	0.8	0.2	0.6	-4.1	0.1
Construction	-0.6	0.7	0.0	0.6	-1.5	0.1
Manufacturing	0.8	1.2	0.7	0.5	-0.5	0.1
Wholesale Trade	2.5	2.1	0.1	2.0	0.3	0.1
Retail Trade	3.4	0.6	0.0	0.6	2.8	-0.1
Transportation and Warehousing	2.3	2.6	0.7	1.8	-0.4	0.2
Information and Cultural Industries	4.3	2.2	0.5	1.7	2.1	0.0
FIRE*	1.2	1.7	na	na	-0.5	0.0
Professional, Scientific and Technical Services	2.3	1.7	0.1	1.5	0.3	0.4
ASWMR**	1.2	1.2	0.1	1.1	0.2	-0.3
Arts, Entertainment and Recreation	-2.2	0.9	0.6	0.3	-3.4	0.4
Accommodation and Food Services	1.3	0.4	0.1	0.3	0.6	0.3
Other Services (Except Public Administration)	2.9	3.8	1.7	2.0	-0.9	0.3
Per Cent Contributions to Labour Productivity Growth						
<b>Business Sector</b>	<b>100.0</b>	<b>463.2</b>	<b>96.8</b>	<b>361.0</b>	<b>-392.3</b>	<b>44.2</b>
Agriculture, Forestry, Fishing and Hunting	100.0	46.4	-36.2	82.4	46.5	5.3
Mining, and Oil and Gas Extraction	100.0	-114.4	-4.1	-110.0	204.6	-3.2
Utilities	100.0	-24.6	-5.7	-18.6	123.6	-2.4
Construction	100.0	-107.0	-7.5	-98.9	250.6	-13.4
Manufacturing	100.0	155.2	89.4	64.5	-67.9	15.1
Wholesale Trade	100.0	84.4	3.7	80.5	11.8	4.8
Retail Trade	100.0	18.5	1.0	17.5	82.2	-1.6
Transportation and Warehousing	100.0	111.8	31.0	79.3	-16.3	8.5
Information and Cultural Industries	100.0	51.7	10.9	40.4	48.7	0.1
FIRE*	100.0	146.6			-45.5	-1.7
Professional, Scientific and Technical Services	100.0	71.2	5.5	65.2	12.8	16.3
ASWMR**	100.0	101.7	8.6	92.3	16.3	-22.8
Arts, Entertainment and Recreation	100.0	-44.0	-28.1	-15.1	156.4	-16.6
Accommodation and Food Services	100.0	27.1	6.1	20.8	47.7	19.0
Other Services (Except Public Administration)	100.0	130.2	57.7	67.8	-31.5	9.5

Source: CSLS Provincial Productivity Database, Appendix Tables

Note: Per cent contributions may not sum to 100 due to rounding.

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation



The causes of growth in labour productivity were very different between Canada and Alberta. Alberta's large negative multifactor productivity growth was a major difference compared to Canada, which saw substantially smaller but still negative contribution of -0.2 percentage points (18.0 per cent). Alberta experienced capital intensity growth on a scale far beyond that enjoyed by Canada, and thus capital intensity was far more important to labour productivity growth for former than the latter.

Table 8 details the contributions in absolute and per cent terms of capital intensity, MFP, and labour quality growth to labour productivity growth in Alberta over the 1997-2010 period at the two-digit NAICS industry level.

## IX. Sources of Labour Productivity Level Gap by Industry

Alberta's labour productivity level was 119.9 per cent of the Canadian level in 2010, which implies a positive labour productivity differential of 19.9 percentage points. This differential is largely attributable to the business sector's above average capital intensity level, which was responsible for 29.1 percentage points of the gap. The differential was reduced by low multifactor productivity, which reduced the differential by 8.4 percentage points. Additionally, the differential was also reduced by labour quality, which had a contribution of -0.2 percentage points to the labour productivity gap.

**Table 9: Sources of the Labour Productivity Gap Relative to Canada for Alberta at the Two-Digit Industry Level, 2010**

	Labour Productivity Relative Level	Labour Productivity Gap	Percentage Point Contributions to Labour Productivity Gap			Percent Contributions to Labour Productivity Gap			
			Capital Intensity	Multifactor Productivity	Labour Quality	Labour Productivity	Capital Intensity	Multifactor Productivity	Labour Quality
<b>Business Sector</b>	<b>119.9</b>	<b>19.9</b>	<b>29.1</b>	<b>-8.4</b>	<b>-0.2</b>	<b>100.0</b>	<b>146.4</b>	<b>-42.1</b>	<b>-0.8</b>
Agriculture, Forestry, Fishing and Hunting	163.4	63.4	21.6	35.3	2.3	100.0	34.1	55.7	3.7
Mining, and Oil and Gas Extraction	110.6	10.6	10.2	5.2	0.3	100.0	96.4	48.9	2.9
Utilities	113.9	13.9	40.7	-23.7	0.3	100.0	292.4	-170.2	1.8
Construction	91.1	-8.9	12.7	-20.7	-0.4	100.0	-141.5	231.6	4.3
Manufacturing	111.3	11.3	3.3	10.0	-1.4	100.0	29.3	89.0	-12.8
Wholesale Trade	114.5	14.5	10.5	5.4	-1.6	100.0	72.3	37.4	-10.9
Retail Trade	107.2	7.2	-5.5	14.9	-2.7	100.0	-76.0	207.6	-38.1
Transportation and Warehousing	127.5	27.5	29.5	-2.1	0.0	100.0	107.1	-7.5	0.0
Information and Cultural Industries	136.1	36.1	22.3	16.3	0.6	100.0	61.8	45.1	1.5
FIRE*	142.1	42.1	5.7	37.1	-3.3	100.0	13.6	88.3	-7.8
Professional, Scientific and Technical Services	88.3	-11.7	12.4	-26.0	-1.6	100.0	-105.9	221.7	13.8
ASWMR**	145.2	45.2	8.0	41.7	-3.8	100.0	17.8	92.4	-8.3
Arts, Entertainment and Recreation	77.1	-22.9	0.0	-20.6	2.3	100.0	-0.2	90.1	-10.1
Accommodation and Food Services	101.5	1.5	9.2	-8.3	-0.3	100.0	596.0	-535.7	-21.3
Other Services (Except Public Administration)	147.7	47.7	6.2	30.7	-2.5	100.0	13.0	64.4	-5.2

Source: CSLS Provincial Productivity Database, Appendix Tables

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Alberta had a negative labour productivity gap in three industries: construction, professional, scientific and technical services, and arts, entertainment and recreation. In each of these industries, the main driver of the gap was a significantly low contribution of multifactor productivity. In the twelve remaining industries, the positive gap was caused primarily by high capital intensity. In a few cases (agriculture, forestry, fishing and hunting, for instance), this gap was fuelled mainly by a strong positive contribution from multifactor productivity.

