

# Economic Spotlight

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## **ALBERTA'S ECONOMIC PERFORMANCE: 1994-2004**

### **A review of Alberta's record on growth, innovation & diversification**

#### **INTRODUCTION**

The past decade has seen remarkable gains for the Alberta economy, with strong growth in gross domestic product (GDP), employment and personal incomes. Despite these achievements, questions have been raised in some quarters regarding the sustainability of Alberta's recent success, which is often attributed solely to a booming energy sector. It has been suggested that the Alberta economy has become less diversified, and thus increasingly vulnerable to possible future downturns in energy prices.

Questions have also been raised regarding the degree of innovation in Alberta's economy, and the implications for future economic growth. In particular, emphasis has been placed in two areas where Alberta ranks below Canada's largest provinces: research and development (R&D) expenditures and venture capital funding. It has been contended that, as Alberta's non-renewable resources diminish, Alberta's growth could be constrained by both a lack of innovation and insufficient access to capital for firms involved in high-risk, but potentially high value-added emerging industries.

The purpose of this study is to examine these questions through an integrated assessment of Alberta's recent economic record. This assessment includes key measures of economic performance, innovation and diversification. While the chief focus of the paper is on broad economic trends, the paper also includes a more detailed examination of the R&D and venture capital issues, in view of their prominence in the current public policy debate.

#### **ECONOMIC GROWTH & RELATED INDICATORS**

By almost all broad measures of economic performance, Alberta's record over the past decade (1994-2004) has been exceptional.

- Alberta's real economic growth has averaged 3.6 per cent per year, higher than both the United States (3.2 per cent) and Canada (3.3 per cent).
- In 2004, Alberta's real GDP per capita reached \$42,383 (in constant 1997 dollars). This was 21 per cent above the Canadian average, and 12 per cent ahead of second place Ontario.
- In nominal (current dollar) terms, Alberta's GDP per capita was 45 per cent above the Canadian average in 2004 (\$58,394 vs. \$40,351), and 40 per cent ahead of second-place Ontario.

- Alberta's employment growth has averaged a remarkable 2.9 per cent per year over the past decade, the highest rate of increase of any province, and far above both the Canadian (2.0 per cent) and U.S. (1.4 per cent) growth rates.
- Alberta has experienced the fastest growth in per capita personal incomes, averaging 4.3 per cent annually over the past decade.
- By 2004, Alberta's per capita personal incomes were 15 per cent above the national average, 9.5 per cent ahead of second-place Ontario. A decade ago, Alberta's personal incomes were just 3.1 per cent above the national average, and 4.6 per cent below first-place Ontario.
- Investment levels have been by far the highest in Canada. Non-residential business investment has grown at an average rate of 7.4 per cent per year in real terms – providing a major impetus for Alberta's economic growth. Real non-residential business investment has averaged 23 per cent of Alberta's GDP over the past decade, almost double the comparable share for the Canadian economy (12 per cent).

## **ECONOMIC DIVERSIFICATION**

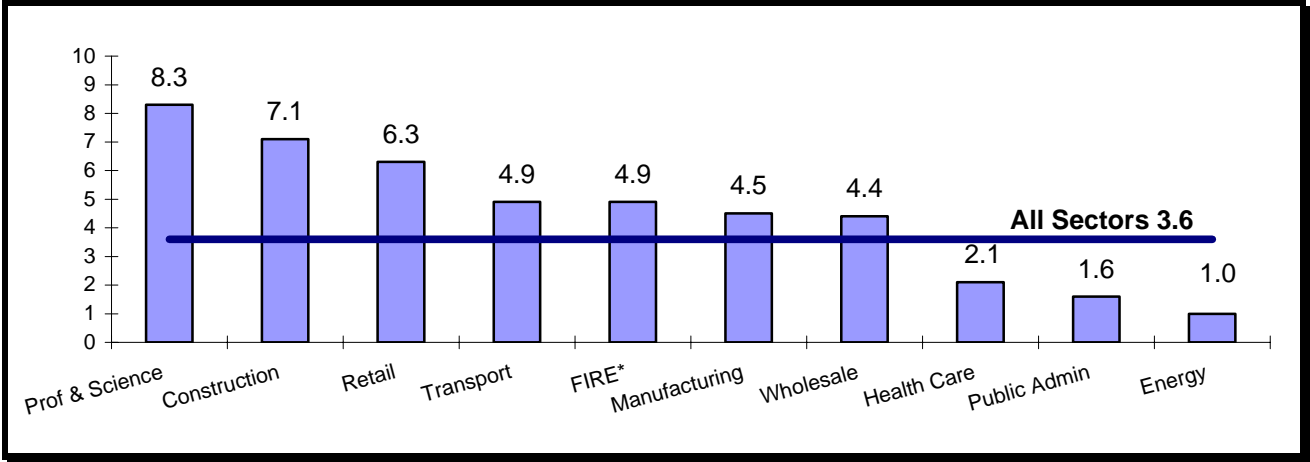
While it is indisputable that high oil and natural gas prices have been an important impetus for Alberta's growth over much of the past decade, it is also true that the composition of Alberta's growth has been broader than is generally acknowledged. A review of real (inflation-adjusted) economic growth rates by industrial sector illustrates this point.

