

# Economic Spotlight

## Working Smarter: Productivity in Alberta

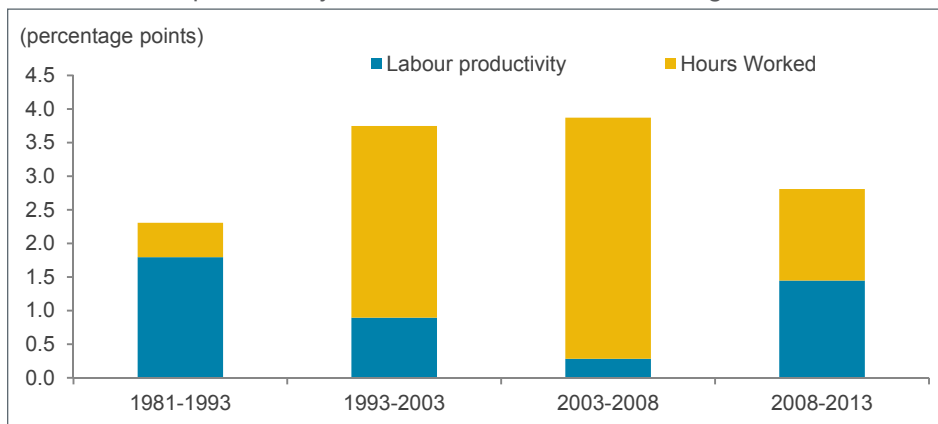
### Why Productivity Matters

“Productivity isn’t everything, but in the long run it is almost everything. A country’s ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker.”<sup>1</sup> Paul Krugman, Nobel Prize winner in economics, is not alone in his appreciation for productivity. Michael Porter, a Harvard expert on competitiveness, says that the “fundamental

<sup>1</sup> Paul R. Krugman, *The Age of Diminished Expectations* (Cambridge: MIT Press, 1994).

### Chart 1: Labour input has made a large contribution to Alberta’s growth

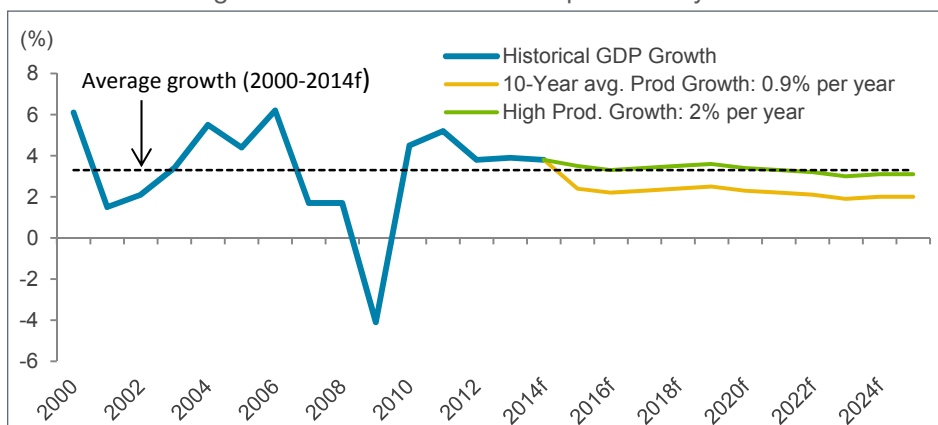
Contribution of productivity and hours worked to real GDP growth



Source: Statistics Canada

### Chart 2: Alberta’s future growth depends on productivity

Alberta real GDP growth under different labour productivity scenarios



Sources: Statistics Canada and Alberta Treasury Board and Finance

source of long-term prosperity is the productivity with which a nation can utilize its human, capital and natural resources.”<sup>2</sup>

The importance of productivity stems from its link to economic prosperity, or living standards. In general, there are two main ways to boost living standards in the long run. One is by increasing labour effort: encourage people to work longer hours, or to enter the workforce. The other way is by making labour more productive; that is, increase the economic value (i.e., Gross Domestic Product (GDP)) generated for every hour worked. Of the two options, labour productivity is the only sustainable way to increase living standards over long periods of time.<sup>3</sup> The logic is quite simple: for each person to earn more, they need to produce more or higher valued goods and services.