## X. Conclusion

During the 1997-2010 period, Alberta experienced lower growth in the three productivity metrics – labour, capital and multifactor productivity – than the national average. Indeed, it had the worst performance in all three measures of all the provinces.

Labour productivity grew at a rate of 0.6 per cent per year, compared to the national rate of 1.3 per cent. Growth in labour productivity was primarily driven by capital intensity growth, 45.8 per cent of growth, though this was largely offset by declines in multifactor productivity. Regarding capital and multifactor productivity growth, Alberta's lackluster performance might reflect the fact that investment in the mining sector, especially in oil sands, requires a long time to be put in place and to become productive.

Alberta enjoyed the second highest labour productivity level in Canada, at 119.9 per cent of the national level in 2010. Similarly, Alberta had the highest capital intensity level in the country, at 169.3 per cent of the national figure, due to the importance of the capital intensive, mining and oil and gas extraction industry. As a result, capital productivity was only 65.6 per cent of the national level, with Alberta ranking ninth in the country on this measure. The multifactor productivity level was 92.7 per cent of the national average. The province's positive labour productivity differential relative to Canada was chiefly attributable to high capital intensity.

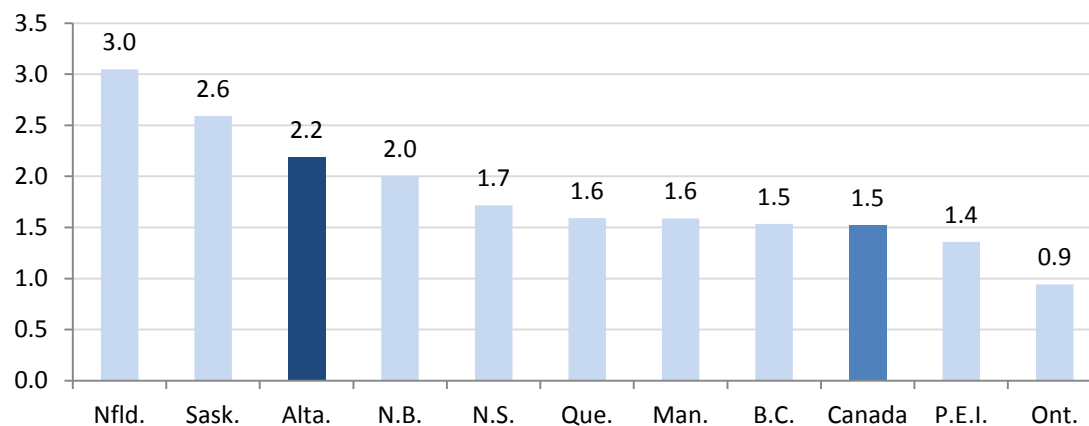
Table 10 provides a summary of both levels (in 1997 and 2010) and growth rates (for the 1997-2010 period) for the productivity measures discussed in the report, along with rankings that show how Alberta fared in comparison to the other provinces. A key observation is that labour productivity was greatly hampered by the lagging mining and oil and gas extraction industry, as Alberta ranks relatively high (4<sup>th</sup>) using the equally weighted measure and last using the business sector. Another core observation is the capital-intensive nature of the Albertan economy, with capital intensity in Alberta growing the fastest in the country between 1997 and 2010.

**Table 10: Summary of Alberta's Productivity Performance in the Business Sector**

	Business Sector Growth, 1997 to 2010			Per Cent of the Canadian Level		Level Rankings, 2010	
	Compound Annual Growth Rate	Business Sector Rank	Equally Weighted Business Sector Rank	1997	2010	Business Sector Rank	Equally Weighted Business Sector Rank
Labour Productivity	0.6	10	4	128.1	119.9	2	1
Capital Productivity	-4.2	10	10	87.5	65.6	9	10
Multifactor Productivity	-2.2	10	7	113.5	92.7	7	1
Capital Intensity	5.0	1	1	135.6	169.3	1	1
Labour Quality	0.5	3	3				

Source: CSLs Provincial Productivity Database, Appendix Tables

Despite Alberta's poor productivity growth, real income growth (defined as personal disposable income divided by the CPI) in the province since 1997 has been strong. Real personal income per capita has advanced at a 2.2 per cent average annual rate between 2007 and 2010 (Chart 8). This was the third best performance in the country and above the national average of 1.5 per cent.

**Chart 8: Personal Income per Capita (\$2002) Growth (Average Annual), Canada and the Provinces, 1997-2010**

Source: Statistics Canada CANSIM Database (Tables 384-0013 and 326-0021)

What explains this disconnect between real income and labour productivity growth (2.2 per cent versus 0.6 per cent)? While in the very long run labour productivity growth determines real income growth, in the shorter term such as the 13 year period between 1997 and 2010, other factors can drive a wedge between the two variables. Increased employment rates can result in per capita income gains exceeding labour productivity growth. More importantly, increased prices for goods and services produced and sold on international markets can improve the terms of trade and boost real income even though physical productivity growth is flat, or negative.

This is exactly what happened in the case of Alberta. Higher oil prices made it very profitable<sup>9</sup> for oil companies to develop and exploit the oil sands even though the amount of labour and capital needed to extract a barrel of oil was greater, sometimes much greater, than in conventional oil production. In other words, high oil prices allowed for oil reserves previously deemed to be uneconomical to be explored. The oil boom, in turn, sent ripples throughout Alberta's entire economy, leading, for example, to a construction boom, which employed marginal workers in the construction sector. From this perspective Alberta's poor productivity performance is not a disaster for the economy, or even evidence of a productivity problem, but a normal responses to market forces. Profits trump productivity in business decision making.