Between 1994 and 2004, real economic growth in the primary energy sector (mining and oil & gas extraction) has been slight, averaging just 1 per cent per year. A steady decline in conventional oil production (30 per cent decline between 1997 and 2004) and a flattening of natural gas production (with 2004 production levels almost identical to those of 1998) have constrained output growth in this sector. Overall growth in Alberta's oil production averaged just 1.1 per cent annually from 1994-2004, slightly below the average growth of natural gas production of 1.5 per cent a year.

With strong provincial economic growth averaging 3.6 per cent annually in real terms, the primary energy sector's share of Alberta's real economic output has declined from 22 per cent in 1994 to 16 per cent in 2004.

Over the past decade, Alberta's real economic growth has been led by other sectors, with strong growth in areas such as manufacturing, retail and wholesale trade, construction and professional, scientific and technical services.

**CHART 1: ALBERTA’S REAL ECONOMIC GROWTH BY SECTOR: 1994-2004  
(AVERAGE ANNUAL PER CENT CHANGE)**



Source: Statistics Canada and Alberta Finance  
\*FIRE-Finance, Insurance, Real Estate, Renting and Leasing

Chart 1 (above) shows real economic growth rates over the past decade for Alberta’s ten largest industrial sectors, which accounted for a combined 82 per cent of Alberta’s real GDP in 2004.

While the strong growth in areas such as construction are unsurprising in view of the large investments in the energy and housing sectors over this period, it is the broad growth in services and manufacturing that is most noteworthy. The professional, scientific and technical services sector has experienced the strongest real growth of any sector in the past decade, averaging a remarkable 8.3 per cent per year. This sector has increased its share of provincial GDP from 3.3 per cent in 1994 to 5 per cent in 2004, up almost two full percentage points. Strong growth has also been achieved in the retail trade, transportation, FIRE (Finance, Insurance and Real Estate), manufacturing and wholesale trade sectors, all of which have averaged real growth of at least 4 per cent annually. These industry growth rates illustrate the continued maturation and diversification of the Alberta economy over the past decade.

Alberta’s industry employment data also highlights these trends. Between 1994 and 2004, the largest per cent increase in employment occurred in the construction (+85 per cent), business (+76 per cent), professional, scientific and technical services (+72 per cent) and wholesale trade (+47 per cent) sectors. Manufacturing and mining, oil and gas sectors both saw employment increases of 44 per cent.

At the same time, Alberta’s industrial composition remains distinct from that of other provinces. The sheer magnitude of the province’s energy industry means that other sectors tend to occupy smaller share of the economy than in most provinces. Alberta’s mining, oil and gas sector presently accounts for more than 16 per cent of Alberta’s real GDP, but less than 1 per cent of GDP in both Ontario and Quebec, and a 2.9 per cent share in British Columbia.

Notwithstanding the consistently strong growth of Alberta's manufacturing sector, the large industrial economies of Ontario and Quebec continue to have significantly larger manufacturing bases. Manufacturing presently accounts for 21 per cent of economic output in Ontario and Quebec. In Alberta, the manufacturing sector accounts for approximately 10 per cent of economic output.

**TABLE 1: PROVINCIAL INDUSTRY COMPOSITION (AS A PER CENT OF 2004 GDP)**

	<b>B.C.</b>	<b>Alberta</b>	<b>Ontario</b>	<b>Quebec</b>
<b>FIRE</b>	<b>22.3</b>	<b>17.3</b>	<b>21.9</b>	<b>17.0</b>
<b>Manufacturing</b>	<b>11.9</b>	<b>9.9</b>	<b>21.0</b>	<b>21.2</b>
<b>Construction</b>	<b>5.9</b>	<b>8.3</b>	<b>5.2</b>	<b>5.8</b>
<b>Professional &amp; Scientific</b>	<b>4.0</b>	<b>5.0</b>	<b>5.1</b>	<b>4.0</b>
<b>Mining, Oil and Gas</b>	<b>2.9</b>	<b>16.4</b>	<b>0.7</b>	<b>0.6</b>

*Source: Statistics Canada Provincial Economic Accounts 2004.*

However, strength in one sector of an economy does not necessarily imply weakness in other sectors – a fact that is often obscured by industry share data. In this connection, it is worth noting the following:

- Alberta has the highest per capita economic output of any province in five of the eight largest sectors: Professional, scientific and technical services (\$2,020), retail trade (\$2,136), transportation (\$2,370) and construction (\$3,405), as well as mining, oil and gas (\$6,385).
- In the FIRE sector, Alberta's economic output per capita is the second highest among the provinces at \$7,069 in 2004, after Ontario (\$7,633).
- In manufacturing, Alberta's output per capita is the third highest among provinces, at \$4,033 (after Ontario and Quebec).

In short, Alberta has a broader economic base than is generally acknowledged. Although the energy sector remains very important to Alberta's economy, it represents a smaller share of real economic output than it did ten years ago. The record of the past decade shows a gradual yet significant shift away from primary resources, in favour of services and manufacturing.

A further point on diversification merits mention. In addition to representing a declining share of the province's real economic output, Alberta's energy sector has itself become an increasingly steady source of economic activity, as oil sands has overtaken conventional oil as the primary source of production. A decade ago, conventional oil accounted for more than 70 per cent of Alberta's total oil production. However, between 1994 and 2004, non-conventional production rose from a 29 per cent share of production to a 62 per cent share. In the process, Alberta's oil industry has undergone a dramatic transformation, increasingly dominated by long-term investments in oil sands projects, which typically have operating horizons measured in decades. Compared to conventional oil production, these investments are far less subject to short-term price-induced fluctuations in activity, and are a much more predictable source of long-term economic growth.