Alberta’s productivity level is impressive (44% above Canada’s in 2013); however, Alberta’s labour productivity growth rate has lagged over the last 15 years, falling below the national and US growth (see section titled: “Productivity growth has lagged”). As such, most of Alberta’s high economic growth can be attributed to increased hours worked as opposed to improvements in labour productivity (Chart 1). This reliance on labour cannot be sustained in the

<sup>2</sup> Michael Porter in *Competitiveness Index: Where America Stands*, Council on Competitiveness, 2007.

<sup>3</sup> Higher living standards can also be achieved through stronger terms of trade, or the price Alberta receives for its exports relative to its imports. Persistent improvement in terms of trade, when not accompanied by productivity growth, cannot be counted on to improve living standards in the long-run.

future, making productivity growth more imperative than ever before.

### A Tight Labour Market Meets an Aging Population

#### The impact of aging is still to come

Aging has long been discussed as a critical issue, but the impact has hardly been felt to date. The oldest of the large baby boomer cohort reached the traditional retirement age of 65 only three years ago. This means that most baby boomers are still working and providing a much needed source of labour. However, over time, older Albertans will eventually withdraw from the workforce, leaving a critical gap that will be difficult to fill. By 2034 it is projected that nearly a quarter of Alberta's working age population will be over 65, more than two-thirds higher than today's share even with continued inflows of young migrants. With an aging workforce, remaining workers will need to be more productive to support higher living standards for both themselves and their retired peers.

#### How much more could Albertans work?

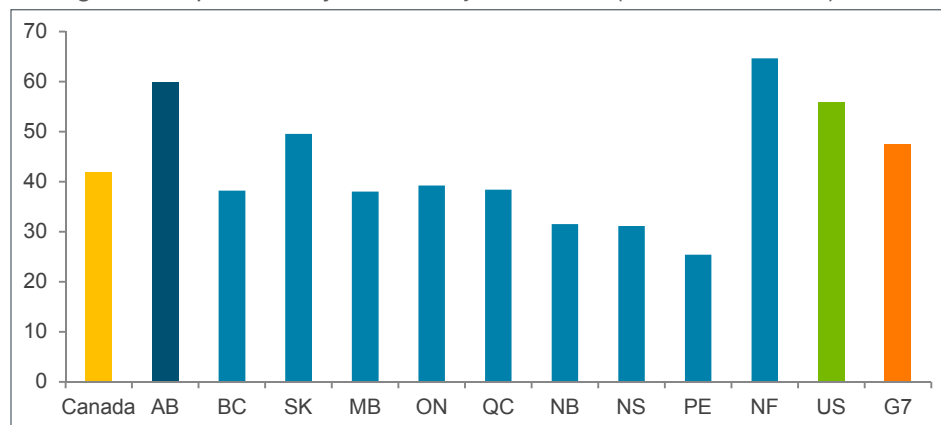
Overall, Alberta's workforce is already stretched. As a share of the working age population, no other province has near the same level of employment. The province has a 4.5% unemployment rate as of October 2014, the second-lowest among provinces. In 2013, this rate was fourth-lowest among all Canadian provinces and US states using the US definition of unemployment. Furthermore, in no other province do workers, on average, work longer hours than in Alberta. While there are opportunities to increase workforce participation among under-represented groups, such as Aboriginals, youth and persons with disabilities, population aging will put major constraints on the province's already-tight labour market.

### What happens if productivity growth does not improve?

The impact of lagging productivity on Alberta's economy is significant. Alberta's productivity growth rate will determine whether the province can sustain strong GDP growth in the long run. Chart 2 shows Alberta's economic growth under alternate labour productivity assumptions. Population aging is built into the forecast, weighing on labour force participation rates and hours worked. The only thing different in each scenario is how much productivity grows. Assuming Alberta's productivity growth averages what it did over the past decade at 0.9% a year, long-term growth falls to around 2% a year, down from the 3.3% average between 2000 and 2014. To average over 3% growth over the next decade, labour productivity would have to grow at twice the pace it did in the previous decade.