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<sup>9</sup> In fact, during the 1997-2010 period, net profits in Canadian oil and mining extraction and support activities increased at a robust pace of 11.7 per cent per year, from \$4,449 million in 1997 to \$18,802 million in 2010, significantly faster than the net profit increase experienced at the total economy level (7.7 per cent per year) (for more information on the topic, see Statistics Canada's Quarterly Financial Statistics for Enterprises survey).

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## Appendix Tables

Appendix Table 1: Labour Productivity Growth by Province at the Two-Digit NAICS Level, 1997-2010

### A) Compound annual growth rates, per cent

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>1.3</b>	<b>3.9</b>	<b>1.6</b>	<b>1.6</b>	<b>2.0</b>	<b>1.2</b>	<b>1.2</b>	<b>1.9</b>	<b>1.8</b>	<b>0.6</b>	<b>1.2</b>
Agriculture, Forestry, Fishing and Hunting	4.6	6.0	2.7	3.7	6.5	4.0	3.5	5.6	5.5	8.7	1.7
Mining, and Oil and Gas Extraction	-1.6	11.3	1.0	3.3	-1.6	-0.7	-4.3	2.0	-4.5	-3.0	2.0
Utilities	-0.5	0.4	2.7	1.0	1.6	-0.1	0.0	-2.0	1.0	-3.3	-2.9
Construction	0.6	2.7	1.5	1.1	0.1	1.2	0.8	1.5	1.9	-0.6	1.2
Manufacturing	1.6	1.8	0.3	1.6	1.9	2.1	1.4	0.7	1.0	0.8	2.4
Wholesale Trade	3.2	4.7	3.0	3.1	4.9	2.6	3.6	5.1	4.6	2.5	2.2
Retail Trade	2.7	3.5	3.6	2.9	4.0	2.2	2.7	3.6	3.4	3.4	2.2
Transportation and Warehousing	1.2	0.3	-0.1	1.6	1.9	1.3	0.5	1.1	1.5	2.3	1.3
Information and Cultural Industries	1.7	4.2	4.7	4.3	4.8	-0.4	1.6	0.6	4.0	4.3	2.6
FIRE*	1.5	2.3	0.0	0.6	1.7	1.0	1.4	1.8	3.5	1.2	2.2
Professional, Scientific and Technical Services	1.1	0.0	2.4	0.1	1.8	0.9	0.9	0.0	2.4	2.3	0.8
ASWMR**	-0.1	0.3	-1.7	0.0	0.3	0.1	-0.2	0.5	1.1	1.2	-1.1
Arts, Entertainment and Recreation	-1.2	-2.6	-2.9	-2.7	-5.6	-1.3	-0.2	5.4	-4.4	-2.2	-3.4
Accommodation and Food Services	0.6	2.0	1.4	0.9	1.2	1.1	0.5	-0.5	0.0	1.3	-0.2
Other Services (Except Public Administration)	1.1	1.3	2.6	2.6	1.9	0.3	1.1	1.6	2.2	2.9	0.0

### B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>1</b>	<b>5</b>	<b>6</b>	<b>2</b>	<b>8</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>10</b>	<b>9</b>
Agriculture, Forestry, Fishing and Hunting		3	9	7	2	6	8	4	5	1	10
Mining, and Oil and Gas Extraction		1	5	2	7	6	9	3	10	8	4
Utilities		5	1	4	2	7	6	8	3	10	9
Construction		1	4	7	9	6	8	3	2	10	5
Manufacturing		4	10	5	3	2	6	9	7	8	1
Wholesale Trade		3	7	6	2	8	5	1	4	9	10
Retail Trade		4	2	7	1	9	8	3	5	6	10
Transportation and Warehousing		9	10	3	2	6	8	7	4	1	5
Information and Cultural Industries		5	2	4	1	10	8	9	6	3	7
FIRE*		2	10	9	5	8	6	4	1	7	3
Professional, Scientific and Technical Services		9	2	8	4	5	6	10	1	3	7
ASWMR**		4	10	7	5	6	8	3	2	1	9
Arts, Entertainment and Recreation		5	7	6	10	3	2	1	9	4	8
Accommodation and Food Services		1	2	6	4	5	7	10	8	3	9
Other Services (Except Public Administration)		7	2	3	5	9	8	6	4	1	10
Absolute Equally Weighted Average Rank		4.2	5.5	5.6	4.1	6.4	6.9	5.4	4.7	5.0	7.1
<b>Equally Weighted Business Sector Rank</b>		<b>2</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>10</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Appendix Table 2: Relative Labour Productivity Levels by Province at the Two-Digit NAICS Level, 2010

## A) Province's Labour Productivity Level as a Share of Canada's

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>100.0</b>	<b>120.0</b>	<b>68.6</b>	<b>75.9</b>	<b>80.3</b>	<b>95.0</b>	<b>100.7</b>	<b>90.5</b>	<b>109.3</b>	<b>119.9</b>	<b>91.7</b>
Agriculture, Forestry, Fishing and Hunting	100.0	131.6	88.7	78.8	96.4	95.5	72.3	85.5	131.8	163.4	102.8
Mining, and Oil and Gas Extraction	100.0	332.2	25.1	74.4	32.2	104.1	33.0	60.3	103.8	110.6	112.4
Utilities	100.0	84.2	118.3	115.6	91.9	142.3	73.3	91.8	134.7	113.9	93.8
Construction	100.0	109.0	57.3	84.9	69.8	122.1	100.1	94.7	113.3	91.1	102.2
Manufacturing	100.0	62.8	60.9	71.3	79.9	97.3	105.2	77.5	107.4	111.3	90.8
Wholesale Trade	100.0	106.7	84.0	93.6	98.6	89.6	102.6	127.3	136.7	114.5	81.0
Retail Trade	100.0	80.2	88.2	77.0	90.9	95.7	105.9	105.2	94.0	107.2	96.1
Transportation and Warehousing	100.0	70.7	58.1	79.2	85.0	94.7	92.3	93.7	110.1	127.5	110.8
Information and Cultural Industries	100.0	116.9	159.6	114.9	122.4	86.3	98.0	98.2	109.9	136.1	100.7
FIRE*	100.0	120.1	56.6	67.2	78.2	93.9	100.8	60.4	56.1	142.1	101.7
Professional, Scientific and Technical Services	100.0	67.3	125.2	102.7	105.3	93.1	102.6	115.6	147.3	88.3	99.6
ASWMR**	100.0	110.2	68.3	90.0	89.1	109.3	120.9	100.4	109.7	145.2	107.9
Arts, Entertainment and Recreation	100.0	73.5	64.2	79.3	59.6	109.4	110.3	102.1	73.6	77.1	87.9
Accommodation and Food Services	100.0	83.6	77.4	73.8	76.3	81.8	87.4	72.1	77.8	101.5	87.1
Other Services (Except Public Administration)	100.0	91.0	91.5	88.0	94.9	118.3	130.9	98.5	90.2	147.7	115.3

