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# **DIVERSIFICATION OF THE ALBERTA ECONOMY: IN SEARCH OF STABILITY**

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# ALBERTA FUTURES PROJECT PRE-PUBLICATION SERIES

Alberta has a long history of facing serious challenges to its economy, including shocks in the form of resource price instability, market access constraints, and federal energy policies. However, the recent and current challenges seem more threatening. It seems that this time is truly different.

The collapse of oil and gas prices in 2014 combined with the rapid growth of U.S. oil production, difficulties in obtaining approval for infrastructure to reach new markets and uncertainty regarding the impacts of climate change policies world-wide have proven to be strong headwinds for the province's key energy sector. Together, the negative effects on employment, incomes and provincial government revenues have been substantial. To make matters worse, in early 2020 the COVID-19 pandemic struck a major blow to the lives and health of segments of the population and to livelihoods in many sectors. The result has been further employment and income losses, more reductions in government revenues and huge increases in government expenditures and debt. These events, combined with lagging productivity, rapid technological shifts, significant climate policy impacts and demographic trends, call for great wisdom, innovation, collective action and leadership to put the province on the path of sustainable prosperity.

It is in this context that we commissioned a series of papers from a wide range of authors to discuss Alberta's economic future, its fiscal future and the future of health care. The plan is that these papers will ultimately be chapters in three e-books published by the School of Public Policy. However, in the interest of timeliness and encouraging discussion, we are releasing selected chapters as pre-publications.

## 1. INTRODUCTION

Calls for economic diversification in Alberta have become a prominent feature of every significant downturn in the provincial economy and these have become louder in the current circumstance of the twin shocks of low oil prices and COVID-19. In late 2014 benchmark oil prices fell by approximately 50 per cent and remained at those levels until 2019. Then in early 2020, COVID-19 led to a further weakening of these prices which dealt an additional blow to employment and incomes across most sectors in the province. The result has been a very severe downturn in the economy<sup>1</sup> and, with the ever more stringent environmental and market access policies facing the key oil and gas sector, there are concerns that the longer-term prosperity of the province is seriously threatened.

These circumstances have intensified the calls for diversification, presumably to achieve greater stability. But it is typically unclear as to what exactly is meant by 'diversification', how it is measured, what its objectives are, how it is to be attained and the ultimate trade-offs and impacts. Nevertheless, there is broad public support for greater diversification during such periods<sup>2</sup> and this makes diversification policies politically very attractive. In most cases the attraction is based on promises of new or 'better' industries that will change the industrial structure of the region. The promise of new industries materializing may generate political support for such policies. However, the reality is that economic diversification is very complex and difficult to define and measure with the result that diversification strategies, like industrial development strategies, tend to be vague and difficult to put in operation.<sup>3</sup>

This paper begins with a summary of the key elements of effective diversification in the context of various types of economic instability faced by Alberta. While inherently difficult to measure given its many dimensions, some common measurement approaches are applied to assess the level and changes in diversification of the provincial economy. Attention is then turned to the degree, types and sources of economic volatility and, in this context, the potential role of greater diversification in stabilizing the economy is examined. Based on lessons from previous diversification attempts, some general policy guidance is proposed, along with other stabilization policies that warrant attention.

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For example, the decline in Alberta's real (or inflation adjusted) GDP in 2020 was 8.2 per cent and compensation per employee fell by 6 per cent, by far the largest declines among the provinces. (Statistics Canada, Table 36-10-0222-01)

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For example, with the collapse of oil prices in 2015 a poll found that two-thirds of those surveyed believed diversification away from oil and gas should be a priority (<https://www.cbc.ca/news/canada/calgary/poll-pembina-alberta-climate-change-1.3249966>). In a 1987 survey following the dramatic drop in oil prices in 1985 almost three-quarters of Albertans surveyed indicated a preference for greater diversification even if it led to incomes and employment that were lower but on average more stable. Mansell and Percy (1990, p.89).

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Beauregard (1993, p.109) sums it up this way: "The romance with industrial diversification, however, should not be seen as a commitment to marriage. While diversification has much to offer, it is certainly not a panacea. Its goals are muddled, its rationale unsubstantiated, its consequences problematic, and its implementation doubtful. Nonetheless, industrial diversification seems to be unconditionally adopted and praised."

To summarize, by most measures, the Alberta economy has become much more industrially diversified over time than is commonly understood, especially in terms of employment and the diversity of goods and services produced. Currently the level of this diversification is fairly comparable to that in other benchmark provinces such as Ontario, Quebec and British Columbia. However, the province continues to exhibit higher levels of cyclical instability in incomes and value added or Gross Domestic Product (GDP) and, looking forward, there are concerns about secular instability related to long term challenges to the Alberta oil and gas sector.

There is a case for policies to encourage industrial development and growth to address the cyclical and secular instability. However, the more commonly proposed forced growth approaches targeting specific industries are often problematic, particularly given marginal success rates and the potential for large trade-offs resulting in lower productivity, incomes, exports and government revenues. Rather, a broad based approach is better suited and should be focused more on expanding the range of goods and services produced within the existing industrial structure and on market diversification. Further, it is noted that there are effective approaches other than industrial diversification to reduce variability. High on that list are policies to diversify the province's tax base and restore fiscal sustainability. Lastly, the potential secular instability associated with the challenges facing the province's oil and gas sector deserves special attention. This is the highest risk to Alberta's long term prosperity. The province has many strengths of adaptability and innovation developed through previous periods of adversity that will be critical in achieving a successful transition for this dominant sector. Strong leadership and consistent policies that anticipate and support the transition will also be particularly important.

## 2. WHAT IS DIVERSIFICATION?

The common objective of diversification in a regional economy is to reduce instability. In most cases the focus is on changing the industrial structure by adding new industries. The principle is similar to that used to stabilize a financial portfolio. In general, the variability of the portfolio will decline as the number of different company shares held increases, as the proportion of the most volatile shares decreases and as the amount of negative covariance increases (that is, where the prices of the individual company shares move in opposite directions).<sup>4</sup> In the case of a regional economy consisting of a 'portfolio' of various industries, the degree of variability will therefore depend on the number of different industries, their relative size and volatility and the degree to which they move together or in opposite directions. As such, the diversification principle suggests the addition of industries exhibiting lower variability and industries which tend to exhibit negative covariance with the more volatile industries.<sup>5</sup>

<sup>4</sup>

As an approximation, with N individual units, each accounting for 1/N of the portfolio, the portfolio variance will be  $(1/N) \times \text{Average Variance} + (1-1/N) \times \text{Average Covariance}$ . As N increases, the portfolio variance approaches the average covariance.

<sup>5</sup>

An example is where the addition of a petrochemical industry using a natural gas based feedstock (primarily, ethane) helps offset the variability associated with the natural gas producing industry. For instance, in a period of low natural gas prices, the declines in the gas producing industry would be partially offset by the gains in the petrochemical industry as feedstock costs are reduced.