### Chart 3: Alberta's productivity level compares well with other jurisdictions

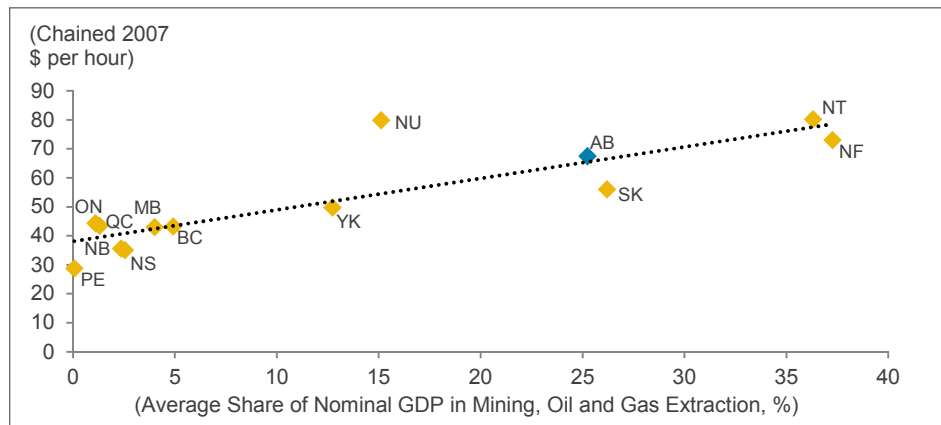
Average labour productivity in various jurisdictions (2013, 2005 PPP\$)



**Source:** Statistics Canada, The Organization for Economic Cooperation and Development with Alberta Treasury Board and Finance calculations  
**PPP** Purchasing Power Parity

### Chart 4: Mining, oil and gas supports higher labour productivity

Productivity versus GDP share in mining, oil and gas extraction (2008-2013)



**Source:** Statistics Canada

## How Is Alberta Doing?

### The energy sector supports high levels of labour productivity

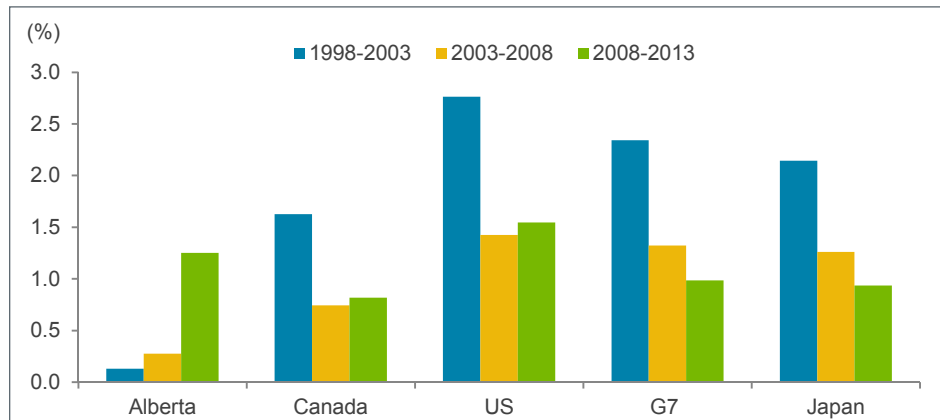
Alberta fares very well in terms of its productivity levels. From 2008 to 2013, Alberta had the second-highest average level among the provinces, behind Newfoundland and Labrador, another energy focused economy. Internationally, Alberta also compares well with other jurisdictions, with its productivity levels exceeding the United States and G7 country average (Chart 3).

Alberta’s productivity advantage is fairly broad based, with its productivity levels surpassing Canadian levels in almost every major industry. A major driver for this is Alberta’s relatively high investment in machinery and equipment (M&E) per worker, which is likely a response to higher labour costs in the province. As shown in the April 2014 *InFocus*, high M&E ratios are observed across many industries.

Most of Alberta’s high productivity is due to the energy sector. Mining, oil and gas extraction is Alberta’s most economically significant industry, contributing 23% percent of the province’s nominal GDP in 2013. This industry’s productivity is driven higher by high capital intensity

### Chart 5: Alberta lags US productivity growth

Average productivity growth rates in different jurisdictions



Source: Statistics Canada, The Organization for Economic Cooperation and Development with Alberta Treasury Board and Finance calculations

and the economic rents captured through extraction. Other Canadian provinces with prominent mining, oil and gas extraction industries (namely Newfoundland and Labrador, and Saskatchewan) also have higher productivity levels (Chart 4).