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>1</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>5</b>	<b>4</b>	<b>7</b>	<b>3</b>	<b>2</b>	<b>6</b>
Agriculture, Forestry, Fishing and Hunting		3	7	9	5	6	10	8	2	1	4
Mining, and Oil and Gas Extraction		1	10	6	9	4	8	7	5	3	2
Utilities		9	3	4	7	1	10	8	2	5	6
Construction		3	10	8	9	1	5	6	2	7	4
Manufacturing		9	10	8	6	4	3	7	2	1	5
Wholesale Trade		4	9	7	6	8	5	2	1	3	10
Retail Trade		9	8	10	7	5	2	3	6	1	4
Transportation and Warehousing		9	10	8	7	4	6	5	3	1	2
Information and Cultural Industries		4	1	5	3	10	9	8	6	2	7
FIRE*		2	9	7	6	5	4	8	10	1	3
Professional, Scientific and Technical Services		10	2	5	4	8	6	3	1	9	7
ASWMR**		3	10	8	9	5	2	7	4	1	6
Arts, Entertainment and Recreation		8	9	5	10	2	1	3	7	6	4
Accommodation and Food Services		4	7	9	8	5	2	10	6	1	3
Other Services (Except Public Administration)		8	7	10	6	3	2	5	9	1	4
Absolute Equally Weighted Average Rank		5.7	7.5	7.3	6.8	4.7	5.0	6.0	4.4	2.9	4.7
<b>Equally Weighted Business Sector Rank</b>		<b>6</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>3</b>	<b>5</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>3</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Appendix Table 3: Capital Productivity Growth by Province at the Two-Digit NAICS Level, 1997-2010

## A) Compound annual growth rates, per cent

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>-0.5</b>	<b>2.9</b>	<b>-1.6</b>	<b>-0.1</b>	<b>-1.2</b>	<b>-0.6</b>	<b>-0.7</b>	<b>-0.6</b>	<b>-2.5</b>	<b>-4.2</b>	<b>-2.1</b>
Agriculture, Forestry, Fishing and Hunting	1.9	2.1	-0.4	3.2	2.4	3.1	2.2	2.5	0.1	2.8	1.2
Mining, and Oil and Gas Extraction	-5.1	13.9	-20.2	1.6	-4.1	-3.9	-5.2	-2.7	-6.6	-6.9	-4.8
Utilities	-0.4	1.1	-0.2	1.6	-0.5	1.2	-1.1	-1.6	-0.6	-4.3	-2.8
Construction	-1.5	-1.1	-4.9	-0.3	-1.0	-0.6	-1.3	-1.6	0.1	-3.9	-1.8
Manufacturing	1.0	0.4	-1.5	0.2	-1.0	0.7	-0.6	-0.4	-1.5	-1.8	0.1
Wholesale Trade	-0.8	1.6	-0.4	-0.6	2.5	-3.8	-0.8	2.2	2.8	-3.5	-1.3
Retail Trade	-1.0	0.4	-1.7	-1.2	-3.4	-1.5	-2.3	-0.6	1.3	0.7	-2.1
Transportation and Warehousing	-1.0	-5.3	-3.9	-1.8	-5.2	-3.3	-1.3	-1.5	-1.0	-3.6	-1.3
Information and Cultural Industries	2.1	1.9	2.2	2.5	0.8	2.0	1.4	-0.5	-2.5	0.5	0.9
FIRE*	0.1	-2.4	-3.1	-0.2	-2.9	-1.3	-0.7	-1.6	-0.4	-2.0	-1.4
Professional, Scientific and Technical Services	-2.4	-5.5	-6.2	-2.5	-3.2	-1.9	-2.5	-1.5	-6.1	-5.5	-4.1
ASWMR**	-0.5	15.3	5.0	-0.8	9.5	0.9	-3.5	-1.1	-3.1	-4.0	-1.3
Arts, Entertainment and Recreation	-0.3	-1.2	6.7	-6.1	-0.2	-1.0	-0.4	0.7	-6.2	-6.3	-10.3
Accommodation and Food Services	0.9	0.0	1.4	-0.1	-1.9	0.4	2.1	-0.1	-0.2	-0.3	-2.6
Other Services (Except Public Administration)	-2.5	-8.7	-6.0	-7.8	-4.8	-7.7	-5.4	-4.7	-5.2	-9.3	-8.1

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>1</b>	<b>7</b>	<b>2</b>	<b>6</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>9</b>	<b>10</b>	<b>8</b>
Agriculture, Forestry, Fishing and Hunting		7	10	1	5	2	6	4	9	3	8
Mining, and Oil and Gas Extraction		1	10	2	5	4	7	3	8	9	6
Utilities		3	4	1	5	2	7	8	6	10	9
Construction		5	10	2	4	3	6	7	1	9	8
Manufacturing		2	9	3	7	1	6	5	8	10	4
Wholesale Trade		4	5	6	2	10	7	3	1	9	8
Retail Trade		3	7	5	10	6	9	4	1	2	8
Transportation and Warehousing		10	8	5	9	6	2	4	1	7	3
Information and Cultural Industries		4	2	1	7	3	5	9	10	8	6
FIRE*		8	10	1	9	4	3	6	2	7	5
Professional, Scientific and Technical Services		8	10	4	5	2	3	1	9	7	6
ASWMR**		1	3	5	2	4	9	6	8	10	7
Arts, Entertainment and Recreation		6	1	7	3	5	4	2	8	9	10
Accommodation and Food Services		4	2	6	9	3	1	5	7	8	10
Other Services (Except Public Administration)		9	5	7	2	6	4	1	3	10	8
Absolute Equally Weighted Average Rank		5.0	6.4	3.7	5.6	4.1	5.3	4.5	5.5	7.9	7.1
<b>Equally Weighted Business Sector Rank</b>		<b>4</b>	<b>8</b>	<b>1</b>	<b>7</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>6</b>	<b>10</b>	<b>9</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation



Appendix Table 4: Relative Capital Productivity Levels by Province at the Two-Digit NAICS Level, 2010

## A) Province's Capital Productivity Level as a Share of Canada's

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>100.0</b>	<b>82.7</b>	<b>100.2</b>	<b>114.4</b>	<b>98.1</b>	<b>104.3</b>	<b>105.2</b>	<b>110.4</b>	<b>65.5</b>	<b>65.6</b>	<b>99.9</b>
Agriculture, Forestry, Fishing and Hunting	100.0	87.6	76.7	103.5	98.7	111.4	91.3	76.6	88.0	118.1	125.1
Mining, and Oil and Gas Extraction	100.0	158.0	112.6	98.9	346.7	898.9	103.9	162.0	74.0	97.0	77.0
Utilities	100.0	123.3	120.5	106.5	107.9	104.1	105.2	105.3	111.4	68.2	75.5
Construction	100.0	75.3	165.7	135.9	118.6	89.2	132.5	162.2	78.8	47.7	101.2
Manufacturing	100.0	35.8	66.1	59.9	48.4	137.5	103.4	57.4	24.0	50.3	70.5
Wholesale Trade	100.0	104.5	132.9	118.9	95.9	87.6	99.8	111.8	91.9	85.4	119.8
Retail Trade	100.0	130.5	97.3	108.0	84.8	98.5	84.6	102.9	122.7	128.1	109.6
Transportation and Warehousing	100.0	86.1	95.2	133.1	81.3	100.0	119.0	92.7	55.8	60.2	111.3
Information and Cultural Industries	100.0	66.7	65.6	87.4	76.4	95.0	103.8	66.1	56.0	91.8	94.2
FIRE*	100.0	101.7	64.7	83.3	77.2	89.5	96.3	63.6	66.5	123.9	94.2
Professional, Scientific and Technical Services	100.0	70.3	161.1	111.1	98.1	78.3	123.5	143.4	144.6	43.0	109.8
ASWMR**	100.0	319.7	235.9	97.5	181.3	100.4	70.3	130.2	79.9	82.3	137.4
Arts, Entertainment and Recreation	100.0	102.1	111.5	65.8	90.9	82.4	117.7	78.3	147.3	66.8	45.3
Accommodation and Food Services	100.0	88.1	97.4	87.1	73.6	100.6	103.7	103.7	77.5	76.3	87.8
Other Services (Except Public Administration)	100.0	46.6	191.6	83.2	133.7	68.5	93.7	83.8	91.0	78.6	68.5

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>8</b>	<b>5</b>	<b>1</b>	<b>7</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>10</b>	<b>9</b>	<b>6</b>
Agriculture, Forestry, Fishing and Hunting		8	9	4	5	3	6	10	7	2	1
Mining, and Oil and Gas Extraction		4	5	7	2	1	6	3	10	8	9
Utilities		1	2	5	4	8	7	6	3	10	9
Construction		9	1	3	5	7	4	2	8	10	6
Manufacturing		9	4	5	8	1	2	6	10	7	3
Wholesale Trade		5	1	3	7	9	6	4	8	10	2
Retail Trade		1	8	5	9	7	10	6	3	2	4
Transportation and Warehousing		7	5	1	8	4	2	6	10	9	3
Information and Cultural Industries		7	9	5	6	2	1	8	10	4	3
FIRE*		2	9	6	7	5	3	10	8	1	4
Professional, Scientific and Technical Services		9	1	5	7	8	4	3	2	10	6
ASWMR**		1	2	7	3	6	10	5	9	8	4
Arts, Entertainment and Recreation		4	3	9	5	6	2	7	1	8	10
Accommodation and Food Services		5	4	7	10	3	1	2	8	9	6
Other Services (Except Public Administration)		10	1	6	2	8	3	5	4	7	9
Absolute Equally Weighted Average Rank		5.5	4.3	5.2	5.9	5.2	4.5	5.5	6.7	7.0	5.3
<b>Equally Weighted Business Sector Rank</b>		<b>6</b>	<b>1</b>	<b>3</b>	<b>8</b>	<b>3</b>	<b>2</b>	<b>7</b>	<b>9</b>	<b>10</b>	<b>5</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Appendix Table 5: Multifactor Productivity Growth by Province at the Two-Digit NAICS Level, 1997-2010

## A) Compound annual growth rates, per cent

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>-0.2</b>	<b>2.9</b>	<b>0.0</b>	<b>0.7</b>	<b>0.4</b>	<b>0.2</b>	<b>0.2</b>	<b>0.5</b>	<b>-1.2</b>	<b>-2.2</b>	<b>-0.2</b>
Agriculture, Forestry, Fishing and Hunting	2.4	2.9	0.8	3.6	4.4	3.4	2.3	2.9	1.0	4.1	1.7
Mining, and Oil and Gas Extraction	-4.6	13.4	-11.2	2.7	-3.4	-2.5	-4.7	-1.1	-6.4	-6.1	-3.4
Utilities	-0.7	1.1	-0.1	1.2	0.0	0.9	-0.7	-1.7	-0.2	-4.1	-2.7
Construction	0.0	1.3	0.3	0.9	-0.1	0.8	0.5	0.9	1.4	-1.5	0.7
Manufacturing	0.6	1.2	-0.4	1.0	0.3	1.2	0.4	0.0	-1.0	-0.5	1.6
Wholesale Trade	1.5	3.4	1.6	1.6	3.9	0.4	1.9	3.9	3.6	0.3	1.3
Retail Trade	1.4	2.1	2.0	1.8	1.7	1.0	1.1	2.3	2.9	2.8	1.1
Transportation and Warehousing	-0.2	-1.5	-2.0	0.5	-0.7	-0.4	-0.4	0.1	0.2	-0.4	0.4
Information and Cultural Industries	1.3	2.7	2.8	3.1	2.5	0.6	1.4	-0.1	0.9	2.1	1.4
FIRE*	-0.1	-0.6	-1.7	0.0	-1.1	-0.5	0.1	-0.3	1.2	-0.5	0.1
Professional, Scientific and Technical Services	-0.1	-1.3	0.6	-0.8	1.0	-0.2	-0.2	0.0	0.4	0.3	-0.2
ASWMR**	-0.5	3.1	0.0	-0.6	1.8	0.2	-1.2	0.0	-0.5	0.2	-0.6
Arts, Entertainment and Recreation	-1.6	-1.9	0.5	-4.0	-4.6	-1.2	-0.2	3.5	-5.0	-3.4	-4.9
Accommodation and Food Services	0.4	1.5	1.6	0.5	0.5	0.9	0.6	-0.3	-0.1	0.6	-0.7
Other Services (Except Public Administration)	-1.7	-2.5	0.5	-1.3	0.1	-2.8	-1.2	-0.8	-0.7	-0.9	-2.7