However, in the case of a regional economy these simple notions become much more complicated. First, there are different types and sources of volatility. This could be cyclical variability related to the frequent 'ups and downs' in commodity markets, especially those for internationally traded resource-based products, or related to less-frequent shifts associated with macroeconomic business cycles. In other cases the main concern could be random variability associated with largely unpredictable changes in such things as government policies, in trading relationships or the emergence of a pandemic. Finally, there is the case of secular instability associated with the long term decline of an industry or sector as a result of, for example, technological change, shifts in markets, or government policies that impair competitiveness. The key point here is that to be effective the type of diversification required will depend on the type of instability and, indeed, in many cases the best solutions will involve policies other than those aimed directly at diversification.

A second source of complications arises from the fact that there are different types of diversification. Most commonly, the focus is on diversity with respect to the industrial structure. However, stability is also related to diversity with respect to markets for existing industries, diversity in terms of the range of commodities produced by existing industries and / or the degree of processing of raw commodities in the region.<sup>6</sup>

A third complication arises from the fact that the degree of diversification will depend on which measure of well-being is used. For example, a region could be highly diversified in terms of employment but less so in terms of income or output.

For these (and other) reasons there is not a single definitive and meaningful measure of diversification and its relationship to regional economic stability.<sup>7</sup> Rather, it is necessary to use a variety of indicators to capture the various dimensions and that is the approach taken here. A common measure used across dimensions is a Herfindal (H) index which indicates the degree of concentration in terms of industrial structure, markets, product mix and so on. For example, the normalized version, (denoted  $H^*$ )<sup>8</sup> for the distribution of employment in a region would have a value of one if all employment was in one sector and a value of zero if employment was equally distributed among all sectors. So, the lower the H-index the more diversified is the economy.

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<sup>6</sup> In general, higher levels of processing results in commodities that have less price and quantity volatility than the raw materials used as inputs.

<sup>7</sup> Conroy (1975) provides a good summary of the complications in measuring diversification in a regional context.

<sup>8</sup> The normalized H index, denoted  $H^*$ , =  $(H-1)/(1-1/N)$  where  $H = \sum_{i=1}^N s_i^2$  and  $s_i^2$  is the square of the share in sector  $i$  and where the sectors range from 1 to  $N$ .

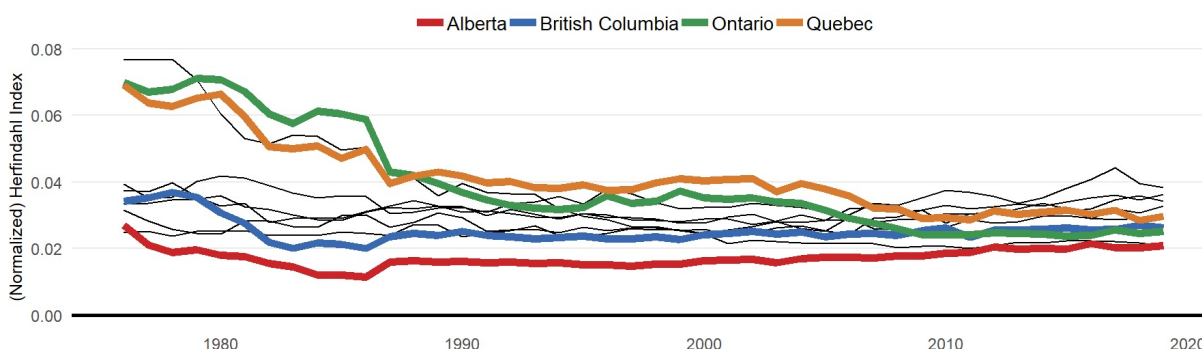
### 3. DIVERSIFICATION OF THE ALBERTA ECONOMY

The focus in this section is on changes over time in the level of diversification of the provincial economy and how this compares to that in other provinces. Values for the shares of employment and GDP by two-digit industry level over selected years in the period 2001-2020 for Alberta, British Columbia, Ontario and Quebec are provided in Appendix tables 1 and 2.

As indicated in Figure 1, as measured by the H\*-index, over the past four decades or so direct employment concentration across industrial sectors in Alberta has tended to be below that in other provinces, and particularly relative to that in comparator provinces such as British Columbia, Ontario and Quebec.<sup>9</sup>

However, this does not take account of the covariance among sectors. For example, in the case of Alberta, there are extensive linkages among the oil and gas, construction, manufacturing and professional / technical Services sectors. As a result, employment in these latter sectors depends to a significant degree on oil and gas sector employment. To the extent that these move together (positive covariance), the result will be less diversification and greater cyclical variability. As indicated in Figure 2, taking these linkages into account results in a lower level of diversification (or higher level of concentration) but it is still at a level that compares favorably with most other provinces.<sup>10</sup>

**Figure 1: H\* Index of Direct Employment Concentration by Province, 1976-2019**



Source: Tombe (2020) based on data from Statistics Canada table 14-10-0023.

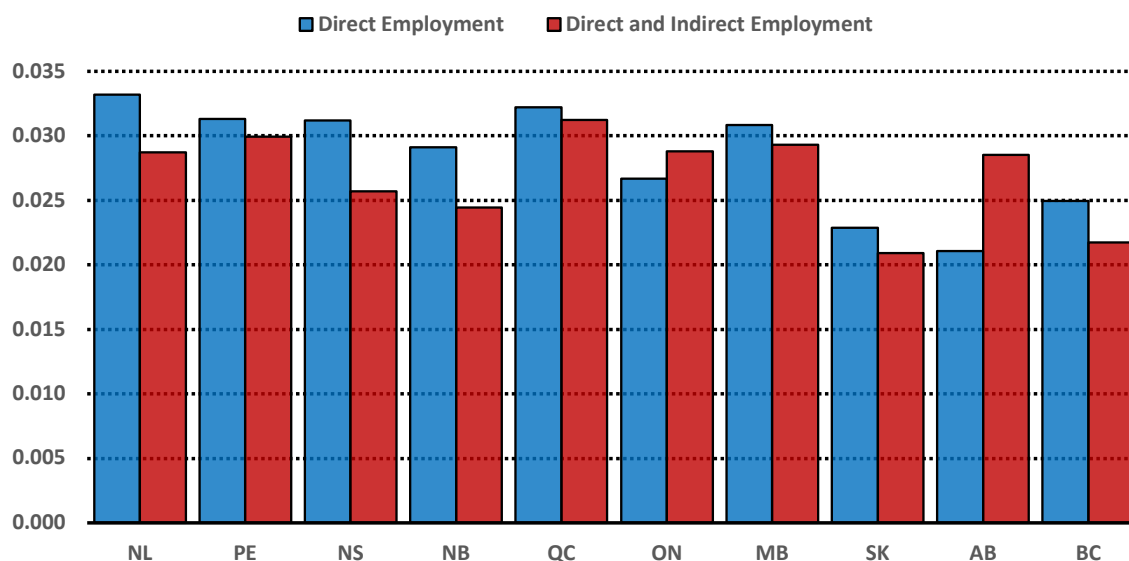
<sup>9</sup>

Indeed, other studies indicate that Alberta has one of the most diversified labour markets in North America. (Alberta Central, 2021).