### Growth has lagged

In the past, Alberta’s productivity growth has lagged other Canadian provinces. Over the last 15 years, Alberta’s productivity growth ranked among the lowest of all of the Canadian provinces. The good news is that Alberta’s growth

rate is showing signs of improvement. For the period of 2008-2013, Alberta’s growth rate increased to the point of outpacing all Canadian provinces except Manitoba.

In a global context, however, Alberta’s productivity growth has continued to lag the United States. As a result, Alberta’s productivity advantage over the US has diminished.

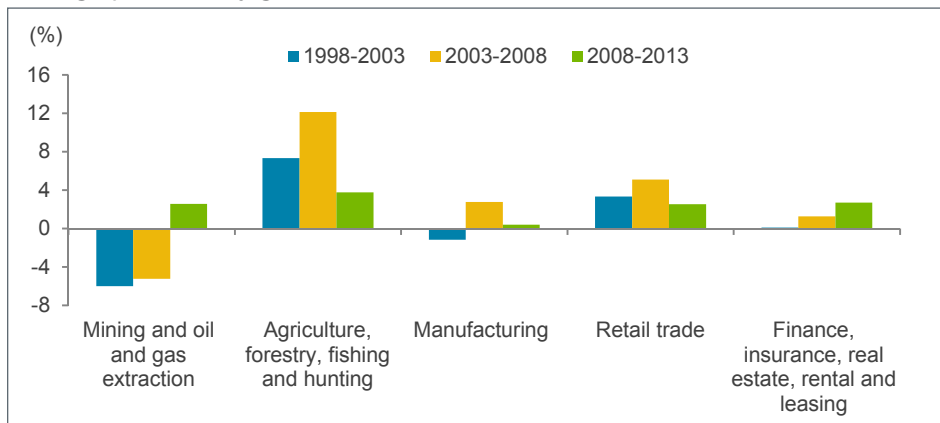
### The role of the energy sector

Alberta’s economy has certain unique industry features which help explain why its productivity growth has been weak until recently.

The mining, oil and gas extraction industry has had a major influence on Alberta’s productivity growth.<sup>4</sup> Over the period from 1998 to 2008, the industry’s productivity fell by an average of 6.1% annually, even though most of Alberta’s other major industries experienced positive productivity growth. However, mining, oil and gas extraction’s growth began to improve over the period

### Chart 6: Mining, oil and gas impacts Alberta’s productivity growth

Average productivity growth of various Alberta industries



Source: Statistics Canada

<sup>4</sup> The Centre for the Study of Living Standards (CSLS) draws a similar conclusion respecting productivity growth from 1997-2010. See CSLS’s “The Alberta Productivity Story, 1997-2010” (Sept. 2012).

from 2008 to 2013, with productivity increasing on average 2.6% annually (Chart 6). These patterns reflect the type and phase of energy development in the province.

Three interrelated forces have influenced the industry’s falling productivity over the 1998-2008 period:

**i. The shift from conventional oil production to oil sands production**

Over this period, the oil industry saw a shift from conventional oil production to oil sands production (Chart 7). Oil sands production, particularly from surface mining, is more labour-intensive than conventional production. It is highly probable that this shift lowered productivity by increasing the labour required per barrel of oil.

**ii. Long lead times between oil sands investment and production**

Oil sands development requires large capital investments which are labour-intensive and do not have immediate output. The lag between when capital investments takes place and when production occurs has likely weighed down the energy sector’s productivity in the short term.

The lag between investment and production is evident when comparing the periods of 2003-2008 with the period of 2008-2013 (Chart 8). In 2003-2008, there was a tremendous growth in capital expenditure for the mining oil and gas extraction industry without a corresponding increase in energy sector real GDP. However in 2008-2013, the energy sector’s real GDP increased substantially, even though capital expenditure growth had slowed.