## **Productivity**

Alberta continues to have Canada's most productive economy. In 2004, Alberta's labour productivity was the highest of any province, at \$60.60 in real GDP per hour worked (measured in constant 1997 dollars). This was almost 11 per cent above the national average.

However, Alberta's productivity growth has slowed in recent years. Over the past decade (1994-2004), Alberta's labour productivity growth has averaged 0.7 per cent per year, well below the Canadian average of 1.7 per cent growth. This is due mainly to developments in Alberta's energy sector. The depletion of high-productivity conventional wells has led to declining conventional crude production and flattening natural gas production, with lower real economic returns per unit of oil and gas produced.

Between 1994 and 2004, average production per well fell by roughly 50 per cent for both conventional oil and natural gas. Conventional oil production was down by half, from 5.2 cubic meters per well per day in 1994 to 2.6 cubic meters in 2004, while natural gas experienced a 54 per cent decline, from 3,438 cubic meters per well in 1994 to 1,587 cubic meters in 2004.

Massive recent investments in oil sands (over \$28 billion in the 2000-2004 period alone, nearly quadruple their previous 5-year total) are only just beginning to be reflected on the production side. Lags between oil sands investment and associated oil production have likely had a significant impact on Alberta's productivity growth in recent years, although this dampening effect will be temporary in nature. As a result of the recent investments, significant productivity gains are expected in the energy sector, with large amounts of new production coming on stream in the next few years. Oil sands production is expected to nearly double from 2004 levels by 2009, while recent rapid increases in non-conventional natural gas exploration (e.g. natural gas in coal) hold significant potential for future gains in this area.

Excluding the energy sector, Alberta's total factor productivity growth in all other sectors has been estimated at a healthy 2.0 per cent per year between 1994 and 2004 (Alberta Finance estimate, 2005).

## **ALBERTA'S RECORD ON INNOVATION**

### **Introduction**

Innovation is a key contributor to productivity growth, and thus ultimately to economic growth. In economic terms, innovation refers to the creation or adoption of new technologies, products, or processes that result in higher returns to economic activity.

With declining production in Alberta's conventional oil and gas sectors, future productivity and economic growth will likely have to be generated from other sources, both within and outside the energy sector.

The preceding review of Alberta's recent economic performance suggests that this evolution is already occurring. This conclusion is supported by the strong average productivity growth and real economic growth in Alberta's non-energy sectors over the past decade, as well as the projected impact of major investments (recent and planned) in the non-conventional energy sector.

## **Measuring Innovation**

While the economic importance of innovation is universally recognized, the approaches used to measure and evaluate innovation vary widely. Some studies focus on innovative inputs relating primarily to 'high-tech' sectors (e.g. research and development (R&D) expenditures). However,

“The reality is that innovation occurs throughout the economy, not just the high tech sector. Any comprehensive measure of innovation would have to look at the economy as a whole.” (THECIS Discussion Paper: “Measuring Innovation” (2002))

There is no single indicator that fully captures the amount of innovation in an economy. The OECD employs a number of economy-wide measures, including productivity growth, investment levels, patent performance and R&D expenditures, among other measures.

The present review takes a similarly broad approach, examining a variety of measures that are frequently used as indicators of innovative activity. The measures include innovation outputs in the form of patents, inputs to innovation such as research and development (R&D) expenditures, broader 'proxy' measures of innovative activity such as capital investment, and more general conditions and factors that may be expected to foster and support innovation, such as tax competitiveness and business costs.

## **Output Measures**

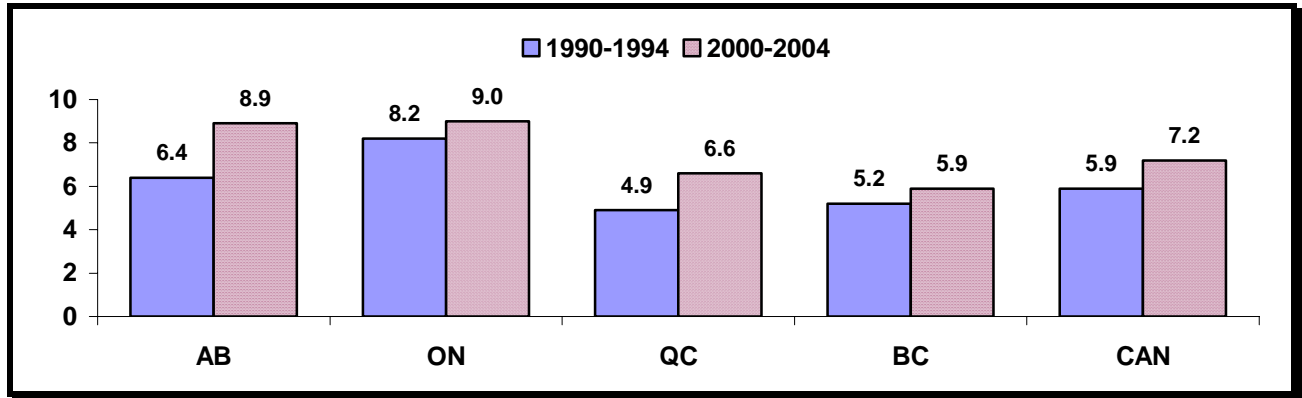
Patents are the most direct measure of the effectiveness of innovative activity in an economy. Patents are “considered to be the most available, objective and quantitative measure of innovation output...and an indicator of the strength of (an economy's) research enterprise and of its technological strengths.” (Industry Canada: *Trends in R&D, Patents and other Measures of Innovation*).