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See Tombe and Mansell (2016, section 2.6) for methodological details.

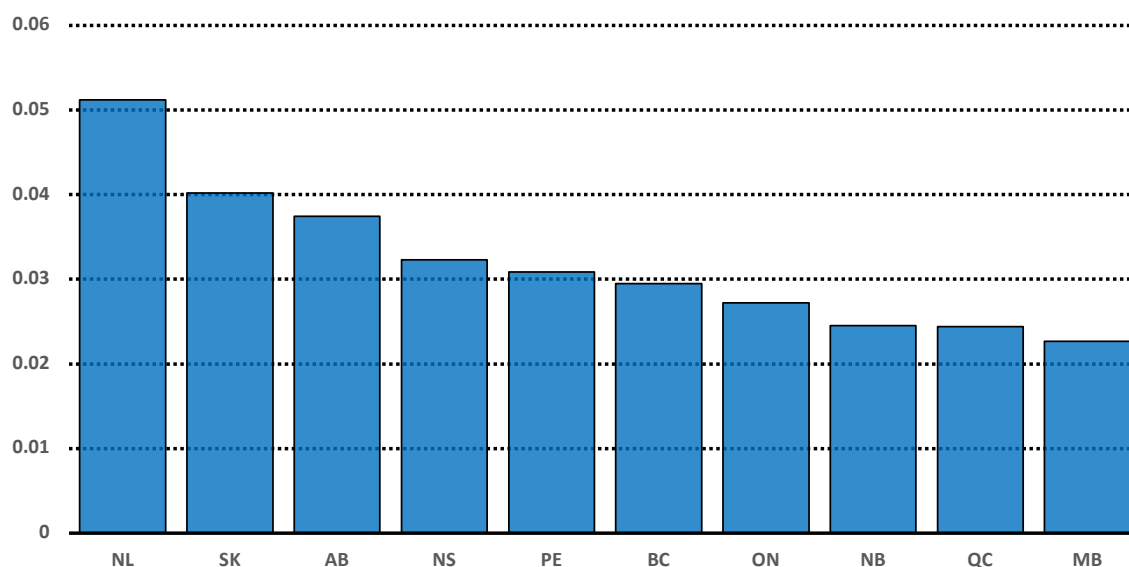
**Figure 2: H\* Index of Direct and Indirect Employment by Province, 2015**



Source: Tombe and Mansell (2016, Figure 7).

However, as shown in Figure 3, the level of diversification for Alberta in terms of value added (or GDP) is significantly less than in most other provinces and particularly so in comparison to that for Ontario and Quebec. A key factor is the dominant contribution by the mining and oil and gas sector which directly accounts for over 25 per cent of total Alberta GDP in most years. (see Appendix Table 2).

**Figure 3: H\* Index of Nominal GDP by Province, 2015**



Source: Tombe and Mansell (2016, Figure 8)

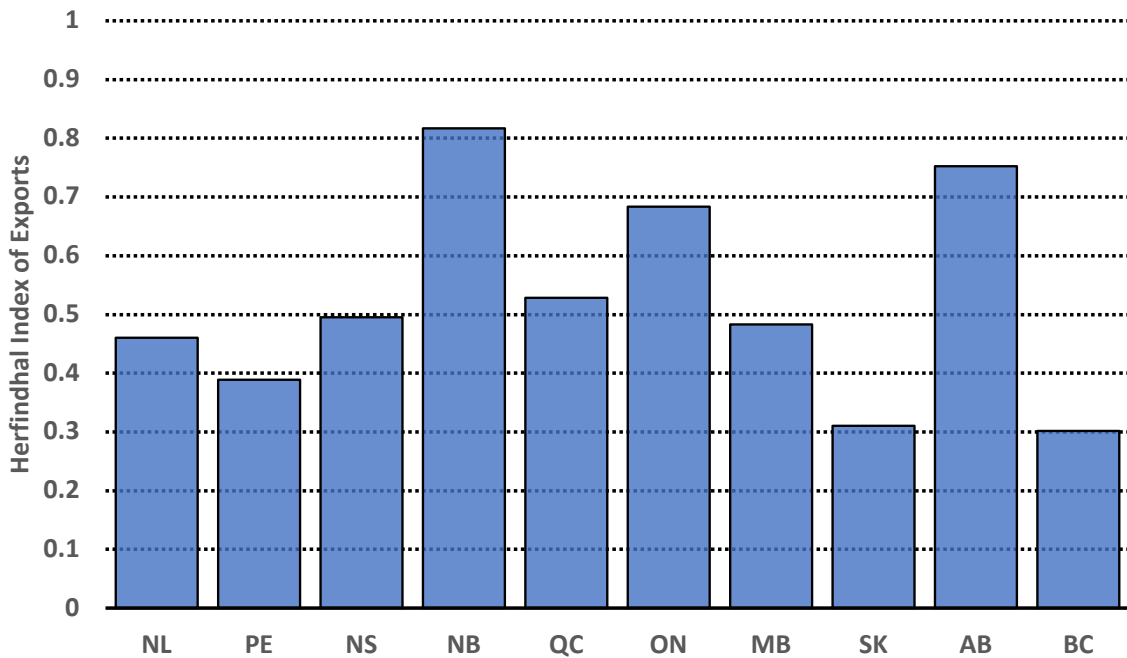
No equivalent summary measure of diversity with respect to the product range of existing industries is provided here. A survey of Statistics Canada data at the six-digit level (the highest level of disaggregation in the North American Industry Classification System (NAICS)) indicates that there has been a significant increase

in this diversity over time (in terms of employment and value added) in the case of Alberta.<sup>11</sup> However, without further detailed analysis it is not possible to compare this increase with the changes for other provinces.

The final dimension summarized here is with respect to the diversity of export markets. Using the H\* index again, the approach is to measure the degree of diversity with respect to the province’s export markets. As before, a higher H\* value indicates less diversity or greater market concentration. Using 2015 again as a representative year, the results shown in Figure 4 indicate a level of market concentration for Alberta well above that for most other provinces, primarily reflecting the very heavy reliance of the oil and gas sector on the U.S. market.<sup>12</sup>

By way of summary, the ranking of the level of diversification across provinces is shown in Table 1. Other than its high degree of diversification in terms of direct employment, Alberta ranks mid-pack when taking into account the indirect employment associated with each sector and it ranks poorly with respect to the sectoral diversity of nominal GDP and export markets. This suggests that, to the degree that greater diversification is aimed at reducing cyclical or random variability of the Alberta economy, the focus should be on two key elements: expanding and diversifying domestic and international export markets and pursuing policies consistent with offsetting the volatility of changes in GDP.