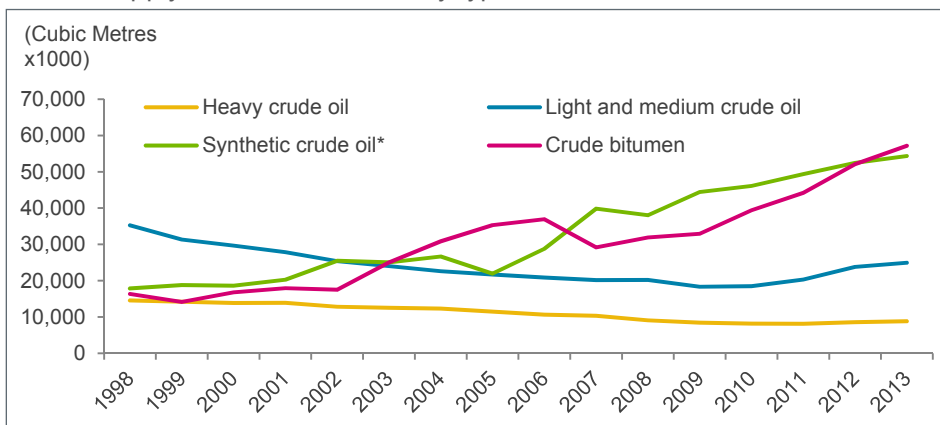
**iii. Increased construction activity**

Investments in the oil sands have increased the relative size of the construction industry in Alberta. In 2002, the construction industry accounted for only 7.7% of nominal GDP, but by 2013, its share increased to 10.9%. This could have had a negative impact on Alberta’s productivity, as the construction industry tends to have relatively low productivity levels.

These factors suggest that productivity is likely to improve in the industry as more oil sands operations come on line and more production comes from in-situ methods (which are less labour-intensive than surface mining). This already appears to be taking place with average annual productivity growth in mining, oil and gas extraction increasing over 2008-2013. Additionally, future technological improvements in extraction processes could further increase productivity in this industry.

**Chart 7: Oil production shifts from conventional to oil sands**

Annual supply of Alberta crude oil by type

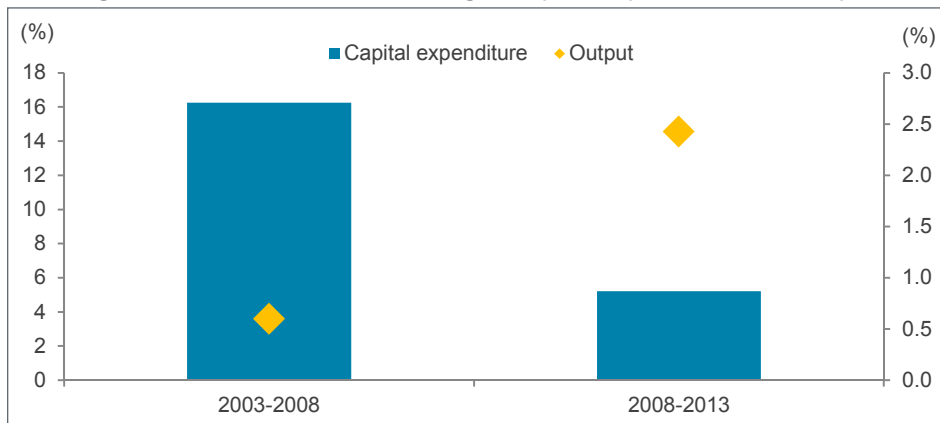


Source: Statistics Canada

\* Synthetic crude is primarily derived from bitumen.

**Chart 8: Long lead time between investment and oil sands production**

Annual growth rates of Alberta oil and gas capital expenditure and output\*



Source: Statistics Canada

\* Output is real GDP (2007) dollars.

## Canada's Productivity Struggles

Alberta's modest productivity growth over the last decade has mirrored a broader Canadian trend. Canada has long lagged behind the US in productivity growth, but the last 5-10 years have been particularly disappointing. Between 2003 and 2013, Canada's growth slowed to a mere 0.8% a year, below the 1.5% pace in the US. Comparing Canada with other advanced countries reveals a similar pattern (Chart 9). As a result of Canada's chronic under-performance, the gap between US and Canadian labour productivity levels has been on the rise. According to the Organization for Economic Cooperation and Development, the differential has widened from about 14% in 1980 to 26% as of 2013 (Chart 10).