While not all innovative activity is patented (or patentable), patent data provides one useful measure of innovation, particularly with respect to 'leading edge' activity for both product and process development.

Over the most recent 5-year period (2000-2004), Alberta has averaged 277 patents granted per year, accounting for 12 per cent of total Canadian patents granted, well in excess of Alberta's share of Canada's population (10 per cent). Alberta's average of 8.9 patents granted per 100,000 population is 23 per cent above the national average, and only slightly behind first-place Ontario (at 9.0 patents per 100,000 population). Alberta's average number of patents granted was well ahead of third-place Quebec (at 6.6 per 100,000 population) over the past five years.

Alberta's patent performance has improved significantly over the past decade, in both absolute and relative terms. In the comparable 5-year period a decade earlier (1990-94), Alberta had averaged 6.4 patents granted per 100,000 population, 8.5 per cent above the national average of 5.9 patents, but 22 per cent below first place Ontario (at 8.2 patents per 100,000 population).

**CHART 2: CANADIAN PATENTS GRANTED  
(PER 100,000 POPULATION)**

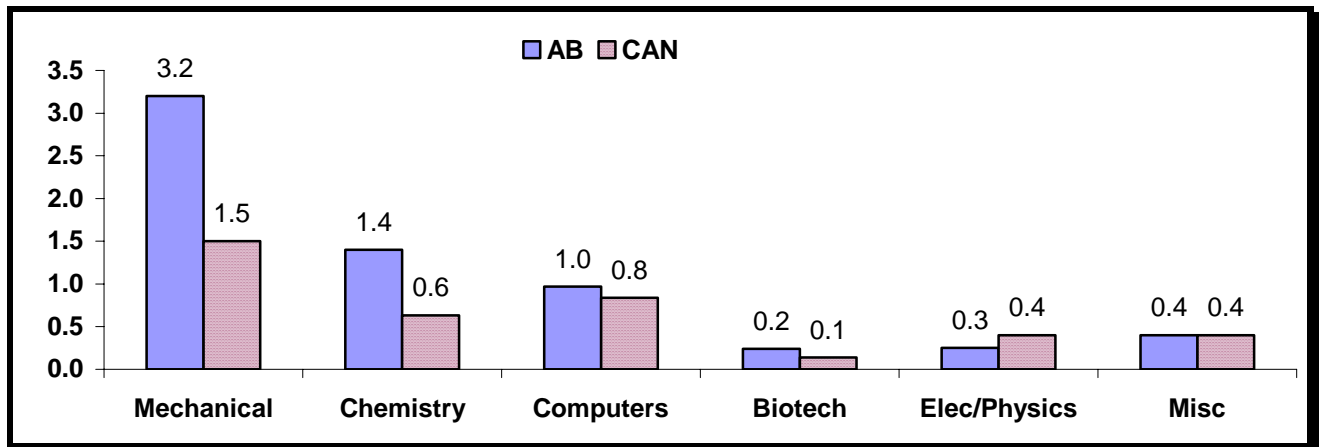


Source: Canada Intellectual Patent Office

In 2004, on a per capita basis, Alberta led all provinces in Canadian patents granted, with 9.4 patents per 100,000 population. Ontario held down second place, with 9.1 patents granted per 100,000 population.

Alberta has shown significant strength in several patent fields in recent years. Over the most recent 5-year period (2000-2004), Alberta led all provinces (on a per capita basis) in Canadian patents granted in the fields of biotechnology, chemistry, and mechanical and civil engineering.

**CHART 3: CANADIAN PATENTS GRANTED TO ALBERTA BY FIELD: 2000-2004  
(PER 100,000 POPULATION)**



Source: Canadian Intellectual Patent Office

In biotechnology, chemistry, and mechanical and civil engineering, Alberta's 5-year average (in patents granted per capita) was more than double the national average in each category, as well as the average of the second place province.

Alberta was third among provinces in computer-related patents, with per capita patents averaging 84 per cent of first-place Quebec, 99 per cent of second place Ontario, and more than double the average of fourth-place British Columbia.

Among the patent fields for which detailed data are reported, Alberta was significantly below the national average in only one category, that of electrical/physics. In this field, Alberta's 5-year average in patents granted was 63 per cent of the national average.

### **Input Measures**

R&D expenditures are one of the input measures used to identify an economy's innovative effort. Although R&D expenditure data provide an indication of R&D trends, they are not a comprehensive measure of either R&D intensity or innovative effort.

R&D expenditures are defined by Statistics Canada as "total intramural expenditures on R&D performed on the national territory during a given period of time". This definition includes all domestic R&D that is funded locally and from abroad, but *excludes* the following: 1) purchase of foreign R&D through licensing agreements; 2) royalty payments for patents; and 3) inflows of R&D through multinational firms operating within the province. By not including the adoption of externally produced R&D, this standard measure of R&D understates the amount of innovative effort in Canada and Alberta.