**Figure 4: H\* Index of Export Market Concentration, by Province, 2015**



Source: Tombe and Mansell (2016, Figure 10)

<sup>11</sup> As just one example it can be noted that the main output of Alberta’s energy industry in the 1950s was conventional oil but over time it has added to its product range large components comprised of natural gas, gas liquids and unconventional (heavy and oil sands) oil. Similar trends can be observed for other basic or exporting sectors.

<sup>12</sup> For example, in January 2021 Alberta exports to the U.S. amounted to \$7.37 B compared to \$0.41 B to China, \$0.24 B to Japan, and \$0.12 B to Mexico. [https://oec.world/en/profile/subnational\\_can/alberta](https://oec.world/en/profile/subnational_can/alberta)



**Table 1: Ranking of Diversification Dimensions Across Provinces**

	Diversification Rank, by Province and Metric			
	Direct Employment	Direct and Indirect Employment	Nominal GDP	Export Markets
SK	2	1	9	2
BC	3	2	5	1
MB	7	8	1	5
AB	1	5	8	9
NB	6	3	3	10
QC	9	10	2	7
PE	5	9	6	3
ON	4	7	4	8
NS	8	4	7	6
NL	10	6	10	4

Source: Tombe and Mansell (2016, Table 4)

#### 4. VARIABILITY OF THE ALBERTA ECONOMY

The dramatic impacts associated with the twin crises associated with energy prices and COVID-19 have unquestionably demonstrated the economic and social costs arising from volatility. But here it is important to distinguish among cyclical, random and secular instability. The large energy price shock initiated in 2014 is no doubt part of the cyclical variability seen many times before and it is this type of variability we initially focus on. The pandemic, on the other hand, is quite different. It is more of a ‘black swan’ event that is less predictable than variations in energy prices and typical variations among regions in terms of industrial structure would not alone make substantial differences to the impacts of the pandemic. In contrast, the increasing policy and market challenges facing the energy sector suggest a potential case of secular or long term instability associated with reduced investment and growth in a major driver of the overall economy.

The costs of variability will generally be smaller the greater the degree to which variations can be predicted or be reasonably anticipated. For example, in theory individuals, industries and governments subject to large income swings due to the vagaries of international commodity markets could take a longer term view with respect to commodity prices and avoid or minimize large swings in their expenditures over the cycle. However, this is often not the case given fleeting memories, the tendency to believe a current boom will be lasting rather than end in a bust, the short term focus of equity markets and the inherent propensities to chase rising markets.

It should also be noted at the outset that mathematically there will always be a tendency for greater variability the higher is the growth rate. This is particularly relevant to the case of Alberta which by most measures has tended to have the highest long term growth rates. For example, between 2001 and 2020 the population growth

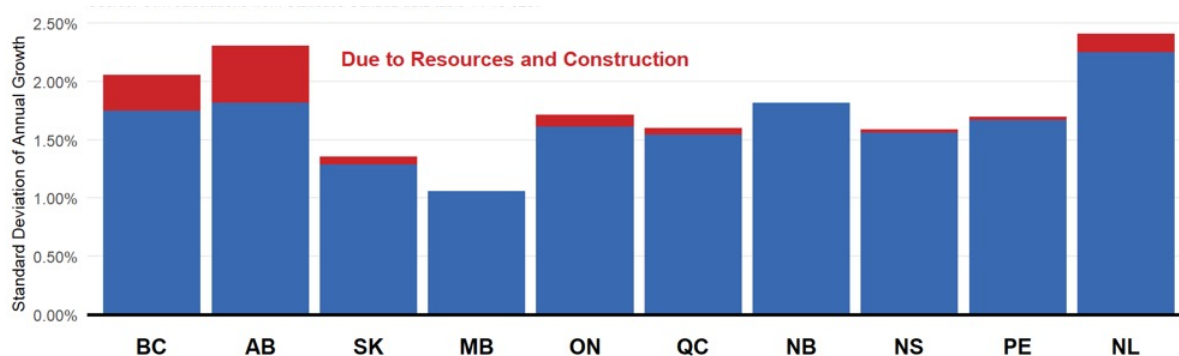
rate for Alberta was 2.2 per cent per annum<sup>13</sup>, 53 per cent above that for Ontario, and more than 100 per cent greater than that for Quebec and Manitoba, all provinces that have tended to have lower levels of variability.

## CYCLICAL INSTABILITY

For the moment attention is on cyclical variability and the starting point is to measure the level of this volatility in terms of two broad measures, employment and GDP, that are critical in terms of economic and social well being. The variability of employment and GDP changes, measured as a standard deviation in annual growth rates, is portrayed in Figures 5 and 6 respectively.<sup>14</sup>

As shown in Figure 5, the variability of employment growth in Alberta over the period indicated has tended to be somewhat higher than in other provinces, with a substantial portion of this related to outsized variations in resource and construction industry employment in Alberta.<sup>15</sup>

**Figure 5: Standard Deviation of Annual Employment Growth, by Province, 1976-2019**



Source: Tombe, (2020, based on calculations from Statistics Canada table 14-10-0287)

However, the greatest variability for the province shows up in terms of GDP growth rates. As indicated in Figure 6, it is substantially above that in other provinces, except for Saskatchewan and Newfoundland and Labrador. There are a number of key sources of this variability. Using the income-based approach to measuring GDP, the net corporate operating surplus (or return on investments) exhibits wide swings in Alberta, largely in relation to the energy sector. For example, the swing in this component between 2014 and 2016 was from \$78.6 billion to \$15.7 billion.<sup>16</sup> Using the

<sup>13</sup> Measured as the annual compound growth rate over this period.

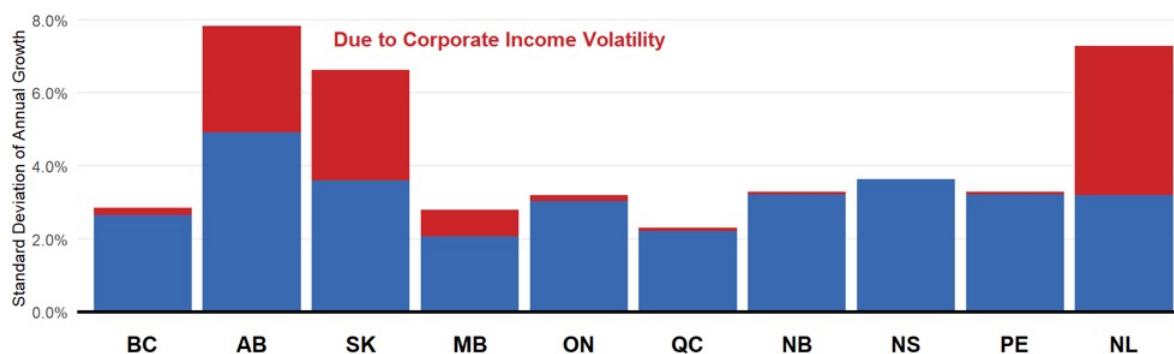
<sup>14</sup> The standard deviation is a measure of the dispersion of a set of values around the mean of those averages. The standard deviation ( $\sigma$ ) is the square root of the sum of the squared deviations of values for  $x$  ( $x_i$ ) from the mean ( $\mu$ ) divided by the number of observations ( $N$ ). That is,  $\sigma = [\sum(x_i - \mu)^2 / N]^{1/2}$

<sup>15</sup> As noted by Mansell and Percy (1990) and Chambers (1999), this variability for Alberta was particularly high during the 1976 – 1987 period, primarily the result of federal energy policies combined with swings in international oil prices. Also, see Kneebone and Gres (2013) for an analysis of regional employment cycles relative to those at the national level.