Understanding the source of Canada's productivity struggles is complicated. Productivity is a multi-dimensional issue, and there is no "silver-bullet" solution. However, over the last decade, economists have uncovered some findings that may help explain Canada's under-performance relative to the US.

### Lack of Business Innovation

Productivity growth can be decomposed into contribution from workforce skills, investment in capital and a measure called multi-factor productivity (MFP). Much of MFP is believed to arise from business innovation: finding better ways to extract value from capital and labour resources. Low MFP growth has been primarily responsible for Canada's weak labour productivity growth since 1980, and many see this as a reflection of weak business innovation performance<sup>5</sup>.

### Low Business Research and Development (R&D)

Technological change is facilitated through R&D, and improvements in

productivity are typically seen when businesses invest in the creation of new knowledge. However, in Canada, business investment in R&D as a share of GDP has fallen below that of the US for the last two decades, with the country ranking 23rd among 36 developed and developing countries.<sup>6</sup>

### Education and Skills Intensity

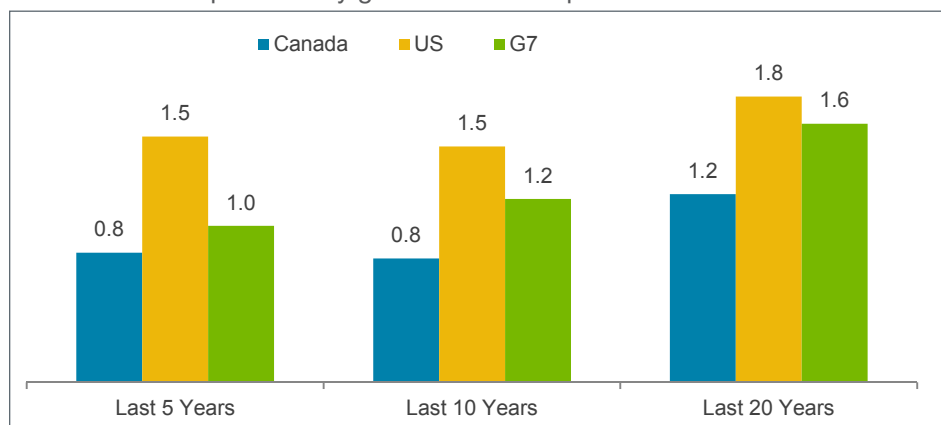
Canada has a highly educated workforce and, overall, ranks ahead of the US in terms of the proportion of post-secondary graduates within the population<sup>7</sup>. However, it produces fewer university graduates than the US across all major fields

<sup>6</sup> For further analysis, See Institute for Competitiveness and Prosperity (2011), "Canada's innovation imperative", Report on Canada, June.

<sup>7</sup> Sharpe, A. (2010) "Unbundling Canada's Weak Productivity Performance: The Way Forward", CSLRS Research Report 2010-02.

**Chart 9: Canada's lagging productivity growth**

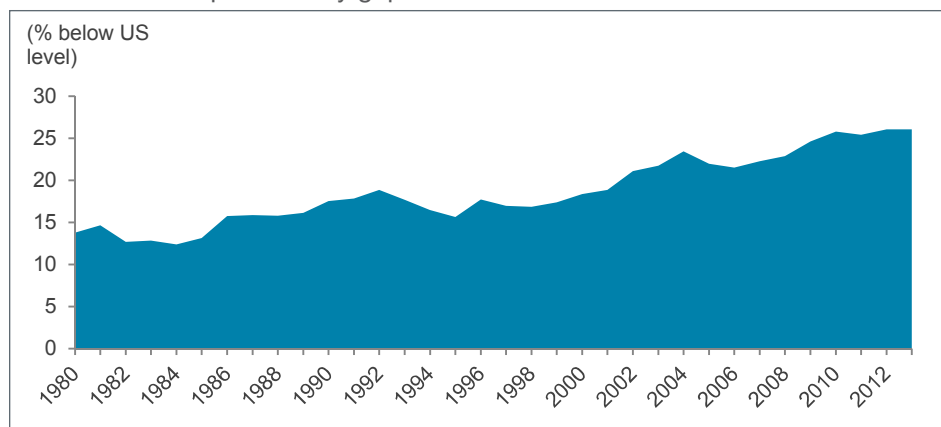
Canada's labour productivity growth rates compared with US and G7 countries