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>1</b>	<b>7</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>3</b>	<b>9</b>	<b>10</b>	<b>8</b>
Agriculture, Forestry, Fishing and Hunting		5	10	3	1	4	7	6	9	2	8
Mining, and Oil and Gas Extraction		1	10	2	6	4	7	3	9	8	5
Utilities		2	5	1	4	3	7	8	6	10	9
Construction		2	8	4	9	5	7	3	1	10	6
Manufacturing		2	8	4	6	3	5	7	10	9	1
Wholesale Trade		4	6	7	1	9	5	2	3	10	8
Retail Trade		4	5	6	7	10	9	3	1	2	8
Transportation and Warehousing		9	10	1	8	7	5	4	3	6	2
Information and Cultural Industries		3	2	1	4	9	6	10	8	5	7
FIRE*		8	10	4	9	7	2	5	1	6	3
Professional, Scientific and Technical Services		10	2	9	1	8	7	5	3	4	6
ASWMR**		1	5	9	2	4	10	6	7	3	8
Arts, Entertainment and Recreation		5	2	7	8	4	3	1	10	6	9
Accommodation and Food Services		2	1	6	7	3	5	9	8	4	10
Other Services (Except Public Administration)		8	1	7	2	10	6	4	3	5	9
Absolute Equally Weighted Average Rank		4.4	5.7	4.7	5.0	6.0	6.1	5.1	5.5	6.0	6.6
<b>Equally Weighted Business Sector Rank</b>		<b>1</b>	<b>6</b>	<b>2</b>	<b>3</b>	<b>7</b>	<b>9</b>	<b>4</b>	<b>5</b>	<b>7</b>	<b>10</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Appendix Table 6: Relative Multifactor Productivity Levels by Province at the Two-Digit NAICS Level, 2010

## A) Province's Multifactor Productivity Level as a Share of Canada's

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>100.0</b>	<b>101.1</b>	<b>83.8</b>	<b>95.0</b>	<b>90.8</b>	<b>102.3</b>	<b>105.6</b>	<b>102.8</b>	<b>85.2</b>	<b>92.7</b>	<b>99.0</b>
Agriculture, Forestry, Fishing and Hunting	100.0	99.2	81.9	95.6	100.4	106.3	85.5	80.5	100.9	131.4	121.2
Mining, and Oil and Gas Extraction	100.0	173.0	106.3	95.3	222.5	154.3	77.6	137.7	78.3	105.1	82.3
Utilities	100.0	115.7	119.8	109.6	106.2	113.6	97.7	102.9	118.1	80.1	81.4
Construction	100.0	100.3	76.3	96.2	82.1	115.3	110.2	111.2	105.0	80.5	106.1
Manufacturing	100.0	82.1	61.4	85.8	77.9	103.8	99.5	103.1	101.9	110.0	98.4
Wholesale Trade	100.0	107.0	106.5	105.7	100.5	89.5	102.1	119.9	113.1	105.2	93.6
Retail Trade	100.0	92.6	91.8	87.7	89.8	97.1	98.9	106.2	104.2	115.5	101.5
Transportation and Warehousing	100.0	77.4	66.3	98.2	85.4	99.2	101.2	96.9	86.2	98.2	115.5
Information and Cultural Industries	100.0	91.4	96.7	101.6	95.8	92.3	104.0	80.0	81.9	114.9	100.3
FIRE*	100.0	114.8	64.2	77.8	80.8	94.4	100.6	63.9	62.9	136.4	99.1
Professional, Scientific and Technical Services	100.0	68.4	134.9	108.4	114.5	91.0	107.3	131.6	147.6	75.9	101.4
ASWMR**	100.0	141.9	95.5	101.6	106.8	115.9	113.1	113.1	109.4	141.1	117.2
Arts, Entertainment and Recreation	100.0	70.6	93.6	76.5	71.6	101.6	117.4	96.0	86.3	79.1	78.6
Accommodation and Food Services	100.0	70.4	57.2	60.5	66.7	73.4	83.1	68.4	63.8	92.1	73.3
Other Services (Except Public Administration)	100.0	130.9	179.5	146.4	139.0	116.4	118.4	143.9	155.1	128.5	105.3

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>4</b>	<b>10</b>	<b>6</b>	<b>8</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>9</b>	<b>7</b>	<b>5</b>
Agriculture, Forestry, Fishing and Hunting		6	9	7	5	3	8	10	4	1	2
Mining, and Oil and Gas Extraction		2	5	7	1	3	10	4	9	6	8
Utilities		3	1	5	6	4	8	7	2	10	9
Construction		6	10	7	8	1	3	2	5	9	4
Manufacturing		8	10	7	9	2	5	3	4	1	6
Wholesale Trade		3	4	5	8	10	7	1	2	6	9
Retail Trade		7	8	10	9	6	5	2	3	1	4
Transportation and Warehousing		9	10	5	8	3	2	6	7	4	1
Information and Cultural Industries		8	5	3	6	7	2	10	9	1	4
FIRE*		2	8	7	6	5	3	9	10	1	4
Professional, Scientific and Technical Services		10	2	5	4	8	6	3	1	9	7
ASWMR**		1	10	9	8	4	5	6	7	2	3
Arts, Entertainment and Recreation		10	4	8	9	2	1	3	5	6	7
Accommodation and Food Services		5	10	9	7	3	2	6	8	1	4
Other Services (Except Public Administration)		6	1	3	5	9	8	4	2	7	10
Absolute Equally Weighted Average Rank		5.7	6.5	6.5	6.6	4.7	5.0	5.1	5.2	4.3	5.5
<b>Equally Weighted Business Sector Rank</b>		<b>7</b>	<b>8</b>	<b>8</b>	<b>10</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>6</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Appendix Table 7: Labour Quality Growth by Province at the Two-Digit NAICS Level, 1997-2010