<sup>16</sup> Data from Statistics Canada, Table 36-10-0221-01.

expenditure approach,<sup>17</sup> the largest volatility is in the value of exports and in investment expenditures. The large fluctuations in energy prices directly produce substantial variations in the value of Alberta exports, one of the key drivers of the provincial (and the national) economy. Further, given the very high capital intensity of the energy sector, non-residential investment is also very large<sup>18</sup> and, given its sensitivity to swings in expectations associated with energy pricing and policies, this adds further volatility to the province's GDP.

**Figure 6: Standard Deviation of Nominal GDP Growth, by Province, 1981-2019**



Source: Tombe, (2020, based on calculations from Statistics Canada table 36-10-0222)

Another way of unpacking the sources of instability involves decomposing a regional economic instability index.<sup>19</sup> Using this approach, Dahlby and Khanal (2018, p.8) found that over the period 1997- 2015 Alberta's GDP volatility was much higher than that of Ontario, Quebec, and British Columbia primarily because of the greater variability in the construction, oil and gas extraction and manufacturing industries and in support activities for oil and gas extraction. At the same time, however, they found that shifts in the industrial composition of the Alberta economy over the period 1997-2015 reduced output volatility by 21 per cent.<sup>20</sup> These authors also examined the industrial composition of the variations in labour income, a more important concern of policy makers. For the period 1997-2014 they found that the construction sector had the most volatile labour income, followed by the oil and gas extraction sector and the manufacturing sector.

## SECULAR INSTABILITY

The shifts in the Atlantic regional economies in the early 1900s are perhaps the most dramatic examples of secular instability in Canada. A combination of events, including

<sup>17</sup> Using this approach,  $GDP = \text{Consumer expenditures} + \text{Investment expenditures} + \text{Government expenditures (on goods and services)} + \text{Exports} - \text{Imports}$ .

<sup>18</sup> For example, in 2009, 2015 and 2019, non-residential investment in Alberta accounted for, respectively, 30 per cent, 33 per cent and 25 per cent of total non-residential investment in Canada. Data from Statistics Canada, table 36-10-0222-01.

<sup>19</sup> See Mansell and Percy (1990, p.69).

<sup>20</sup> Dahlby and Khanal (2018, p.10). The comparable reductions for Quebec and Ontario were, respectively, 42.5 per cent and 34.5 per cent.

the phasing out of wooden ships, the shifting of international trade routes with the opening of the Panama Canal, the shrinking of traditional fish markets, and the declines in the demand for Maritime-sourced coal and steel struck serious blows to these economies. Arguably they have never fully recovered and this highlights the immense costs of secular instability.

While there have been cases of secular instability at a local level in Alberta, there have been none for the province overall. However, there have been instances of significant concern, particularly in relation to the energy sector. In the early 1970s and into the 1980s there were concerns that production from the province's pivotal oil and gas sector would begin a secular decline and that there was perhaps only a decade to diversify. In response Premier Lougheed (1974), emphasized the need for a diversification strategy to "become less dependent on the sale of unprocessed resources." This led to a number of diversification initiatives (noted later), including the formation of the visionary Alberta Heritage Savings Trust Fund to save for the future, strengthen or diversify the economy and improve the quality of life of Albertans.

As it turned out, the development and implementation of new technologies resulted in dramatic increases in oil sands production along with uplifts to conventional crude oil, natural gas and gas liquids production. This greatly reduced the urgency to address any future declines in the contributions of the oil and gas sector, and those of the linked industries, to Alberta's future prosperity. However, there are now growing environmental, policy and market issues around oil and gas that represent huge challenges to its contributions to Alberta's long term growth and prosperity.

## **5. DEALING WITH INSTABILITY**

### **TRADE-OFFS**

Any discussion of instability must be in the broader context of the province's overall performance. Alberta has an enviable record in terms of most measures of economic and social well-being of its residents. For example, Uguccioni, Sharp and Beard (2017, p.33) indicate that over the period 2000-2015 Alberta ranks first in terms of the Human Development Index<sup>21</sup> among all Canadian provinces and fifth in the world. The province has also tended to have the highest output and income per worker and per capita and the lowest poverty rates.<sup>22</sup>

Much of this success can be traced to the resources sector and particularly the energy industry (Mansell and Staples, 2011). In general, the resource industries tend to be characterized by capital and technology-intensive production processes, a large number of independent units, a high degree of risk and entrepreneurial awareness, considerable backward and forward linkages to other sectors, and wide exposure to the vagaries of international markets and government policies. Taken together, these

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<sup>21</sup> This international measure takes into account factors such as life expectancy, education, and per capita incomes.

<sup>22</sup> See Kneebone and Wilkins (2021).

characteristics have created a very entrepreneurial, flexible and mobile population with strong incentives and abilities to respond to adversity by modifying existing activities and creating new ones. (Cross, 2021 and Mansell and Percy, 1990, p.57).

This adjustability in the broader real-world environment with rapid changes and volatility represents a very important strength of Alberta's economic base. It also highlights the fact that an industrial development policy aimed at replacing the more variable sectors with less variable ones can involve large trade-offs. These include a lower overall level of productivity, a less competitive industrial structure (particularly in a rapidly changing and volatile environment), and a diminished level of economic and social well being.<sup>23</sup> Further issues arise given the large size and highly integrated structure of the energy sector and its critical role (along that of agriculture and other resource sectors) in the economic base of many communities across the province. Simply put, there are no industry alternatives of sufficient size, productivity, export and government revenue generation capability, regional impacts and competitiveness that could realistically offset the negative impacts on the Alberta economy associated with a rapid and substantial decline in this sector.