**Source:** The Organization for Economic Cooperation and Development

**Chart 10: Canada's productivity gap with the US has increased**

Canada's labour productivity gap



**Source:** The Organization for Economic Cooperation and Development

<sup>5</sup> Council of Canadian Academies (2009) "Innovation and Business Strategy: Why Canada Falls Short." Ottawa.

of study, and has fewer managers with university education<sup>8</sup>. Another measure of human capital is skills intensity,<sup>9</sup> and again Canada falls short of the US.<sup>10</sup>

### Investment in Machinery and Equipment (M&E)

Research shows a strong link between M&E investment and productivity.<sup>11</sup> Since the 1970s, Canada's investment in M&E (as a share of GDP) has remained among the lowest of the advanced countries.<sup>12</sup> While Canada's relative

<sup>8</sup> As a share of the population for Science & Engineering, Business & Management, and Others. Source: Institute for Competitiveness and Prosperity (2011).

<sup>9</sup> The share of hours worked by persons with a university education in total hours worked.

<sup>10</sup> In the business sector, the skills intensity in Canada is about 64% of that of the US. See Rao, Tang and Wang (2008). "What Explains the Canada-US Labour Productivity Gap?", Canadian Public Policy, Vol. 34, No. 2 (Jun., 2008), pp. 163-192.

<sup>11</sup> Conference Board of Canada finds that investments in M&E has contributed on average 0.5 percentage points to annual GDP growth in OECD countries between 1995 and 2001. See Conference Board of Canada, (April, 2011) "Investment and Productivity: Why is M&E investment important to labor productivity?"

<sup>12</sup> Conference board of Canada (2011) "Investment and Productivity: Why is M&E investment important to labor productivity?" (April 2011).

performance has improved over the last decade, this mainly reflects lower levels of investment in some peer countries. One estimate suggests that the M&E intensity gap accounts for about 20% of the productivity gap between Canada and the US.<sup>13</sup>

### Future Research Directions

Although current research has identified some contributors to Canada's low productivity, the problem is still not well understood. To date, most productivity research has focused on aggregate macro level data; however, little research has looked into firm-level behaviour that drives the overall productivity numbers. Prominent Canadian productivity researcher Don Drummond believes that future research must shift focus to firm-level behaviour in order to gain a better understanding of the causes of Canada's stagnant productivity.<sup>14</sup>

### Conclusion

In the past, Alberta has utilised more labour to support most of its GDP growth. However, as Alberta's tight

<sup>13</sup> Rao, Tang and Wang (2008) "What Explains the Canada-US Labour Productivity Gap?", Canadian Public Policy, Vol. 34, No. 2 (Jun., 2008), pp. 163-192.

<sup>14</sup> Drummond, Don (2011), "Confessions of a Serial Productivity Researcher", International Productivity Monitor N. 22, CSLS.

labour market confronts an aging population, this reliance on labour will be difficult to maintain. In short, Albertans will have to work smarter not harder.

Although Alberta has one of the highest productivity levels in Canada, its productivity growth rate is the key to maintaining this advantage in the future. Alberta's labour productivity growth has been weak over the past 10 years. Much of this can be attributed to structural changes in the mining, oil and gas extraction industry. As new production in the oil sands has come on line, Alberta's productivity has begun to improve, and is expected to continue to improve moving forward.

So what to do? Productivity is often seen as doing more of the same with less. This is a very limited view. In fact, more investments in existing human resources, including training and experience, can go a long way to bolster an organization's productivity and bottom-line. Similarly, using existing staff in more effective ways to develop new or improved products, services and processes can also generate more value for every hour worked. There is no single solution to bolstering productivity. It is a shared responsibility between industry and government.

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