For example, Statistics Canada reported that Canada spent approximately 2.1 per cent of its GDP on R&D in 2001. This figure does not include expenditures on foreign R&D services, royalties and license fees. However, Statistics Canada has estimated Canada's expenditures on these items to be 0.7 per cent of GDP in 2001 (in comparison, the U.S. spent only 0.15 per cent of its GDP in these areas). By excluding the adoption of foreign R&D, the intramural R&D expenditure data from Statistics Canada underestimated Canadian R&D effort by an estimated \$7.8 billion in 2001.

In this manner, the "domestic" R&D expenditure data from Statistics Canada provides only a partial view of R&D intensity and innovative effort in open economies such as Canada and Alberta.

### **Domestic R&D: Provincial Comparisons**

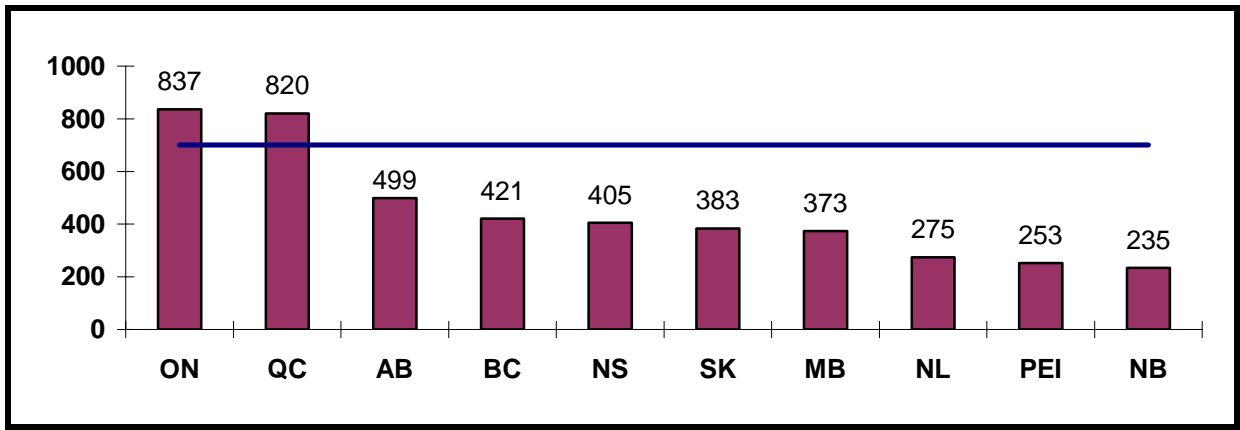
In terms of domestic R&D spending, Alberta's position within Canada depends upon the R&D measure selected, although Alberta ranks well behind Ontario and Quebec in reported R&D spending per capita.

As a percentage of nominal GDP, Alberta's reported total R&D spending averaged 1.04 per cent of GDP in the most recent 5-year period for which data are available (1999-2003). While well below that national average of 1.96 per cent of GDP, this is due mainly to Quebec and Ontario skewing the average with shares of 2.6 per cent and 2.2 per cent, respectively. Excluding these two provinces, the average among other provinces is 1.13 per cent of nominal GDP, similar to Alberta's. Also, Alberta's R&D to GDP ratio is presently reduced by the province's very high nominal GDP (inflated in recent years by very high energy prices). In 2004, Alberta's nominal GDP was over 46 per cent above the national average.

On a per capita basis, Alberta ranked third among provinces in domestic R&D spending over the same 5-year period, with gross domestic expenditures on research and development (GERD) of \$499 per capita. This was well behind both Ontario (\$837) and Quebec (\$820), but 19 per cent ahead of fourth place B.C. and 23 per cent ahead of fifth place Nova Scotia.



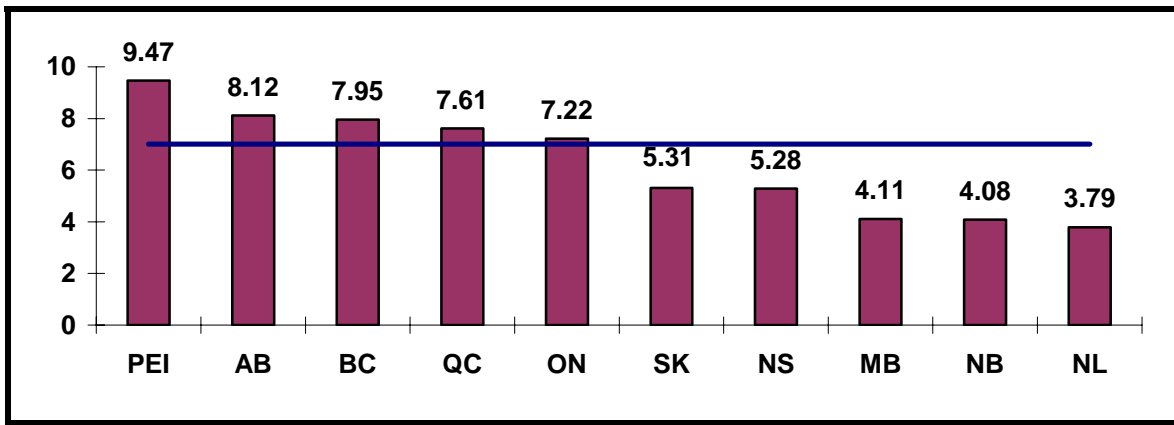
**CHART 5: AVERAGE GROSS DOMESTIC R&D EXPENDITURE: 1999-2003  
(\$ PER CAPITA)**



Source: Statistics Canada

Over the most recent 10-year period for which data are available (1993-2003), Alberta’s total domestic R&D spending increased at an average rate of 8.12 per cent per year. This was the second highest growth rate among provinces, after Prince Edward Island (whose per capita R&D expenditures were approximately 2 per cent of Alberta’s in 2003).