## ELEMENTS OF A SOLUTION

These trade-offs do not deny the fact that reduced variability of the Alberta economy would represent a real gain so long as the solutions would not entail significant reductions in overall economic and social well being. But diversification is not a panacea in achieving greater stability. Rather, there are approaches other than a forced re-engineering of Alberta's economic base that must also be considered in the search for greater stability.<sup>24</sup>

### Random Instability

Industrial diversification is not generally an effective strategy for truly random instability such as that associated with the pandemic. However, as noted by Cléroux (2020), diversification in the form of expanding the range of products and markets for existing industries and firms is a viable risk mitigation strategy for the province. This, along with having appropriate risk management systems in place (including access to technologies to allow market pivots) and sufficient federal and provincial fiscal flexibility and capacity to provide short term income supports to assist individuals and businesses to 'weather the storm', are essential.<sup>25</sup> The enormous increase in federal expenditures has certainly been important in cushioning the impacts of the COVID-19

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Labour productivity and compensation in Alberta's energy and related industries is multiples above the average for most other industries in the province and in Canada. For example in 2020 per hour labour productivity (in chained 2012\$) for conventional oil and gas extraction was \$341.7 and it was \$1323.3 for non-conventional oil extraction, \$935.2 for petroleum refineries and \$672.2 for basic chemical manufacturing, compared to an average of \$84.5 for all industries in the province. (Data from Statistics Canada, Table 36-10-0480-01).

<sup>24</sup>

See chapter 5 of Mansell and Percy (1990) for a detailed discussion.

<sup>25</sup>

The Alberta government alone has committed just under \$9 billion as part of its support and economic recovery program.

pandemic. While the longer term macro and regional effects of the resulting expansion in federal debt are certainly a concern, the run up in Alberta's debt is more problematic given the province's pre-existing and significant long term fiscal gap (Tombe, 2021 and Crisan and McKenzie, 2021). Unlike the case at the federal level where deficits can be financed by 'printing money', at the provincial level there are definite debt walls and immediate negative consequences when they are approached (Ascah, 2021). This brings us to the issue of Alberta's fiscal situation and, in particular, the problem of revenue instability.

### **Mitigating Cyclical Variability – Fiscal Stabilization**

Alberta, along with Saskatchewan and Newfoundland and Labrador, suffers by far the greatest instability in provincial government revenue (Dahlby, 2019) and this has important implications for their governments in dealing with cyclical variability. This instability is primarily a result of the non-renewable resource revenues that comprise a substantial portion of the provincial government's revenues and swing widely with the ups and downs of oil and gas prices. As indicated in Figure 7, this share of Alberta revenues over the last two decades has ranged from over 40 per cent to under 10 per cent. While the running of fiscal surpluses and deficits has provided a buffer, there are still significant consequences for overall economic stability.

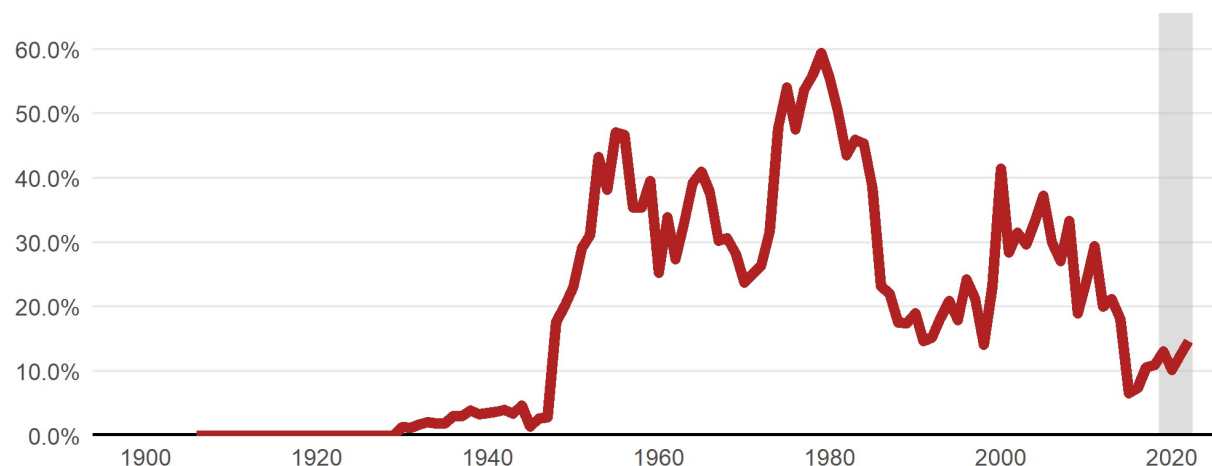
As noted by Crisan and McKenzie (2021, Figure 1) a result has been the tendency for the provincial government to overspend in periods of fiscal bounty, followed by periods of painful retrenchment.<sup>26</sup> Given that almost a quarter of total Alberta employment is in education, health care, social assistance and public administration, all sectors heavily dependent on provincial funding (see Appendix Table 2), this alone transmits significant volatility in addition to that associated with changes in other revenue and expenditure components. Further, it reduces the ability of the government to more aggressively pursue a fiscal stabilization policy involving, for example, large increases in infrastructure and other capital expenditures during downturns in the provincial economy. And, it also reduces the ability of the province to provide stable, attractive and predictable tax policies, along with high quality physical and social infrastructure. These factors are particularly important in attracting investment, employment and income growth.

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See also Mansell (1997).

**Figure 7: Non-Renewable Resource Revenues as a Share of Total Alberta Government Revenues, 1905-2020.**



Source: Tombe, (2020).

It should be noted that restoring fiscal stability and sustainability is widely seen by the business community as the highest priority for maintaining and growing employment and incomes in Alberta. (Kobly, 2021).

A sensible way of converting an unstable stream of resource revenues into a more stable flow of interest and dividend income is through a sovereign fund. Indeed, this, and the desire to save for the future, was the motivation for the Alberta Heritage Savings Trust Fund (AHSTF), as well as other similar funds such as the Alaska Permanent Fund and the Government Pension Fund Global of Norway (or Oil Fund). By investing a portion of resource revenues in a financial portfolio diversified across industries and regions, the Oil Fund has, since 1996, grown to almost \$1.6 trillion (Cdn) and the Alaska Permanent Fund (APF) has, since 1976, grown to over \$97 billion (Cdn).<sup>27</sup> In contrast the AHSTF, also established in 1976, had a value of \$17.3 billion at the end of 2020.<sup>28</sup> Unlike the APF and Oil Fund, the AHSTF did not and does not have the type of constitutional or pension plan protection to counter the propensity to spend rather than save and benefit from compound growth in interest and dividend revenues. As a result it has been politically attractive to significantly reduce the original non-renewable revenue investment commitments (to zero in many years), and to use it to fund capital projects and operating expenditures.<sup>29</sup> It is interesting to contemplate how different Alberta's economic future would look if the fund was, say, \$100 billion and able to realistically

<sup>27</sup> Data from: <https://www.nbim.no/> and <https://apfc.org/>

<sup>28</sup> Data from: <https://www.alberta.ca/heritage-savings-trust-fund.aspx#jumplinks-0>

<sup>29</sup> See <https://open.alberta.ca/dataset/80ee4142-17f2-4bc7-b30b-18afd3dfe5c8/resource/1c95d123-fa1d-49e3-ad25-98599aba2fb4/download/heritage-fund-historical-timeline.pdf> for a historical timeline of the AHSTF.



generate a fairly stable average of \$7 or \$8 billion per year in revenue.<sup>30</sup> Rather than a lament of the lost opportunity, the main point here is that it can serve as a useful lesson going forward. It is reasonable to expect resource revenues will remain substantial, and highly variable, for the foreseeable future. As emphasized by Smith (2021), a re-dedication to consistently saving a larger share of these revenues in a protected AHSTF would be one option in the context of much-needed fiscal restructuring to stabilize and enhance the sustainability of provincial government revenues.