## A) Compound annual growth rates, per cent

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>0.5</b>	<b>0.4</b>	<b>0.5</b>	<b>0.3</b>	<b>0.4</b>	<b>0.4</b>	<b>0.5</b>	<b>0.6</b>	<b>0.8</b>	<b>0.5</b>	<b>0.2</b>
Agriculture, Forestry, Fishing and Hunting	0.8	1.3	0.4	0.0	0.5	0.6	1.2	1.5	-0.1	1.6	-0.5
Mining, and Oil and Gas Extraction	0.3	-0.3	-4.8	0.3	-0.5	0.1	-0.1	0.6	0.4	0.5	-0.4
Utilities	0.2	-0.5	0.5	0.8	0.1	0.3	0.0	0.2	0.3	0.4	0.0
Construction	0.1	0.1	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0
Manufacturing	0.4	0.6	0.4	0.1	0.6	0.6	0.5	0.4	1.1	0.2	0.1
Wholesale Trade	0.2	-0.3	0.1	0.1	-0.3	0.1	0.3	0.1	0.1	0.2	0.0
Retail Trade	0.2	0.7	0.2	0.1	0.3	0.2	0.3	0.1	-0.1	-0.1	0.1
Transportation and Warehousing	0.4	0.2	0.9	0.3	0.5	0.4	0.5	0.1	0.2	0.3	0.1
Information and Cultural Industries	0.3	-0.1	0.1	0.3	0.4	0.4	0.3	0.3	0.0	0.0	0.5
FIRE*	0.4	0.0	-0.2	0.5	0.2	0.5	0.4	0.6	0.3	0.0	0.3
Professional, Scientific and Technical Services	0.5	0.7	-0.1	0.2	-0.3	0.6	0.6	-0.2	0.3	0.5	0.3
ASWMR**	0.0	0.2	-0.2	0.4	0.3	-0.2	0.3	0.3	0.1	-0.3	-0.2
Arts, Entertainment and Recreation	0.0	-0.4	-0.6	0.6	0.2	0.0	-0.1	1.0	0.8	0.5	-0.5
Accommodation and Food Services	0.2	0.1	-0.2	0.2	-0.1	0.1	0.3	0.0	0.2	0.3	0.1
Other Services (Except Public Administration)	0.4	0.2	0.4	0.6	0.4	0.3	0.4	0.3	0.5	0.4	0.5

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>6</b>	<b>5</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>10</b>
Agriculture, Forestry, Fishing and Hunting		3	7	8	6	5	4	2	9	1	10
Mining, and Oil and Gas Extraction		7	10	4	9	5	6	1	3	2	8
Utilities		10	2	1	7	5	9	6	4	3	8
Construction		3	1	7	6	10	5	4	9	2	8
Manufacturing		2	7	9	3	4	5	6	1	8	10
Wholesale Trade		10	5	3	9	7	1	6	4	2	8
Retail Trade		1	5	8	2	4	3	6	10	9	7
Transportation and Warehousing		7	1	6	3	4	2	9	8	5	10
Information and Cultural Industries		10	7	6	2	3	5	4	8	9	1
FIRE*		9	10	3	7	2	4	1	5	8	6
Professional, Scientific and Technical Services		1	8	7	10	3	2	9	5	4	6
ASWMR**		5	7	1	2	8	3	4	6	10	9
Arts, Entertainment and Recreation		8	10	3	5	6	7	1	2	4	9
Accommodation and Food Services		5	10	3	9	7	2	8	4	1	6
Other Services (Except Public Administration)		10	7	1	5	9	4	8	3	6	2
Absolute Equally Weighted Average Rank		6.1	6.5	4.7	5.7	5.5	4.1	5.0	5.4	4.9	7.2
<b>Equally Weighted Business Sector Rank</b>		<b>8</b>	<b>9</b>	<b>2</b>	<b>7</b>	<b>6</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>3</b>	<b>10</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Appendix Table 8: Capital Intensity Growth by Province at the Two-Digit NAICS Level, 1997-2010

## A) Compound annual growth rates, per cent

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>3.0</b>	<b>0.9</b>	<b>3.3</b>	<b>1.7</b>	<b>3.3</b>	<b>1.9</b>	<b>2.0</b>	<b>2.5</b>	<b>4.4</b>	<b>5.0</b>	<b>3.4</b>
Agriculture, Forestry, Fishing and Hunting	2.9	3.8	3.0	0.5	4.0	0.9	1.4	3.0	5.4	5.8	0.5
Mining, and Oil and Gas Extraction	4.1	-2.3	26.5	1.7	2.7	3.4	1.0	4.9	2.2	4.2	7.2
Utilities	0.3	-0.8	2.9	-0.6	2.1	-1.3	1.1	-0.4	1.6	1.0	-0.1
Construction	2.8	3.8	6.7	1.5	1.0	1.8	2.1	3.2	1.7	3.4	3.1
Manufacturing	2.0	1.3	1.8	1.3	2.9	1.4	2.0	1.1	2.5	2.6	2.3
Wholesale Trade	4.7	3.1	3.4	3.7	2.4	6.7	4.4	2.8	1.7	6.1	3.6
Retail Trade	4.3	3.1	5.5	4.1	7.6	3.8	5.1	4.2	2.1	2.6	4.4
Transportation and Warehousing	3.5	6.0	4.0	3.5	7.5	4.8	1.9	2.6	2.6	6.2	2.7
Information and Cultural Industries	0.5	2.2	2.4	1.7	3.9	-2.3	0.2	1.1	6.6	3.8	1.7
FIRE*	2.6	4.8	3.2	0.8	4.8	2.3	2.1	3.5	4.0	3.2	3.6
Professional, Scientific and Technical Services	4.5	5.9	9.1	2.7	5.2	2.9	3.4	1.6	9.1	8.3	5.1
ASWMR**	1.9	-13.0	-6.4	0.9	-8.4	-0.8	3.5	1.6	4.3	5.4	0.2
Arts, Entertainment and Recreation	1.6	-1.4	-9.0	3.6	-5.4	-0.3	0.3	4.6	2.0	4.4	7.8
Accommodation and Food Services	0.4	2.0	0.1	1.0	3.2	0.7	-1.6	-0.4	0.2	1.7	2.5
Other Services (Except Public Administration)	8.5	10.9	9.2	11.2	7.0	8.7	6.9	6.6	7.8	13.4	8.8