**CHART 6: GROWTH IN DOMESTIC R&D SPENDING: 1993-2003  
(AVERAGE ANNUAL PER CENT GROWTH)**



Source: Statistics Canada

### R&D Employees

As with R&D expenditures, the number of R&D workers is highest in Ontario and Quebec. Alberta ranks third in per capita terms in industrial R&D performers, slightly ahead of B.C. and significantly ahead of the per capita figures in the multi-province regions of “Manitoba and Saskatchewan” and “Atlantic Canada”.

## **Measuring Innovation in Alberta's Energy Sector**

There is strong evidence that the domestic R&D data from Statistics Canada significantly understates the amount of innovative activity that takes place in Alberta's energy sector. Much of this energy sector activity is akin in both purpose and outcome to "research and development", if perhaps not meeting the OECD/Statistics Canada definitions of that term.

For example, R&D expenditures for the mining, oil & gas sector were reported at \$214 million for all of Canada in 2001. Assuming that Alberta's share of these R&D expenditures equaled Alberta's share of the national mining, oil and gas industry, this would imply that Alberta's energy sector committed only about \$150 million - or 0.76 per cent of the sector's GDP, to research and development activities.

With the Alberta energy sector's annual investment levels running in excess of \$20 billion, the Statistics Canada data would suggest that R&D comprised only about 0.8 per cent of total investment in the sector. This clearly assumes a narrow definition of R&D, one that excludes a good deal of innovative activity contributing to production and process improvements that enhance productivity. Also, as noted previously, activities omitted from the published data would include the adoption of foreign R&D, which is likely prevalent among the numerous multinational firms operating in Alberta's energy sector.

As has been noted in a recent paper from the C.D. Howe Institute, Alberta's "oil and gas sector is a focus of high-risk entrepreneurial activity. As currently measured, much of this does not count as R&D, yet in many ways it is economically equivalent to it. In this sense, the Alberta R&D figures do not tell the whole story."

## **CAPITAL INVESTMENT**

*"Given the increasingly global nature of knowledge and innovation, it is eminently clear that focusing exclusively on a "supply side" approach to R&D is inappropriate. In today's world economy, the origin of discoveries is not the issue. Rather, success in technology-led economic growth hinges critically on being able to tap knowledge (whether it is domestic or foreign) and transform it into productive innovation. Canada's status as a small, open economy positions it exceptionally well to exploit international technology flows to spur domestic economic growth."*

*"Recent research indicates the vital importance of investment as a bridge between technology and economic growth. Investment in new machinery and equipment in particular emerges as an important explanatory factor in economic growth"*

[Technology, Taxation and Canada's Competitiveness: Policies for the New Global Economy". Institute for Research in Public Policy (1998)]

Capital investment is a broader 'proxy' measure of innovative activity, as it captures both creation and adoption of new technologies and innovative processes. As noted earlier in the paper, Alberta's investment levels have been exceptionally high in recent years, with real non-residential business investment averaging 23 per cent of GDP over the past decade – more than double the 12 per cent GDP share for all of Canada.

In particular, there is considerable evidence pointing to the importance of investment in machinery and equipment (M&E) as a source of productivity growth. A number of studies have pointed to this indicator as a highly important factor in the productivity gap between the United States and Canada (e.g. Harris, 2005). One study of U.S. productivity indicated that M&E investment had the strongest effect on productivity performance of any of the variables studied, including R&D spending and educational levels (Industry Canada paper, Spring 2001).

Underinvestment in M&E has frequently been cited as a major hurdle that the Canadian economy needs to address in order to match U.S. productivity and income gains. This criticism, however, does not seem to apply to Alberta. Over the past five years (2000-2004), Alberta's M&E investment has been by far the highest in Canada, at \$4,715 per capita. This was 66 per cent above the M&E investment for second-place Ontario (at \$2,842 per capita) and 75 per cent above the national average (\$2,702 per capita).

Alberta's strength in M&E investment is by no means confined to the energy sector. Alberta also ranks number one among provinces in non-energy M&E investment (which accounted for approximately 70 per cent of Alberta's total M&E investment in 2004). At an average of \$3,249 per capita over the past 5 years, Alberta's non-Energy M&E investment was 29 per cent above the national average and 15 per cent ahead of second place Ontario (at \$2,820 per capita).

It is also worth noting that Alberta's advantage in non-energy M&E investment has strengthened considerably over the past decade. In the 4-year period from 1991 to 1994 (data for 1990 are not available), Alberta's non-energy M&E investment was 14 per cent above the national average and second among provinces after Ontario. Alberta's move to the top ranking over the past decade was due to having the fastest rate of growth in non-energy M&E investment among provinces, averaging 7.8 per cent per year (compared to 5.1 per cent growth for Canada and 4.7 per cent for Ontario).