Additional stability could be obtained by broadening the provincial tax base. Other papers in this series discuss this issue (see Tombe, 2021 and Crisan and McKenzie, 2021). A common prescription from an efficiency and stability perspective is the introduction of a sales (or value-added) tax. Unfortunately, in the case of Alberta this is difficult politically given that the absence of a sales tax is seen almost as a 'birth right'. Another option may be the repatriation of the federal carbon tax (which has many of the efficiency characteristics of a sales tax) and the use of some of the associated revenues to supplement the existing tax base.

One of the common requirements of a well-functioning federation is the provision of economic stabilization to allow regions to specialize in areas of comparative advantage without the added risks of doing so. As noted by Kneebone and McKenzie (1998), federal stabilization has primarily been through expenditure and transfer policies. For example, via automatic or discretionary federal fiscal adjustments a net stimulus can be provided to offset the effects of a sharp regional downturn. As outlined by Mansell, Khanal and Tombe (2020), over the period 1961-2018, these types of adjustments have played a significant role in stabilizing incomes in most provincial economies but not in the case of Alberta. In general, the net federal fiscal balance for the province (the difference between the total federal revenues collected in the province and the total federal expenditures and transfers returning to the province) has represented a large net outflow from the province and it has not been particularly responsive to downturns in Alberta's economy. This net outflow from Alberta associated with federal fiscal programs and policies has averaged more than \$20 billion annually and amounts to an annual transfer of over \$5000 per person. This is by far the highest in Canada, representing an annual transfer out of the province equal to about 10 per cent of total personal incomes in Alberta.<sup>31</sup> These large transfers of income (and associated employment and population) become a substantial drag on the provincial economy during downturns and work against stabilization. Even modest changes, such as a

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<sup>30</sup> The 2008 Financial Investment and Planning Advisory Commission's report on Alberta's savings and investment strategy recommended investing a legislated share of the non-renewable revenues with a target for the Alberta Heritage Fund of \$100 billion by 2030. See: <https://www.alberta.ca/release.cfm?xID=24786B1AE3659-F3BF-39F1-519A63F0E373A3EE>. Bremer and Ploeg (2014) have estimated that to achieve an on-going resource dividend equivalent to 30 per cent of government revenue the AHSTF would need to be worth the equivalent of 40 per cent of Alberta GDP by 2030 and 100 per cent by 2050.

<sup>31</sup> This is roughly 3.5 times the net per capita federal fiscal contribution by Ontario, the only other major net federal fiscal contributor in Canada. Since 2000, the per capita federal fiscal balance for Ontario has ranged from a net per capita outflow of just over \$4000 to a net inflow of just under \$1000 per capita. The total net federal fiscal transfer out of Alberta over the period 1961-2018 amounted to \$631 billion. See Mansell, Khanal and Tombe, (2020). With the net transfer for 2019 added, the total comes to \$661 billion (in 2019\$).



re-balancing of federal procurement so that Alberta receives something closer to the per capita share for other provinces, would significantly reduce this drag on the economy.<sup>32</sup>

The federal fiscal stabilization program is intended to provide insurance to provinces in cases of dramatic drops in their own-source revenues and could be of considerable assistance in stabilizing Alberta's revenues. However, as explained by Dahlby (2019), it is designed to minimize the protection against large revenue declines for the provinces with heavy reliance on resource revenues (Alberta, Saskatchewan and Newfoundland and Labrador).<sup>33</sup> Unfortunately these are the provinces in greatest need for revenue stabilization. In the case of Alberta, for instance, revenues dropped by \$8.8 billion in 2015-16 (roughly 20 per cent) and it received \$248.3 million under the stabilization program. Over the period 1986-2018 there have been two instances of 25 and 34 per cent declines and four years with declines of more than nine per cent. Based on standard insurance principles, Dahlby estimates that the province should have received an additional \$7 billion to \$11 billion in revenue stabilization over this period (Dahlby 2019, p.11). While the formula was changed recently by the federal government this was limited to raising the cap from \$60 to \$170 per resident to reflect inflation over time but did not address the discriminatory 50 per cent deductible for resource revenues. The net result is an increase in the expected payment to Alberta to \$750 million and with the main benefits going to the provinces that are not significantly dependent on resource revenues.<sup>34</sup>

All of the types of fiscal restructuring in Alberta and those involving changes to federal fiscal policies discussed above would significantly reduce the cyclical variability of the provincial economy. The huge challenge is achieving the sustained political leadership and support to make these changes a reality in a democratically unbalanced federation.<sup>35</sup>

### **Mitigating Cyclical Variability – Diversification**

As noted earlier, the Alberta economy has become more diversified over time and this has reduced cyclical variability. This has been due to both market-induced changes, particularly involving innovation, as well as policy-induced changes. At the provincial level there have been numerous policy statements and strategies since the 1970s which have invariably included diversification objectives, typically captured within a broader 'industrial development' strategy.<sup>36</sup> The most recent (Government of Alberta, 2020) is the recovery plan to create jobs, build and diversify. It includes strategies to drive diversification in relation to agriculture, forestry, tourism, technology and innovation, finance and fintech, creative industries, natural gas and petrochemicals.

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<sup>32</sup> This change alone for federal non-defense and defense procurement would reduce the net annual outflow by over \$3 billion. See Mansell, Khanal and Tombe (2020, Table 7). See also, Alberta (2020).

<sup>33</sup> The very low coverage for these provinces results from changes in the program over time that included a deductible of 50 per cent for resource revenues, a deductible of five per cent for non-resource revenues and a cap of \$60 per capita in payments to the provincial government.

<sup>34</sup> See <https://www.cbc.ca/news/politics/pbo-fiscal-stabilization-reform-1.5880714>

<sup>35</sup> Savoie (2019) provides a comprehensive analysis of these fundamental issues.

<sup>36</sup> For example, see: Government of Alberta (1984, 2011 and 2020).

The overall quantitative impact of the earlier policies and strategies on cyclical stabilization and other objectives has yet to be estimated.<sup>37</sup> However, much can be learned from case studies of both the successes and failures and these lessons should be applied going forward.