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>10</b>	<b>5</b>	<b>9</b>	<b>4</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>3</b>
Agriculture, Forestry, Fishing and Hunting		4	5	10	3	8	7	6	2	1	9
Mining, and Oil and Gas Extraction		10	1	8	6	5	9	3	7	4	2
Utilities		9	1	8	2	10	4	7	3	5	6
Construction		2	1	9	10	7	6	4	8	3	5
Manufacturing		9	6	8	1	7	5	10	3	2	4
Wholesale Trade		7	6	4	9	1	3	8	10	2	5
Retail Trade		8	2	6	1	7	3	5	10	9	4
Transportation and Warehousing		3	5	6	1	4	10	8	9	2	7
Information and Cultural Industries		5	4	6	2	10	9	8	1	3	7
FIRE*		1	6	10	2	8	9	5	3	7	4
Professional, Scientific and Technical Services		4	1	9	5	8	7	10	2	3	6
ASWMR**		10	8	5	9	7	3	4	2	1	6
Arts, Entertainment and Recreation		8	10	4	9	7	6	2	5	3	1
Accommodation and Food Services		3	8	5	1	6	10	9	7	4	2
Other Services (Except Public Administration)		3	4	2	8	6	9	10	7	1	5
Absolute Equally Weighted Average Rank		5.7	4.5	6.7	4.6	6.7	6.7	6.6	5.3	3.3	4.9
<b>Equally Weighted Business Sector Rank</b>		<b>6</b>	<b>2</b>	<b>8</b>	<b>3</b>	<b>10</b>	<b>8</b>	<b>7</b>	<b>5</b>	<b>1</b>	<b>4</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation

Appendix Table 9: Relative Capital Intensity Levels by Province at the Two-Digit NAICS Level, 2010

## A) Province's Capital Intensity Level as a Share of Canada's

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>	<b>100.0</b>	<b>134.4</b>	<b>63.4</b>	<b>61.4</b>	<b>75.7</b>	<b>84.3</b>	<b>88.6</b>	<b>75.9</b>	<b>154.6</b>	<b>169.3</b>	<b>85.0</b>
Agriculture, Forestry, Fishing and Hunting	100.0	143.7	110.6	72.8	93.4	82.0	75.8	106.9	143.3	132.4	78.6
Mining, and Oil and Gas Extraction	100.0	206.8	22.0	73.9	9.1	11.4	31.2	36.6	137.9	112.2	143.7
Utilities	100.0	66.5	95.7	105.8	82.9	133.2	67.9	84.9	117.8	162.8	121.0
Construction	100.0	129.4	30.9	55.9	52.6	122.4	67.6	52.2	128.6	170.5	90.3
Manufacturing	100.0	44.1	97.8	61.3	105.0	82.3	117.5	52.2	102.2	107.6	82.9
Wholesale Trade	100.0	100.0	61.9	77.1	100.7	100.1	100.7	111.5	145.6	131.3	66.2
Retail Trade	100.0	60.0	88.4	69.6	104.6	94.8	122.2	99.8	74.8	81.6	85.5
Transportation and Warehousing	100.0	77.1	57.4	56.0	98.3	89.0	72.9	95.0	185.6	199.2	93.6
Information and Cultural Industries	100.0	165.3	229.2	124.0	150.9	85.6	89.0	140.1	184.9	139.7	100.8
FIRE*	100.0	112.8	83.6	77.1	96.8	100.2	99.9	90.8	80.5	109.5	103.2
Professional, Scientific and Technical Services	100.0	90.3	73.3	87.1	101.2	112.1	78.3	76.0	96.1	193.4	85.5
ASWMR**	100.0	25.6	21.6	68.7	36.6	81.0	128.0	57.4	102.2	131.3	58.5
Arts, Entertainment and Recreation	100.0	62.5	49.9	104.6	56.9	115.3	81.4	113.2	43.4	100.2	168.6
Accommodation and Food Services	100.0	102.3	85.7	91.3	111.8	87.7	90.9	75.0	108.2	143.6	107.1
Other Services (Except Public Administration)	100.0	138.1	38.8	85.4	52.6	109.7	89.9	90.6	86.0	121.9	106.5

## B) Ranking

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
<b>Business Sector</b>		<b>3</b>	<b>9</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>4</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>5</b>
Agriculture, Forestry, Fishing and Hunting		1	4	10	6	7	9	5	2	3	8
Mining, and Oil and Gas Extraction		1	8	5	10	9	7	6	3	4	2
Utilities		10	6	5	8	2	9	7	4	1	3
Construction		2	10	7	8	4	6	9	3	1	5
Manufacturing		10	5	8	3	7	1	9	4	2	6
Wholesale Trade		7	10	8	5	6	4	3	1	2	9
Retail Trade		10	5	9	2	4	1	3	8	7	6
Transportation and Warehousing		7	9	10	3	6	8	4	2	1	5
Information and Cultural Industries		3	1	7	4	10	9	5	2	6	8
FIRE*		1	8	10	6	4	5	7	9	2	3
Professional, Scientific and Technical Services		5	10	6	3	2	8	9	4	1	7
ASWMR**		9	10	5	8	4	2	7	3	1	6
Arts, Entertainment and Recreation		7	9	4	8	2	6	3	10	5	1
Accommodation and Food Services		5	9	6	2	8	7	10	3	1	4
Other Services (Except Public Administration)		1	10	8	9	3	6	5	7	2	4
Absolute Equally Weighted Average Rank		5.3	7.6	7.2	5.7	5.2	5.9	6.1	4.3	2.6	5.1
<b>Equally Weighted Business Sector Rank</b>		<b>5</b>	<b>10</b>	<b>9</b>	<b>6</b>	<b>4</b>	<b>7</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>3</b>

\* Finance, Insurance, Real Estate and Renting and Leasing \*\* Administrative and Support, Waste and Remediation