## **CAPITAL ACCESS IN ALBERTA**

Access to funds for the development and commercialization of leading edge products and processes is a key condition for successful innovation. Due to the high-risk nature of start-up ventures, financing for these businesses is often difficult to secure through standard banking institutions. Instead, many new entrepreneurs rely on venture capital in the early stages of their business development.

Concern has been expressed in some quarters regarding the published data on 'formal' venture capital in Alberta. Historically, Alberta has attracted a relatively small share of 'formal' venture capital. This share averaged less than 4 per cent of the national total from 1996-2003, and declined further in 2004. Although the share declined in 2004, Alberta's share of 'formal' Canadian venture capital financing reached 4 per cent in 2005. Considering that Alberta's population is approximately 10 per cent of the Canadian total, these venture capital numbers appear low.

However, recent estimates of Canadian capital financing sources suggest that at least 50 per cent - and as much as 80 per cent - of early stage venture capital is informal in nature (i.e. from business associates, family, friends, etc.). Such informal financing is very difficult to measure,

and is, for the most part, not included in the published venture capital data. The underestimation of Alberta venture capital funding is likely to be especially significant for Alberta, where energy sector venture capital is largely absent from the available data.

Furthermore, it is difficult to reconcile such low levels of 'formal' start-up venture capital funding in Alberta (relative to other provinces) with other, more reliable indicators of Alberta's performance, including its consistently and exceptionally high investment levels.

Overall, present indicators suggest an abundant supply of venture capital in Canada. Total venture capital under management was \$20.7 billion in 2004, more than 50 per cent higher than the level of \$13.6 billion in 2000. Un-invested Canadian venture capital averaged \$5.3 billion from 2001-2003, and the size of available venture capital was estimated at \$4.9 billion in 2004.

Alberta's share of disbursements from venture capital funds is not generally seen by the investment industry as indicating a lack of access to capital for start-up venture companies. A 2002 study commissioned by Alberta Economic Development found that most institutional investors do not see Alberta as having unfilled venture capital needs, concluding that the supply of venture capital in Alberta is sufficient to meet current demand.

In addition, there is evidence that Alberta and Canadian companies are increasingly meeting their equity financing needs through other sources. Between 2001 and 2004, the amount of new venture capital raised in Canada declined steadily, from \$4.5 billion in 2001 to \$1.7 billion in 2004. Although 2005 saw the first increase in funds raised since 2001 (\$2.2 billion in funds raised), it was less than half of the levels reached five years earlier.

Over the same period, however, the amount of new equity capital raised on the TSX Venture exchange jumped almost four-fold, from \$1.1 billion in 2001 to \$4.2 billion in 2004. Over the past three years, TSX venture equity financing has moved from being less than half the magnitude of new private venture capital fund investment to more than two and a half times as large. In 2005, new financing on the TSX venture rose another 47 per cent to \$6.2 billion.

Alberta companies play a very significant role on Canadian stock exchanges. With only 10 per cent of Canada's population, Alberta companies represent 20 per cent of all companies listed on the Toronto Stock and TSX Venture Exchanges. In 2004, approximately 23 per cent of all new listings on these exchanges came from Alberta.

Alberta's junior blind pool capital funds are another growing source of capital for Alberta companies. The Junior Capital Pool Program (CPC) began in 1985, and was the first of its kind in Canada. Over the past 20 years, the CPC has evolved into a highly successful form of public financing, a model that has since been followed by Ontario, Quebec and Nova Scotia.

Alberta companies conducting R&D also have access to the Alberta Heritage Science and Engineering Research Endowment Fund, which was established in 2000 with an initial endowment of \$500 million (since doubled to \$1 billion). The Fund supports the discovery of new knowledge and encourages its applications to benefit Albertans. In addition, Alberta companies have access to the Alberta Heritage Foundation for Medical Research, which supports

biomedical and health research in Alberta. Since 1980, the AHFMR has contributed more than \$780 million directly to the scientific community.

The biotechnology sector provides one illustration of the growth of Alberta's emerging value-added industries. In 2004, Alberta was home to 61 biotechnology companies – up from 9 in 1990 and 21 companies in 2000. The revenues of these companies more than doubled between 2001 and 2003, reaching \$285 million in 2003 (a year in which they raised over \$87 million in financing). The sector has also benefited from the Technology Commercialization Program offered by the Alberta Heritage Foundation for Medical Research, which provides up to \$685,000 in direct early-stage funding to companies, including up to \$500,000 for product commercialization. To date, this program has funded over 250 Alberta projects in excess of \$20 million.

While Alberta's high-tech industries frequently report raising capital as a major challenge, there is no compelling evidence that it is more of a challenge for Alberta companies than for companies in other jurisdictions, or that this challenge is a critical obstacle to growth. Most companies, irrespective of jurisdiction or policy environment, face such capital financing challenges in their early stages of development.

For example, a recent survey sponsored by KPMG revealed that Alberta's wireless and telecom industries are expecting strong growth, despite reporting challenges in financing. Even though 57 per cent of firms reported the ability to obtain funding as their most important challenge, the survey nonetheless showed that 84 per cent of firms intended to increase employment over the next two years, and 70 per cent of firms use internal cash flow to finance their current operations.

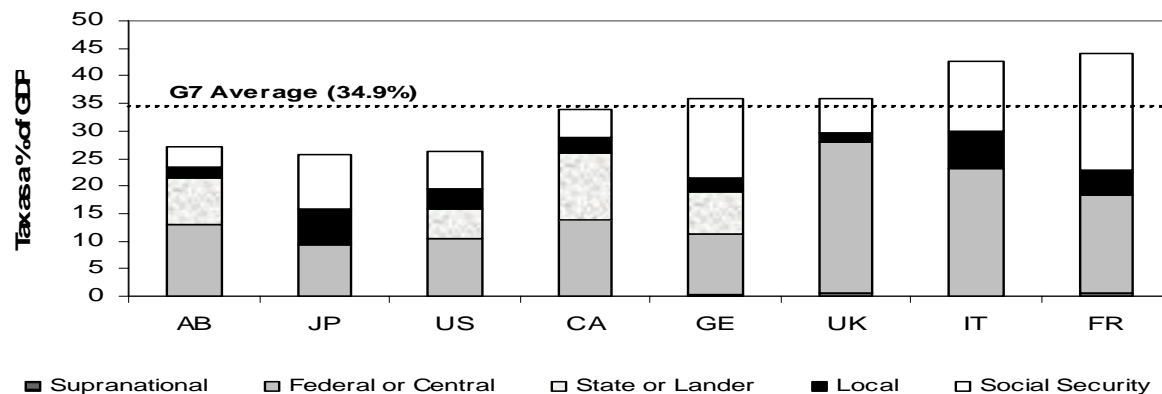
### **TAX COMPETITIVENESS**

In a global economy characterized by increasingly mobile factors of production (both capital and skilled labour), a competitive tax system is widely recognized as necessary condition for fostering and sustaining a climate of innovation.

Alberta's average tax load is by far the lowest of any province in Canada, with provincial tax effort measured at only 77.7 per cent of the national average in 2004-05 - far ahead of second place Nova Scotia (with a tax effort measured at 99.4 per cent of the national average).

Alberta also has competitive taxation by international standards. As a percentage of GDP, Alberta's tax burden is close to the average in the United States, and is lower than almost all other G7 countries.

## Tax as a Percentage of GDP, 2002



Over the past five years, Alberta has made significant strides in strengthening the province’s “tax advantage”. Since 2000, the Alberta government has implemented several major reforms to personal and business taxes, including:

- Lowering the general corporate income tax rate from 15.5 per cent to 10 per cent
- Cutting in half the small business income tax rate (from 6 per cent to 3 per cent), and doubling the income threshold determining eligibility for the small business rate (from \$200,000 to \$400,000).
- Implementing a ‘single-rate’ personal income tax system that increases the incentives and rewards for work effort. This system includes Canada’s lowest top marginal tax rate on personal income, an important factor in attracting skilled workers from other countries and provinces.

### BUSINESS COSTS

Business cost competitiveness is also widely recognized as an important factor in fostering and sustaining an innovative, investment-intensive economy.

Alberta is internationally competitive as a low-cost location for business operations, including in high-technology industries. A recent (2004) KPMG study of after-tax profits and business costs, covering 120 cities in 11 countries, showed that Alberta cities ranked among the most competitive in several categories.

In terms of net profitability after taxes, Edmonton ranked among the 5 top cities in pharmaceuticals, telecommunications equipment, advanced software, medical devices, and oil and gas equipment, while Calgary ranked among the 10 most profitable cities for operations in each of these industries. Similarly, in terms of total costs, Edmonton ranked among the 5 lowest-cost cities for Biomedical R&D, while Calgary was among the 10 lowest-cost cities. In each of these cases, Edmonton’s ranking was better than that of any city in Ontario.

Edmonton had the lowest overall business costs in North America’s Midwest region for all industries, including an average 10.8 per cent cost advantage relative to the United States.

## **SUMMARY**

The Alberta economy has made remarkable strides over the past decade. In addition to its more widely recognized achievements in terms of economic growth, job creation and income gains, Alberta has been a strong performer in terms of innovation, and has also experienced significant economic diversification, with real economic growth being led by manufacturing and services.

Viewed comprehensively, Alberta's record on innovation is far better than is generally realized. This record includes substantial gains in Alberta's patent performance and exceptionally high levels of investment (which encompass both the creation *and adoption* of new technologies). Productivity-enhancing investment in machinery and equipment is much higher in Alberta than in any other province. It has also been shown that Alberta's strong investment performance is not confined to the energy sector, as the province also has easily the highest level of non-energy investment in Canada. Furthermore, Alberta's strong competitive position in terms of both taxes and business costs suggests that conditions are highly favourable for further improvements in Alberta's innovation performance.

While official measures of R&D expenditures indicate Alberta ranking below Canada's two largest provinces, it has been shown that the published R&D data contain significant omissions, and in particular substantially understate the amount of innovative activity in Alberta's energy sector. With regard to another perceived 'weakness' in Alberta's economic record, that of venture capital funding, it has been shown that the available venture capital data misses a great deal of financing activity in the province, and that the balance of evidence does not indicate any shortage of available capital in Alberta.