The most studied cases have involved examples of ‘forced growth’ where government-led initiatives using public funding, along with private funding, target and subsidize specific industries for development in a region. Some of the classic, earlier examples of this approach used across Canada, along with details on why they failed, can be found in Mathias (1971).<sup>38</sup> More recent cases of the forced growth approach in Alberta are summarized in Puscoi (2013) and Morton and McDonald (2015). These highlight the successes (such as Syncrude, the Alberta Energy Company, the Ethane-based Petrochemical Industry, the Canadian Western Bank and Pacific Western Airlines/WestJet), along with a dozen or so failures. In general, the successes have avoided the problems of the earlier Canadian experience but in addition they have tended to be rooted in some clear comparative advantage related to Alberta’s strengths such as natural resources, the existing industrial base, access to markets, entrepreneurial skill, innovation or scale-up economies. Further, they could demonstrate long-run financial viability and sustainability in the province under a range of realistic future scenarios and there was one or more clear market imperfections justifying government intervention.<sup>39</sup> It is also noteworthy that the successful diversification policies have not been focused on promoting industries or sectors based on their cyclical stability or negative covariance with the existing economic base. Indeed, such a singular focus is unrealistic.

While there are certainly cases where a forced growth approach is appropriate for advancing diversification aimed at greater stability, experience suggests that a broader approach should be the dominant one. This ‘shot gun’, market-based approach does not focus on trying to re-engineer the industrial structure or economic base, something which is extremely complex, interconnected and subject to rather gradual evolution over time. Rather, it emphasizes product diversification (expanding the range of products) over many industries, growing and diversifying markets for Alberta goods

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<sup>37</sup> Given the combination of differing policies and objectives typically embodied in these industrial development strategies it is difficult to separate out and estimate the independent effects on diversification. To do so requires the use of a detailed model of the provincial economy to run projections under different policy parameters and compare those projections to the actual or observed changes in the economy. An example can be found in Mansell (1990, 30-43).

<sup>38</sup> The reasons for failure include: lack of objectivity and impartiality in the motivation for, assessment of and justification for publically funded industrial development projects; lack of evaluation that is arm’s length from politics; lack of thorough, impartial and independent cost-benefit analysis, viability analysis and risk analysis; dealing with private sector partners without a proven track record and lacking in terms of integrity, competence and financial sustainability; lack of government expertise to properly and accurately evaluate projects and proposals and ensure the information provided by partners is accurate and complete; failure to subject the projects to ‘market failure’ or ‘comparative advantage’ tests (to justify government intervention and determine whether the new industry could realistically be competitive without sustained public funding); poor or inadequate audits and financial controls; lack of sunset/contingency clauses to limit taxpayer liability or allow taxpayers to cut their losses in the event of unforeseen changes; and, over reliance on imported expertise with few provisions for the development and use of local skills.

<sup>39</sup> Perhaps the most dramatic success has been the development of the in-situ oil sands industry. Much of this can be tied to the Alberta Oil Sands Technology and Research Authority (AOSTRA) created in the 1970s to advance research and technology development to unlock the vast oil sands resources that are too deep to mine. See Hastings-Simon (2019).

and services generally and encouraging innovation and adaptability to thrive in an environment of constant change. It is consistent with broadly-based diversification and development, its effects are not determined by the success or failure of a few projects, it imposes an element of market discipline that encourages efficiency, and it is consistent with diversity of opportunities for diversification and development across many sectors.

This broad-based approach is consistent with the goals and objectives outlined in Alberta's current recovery plan and, for that matter, the earlier strategies going back to 1984. What has often been lacking is the consistent adherence to the basic requirements for this approach to be effective. Most importantly, it requires a commitment to establishing and maintaining an attractive investment climate. This includes: a strong and stable fiscal position for the province; stable, competitive and predictable taxation policies, including low effective tax rates on business investments; a highly skilled and adaptable labour force; and an efficient system with short time frames for regulatory decisions on investments.

Alberta has many strengths that support this broader approach to expand Alberta's economic base and thereby reduce variability. It has high quality social and physical infrastructure, a large and vibrant education, research and development ecosystem, and, in many sectors, a strong culture of entrepreneurship innovation and adaptability, strengths honed through adversity. But there are areas where significant change is required. This includes: shifts to achieve fiscal stability and sustainability for the province; a focus on improving the regulatory and investment environment; better access to risk capital to bridge the 'death valley' where funding is often not available to commercialize and realize the benefits of many innovations developed in the province; infrastructure development and reduced interregional and other trade barriers to allow growth and market diversification for Alberta industries; and, a rebalancing of federal policies to reduce the net federal fiscal outflows from the province.

### **Secular Instability – the Elephant in the Room**

By far the greatest concerns for secular instability of the Alberta economy must center on the long-term prospects for its oil and gas sector. It has been a major driver for the provincial economy (and the Canadian economy) for many decades, making outsized contributions to exports, investment, productivity, incomes and government revenues. However, it seems clear that the headwinds facing this sector, particularly since 2014, will only intensify going forward.<sup>40</sup> Climate change concerns and policies addressing GHG (Green House Gas) emissions will undoubtedly only grow and increasingly target fossil fuel production, limiting both markets and access to capital.

There is great uncertainty as to what this means for the future of Alberta's oil and gas industry. For example, in the 'Evolving Scenario' of the Canadian Energy Regulator (CER), Alberta production of crude oil continues to grow<sup>41</sup> (especially from in-situ oil

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<sup>40</sup> See Cosbey, Sawyer and Stiebert (2021) for a summary.

<sup>41</sup> Although at much lower rates than in the past.

sands operations) until 2040 and the province's natural gas production declines only slightly over the period to 2050. Although substantial new investments in carbon emissions reduction are required, this path would seem quite manageable for the province. In particular, the reduced contribution of the oil and gas sector to overall employment and incomes in the province would be gradual enough to be offset to a large degree by added growth in other sectors,<sup>42</sup> aided by the types of diversification policies discussed in the previous section.

In a scenario with the addition of even more aggressive policies to reach net-zero carbon emissions by 2050, the transition would be significantly shorter. However, even here, as outlined by Van Wielingen (2021) and by Bataille, Dobson, Kanduth and Winter (2021), a reasonable path of prosperity for Alberta over the longer term would be potentially achievable. It builds on the strong record of the sector and the province for innovation and adaptability. And it builds on the world class experience with energy technologies and on the wealth of both skills and resources (such as viable carbon storage sites) required for large scale carbon capture use and storage (CCUS) or for transitions to hydrogen and other low carbon fuels.

However, there are other quite plausible scenarios that would have much more disruptive and negative impacts. For example, it is entirely possible to have extended periods of lower and highly volatile oil prices as low-cost foreign suppliers compete for shares in a stagnant or declining global oil market. As outlined in Cosbey, Sawyer and Stiebert (2021), in a lower price environment, particularly when price shocks similar to those observed in the past are incorporated, the impacts on the provincial economy would be large, negative and long term.<sup>43</sup> It is not hard to come up with other examples of destabilizing external factors with similar implications for Alberta.<sup>44</sup>

The main point is that these types of uncertainty imply considerable risks to the viability of the existing oil and gas industry and to long-run prosperity in the province. Indeed, this potential secular instability is the strongest case for more aggressive policies aimed primarily at diversification of products from the province's various sectors and at diversification of markets for those products.<sup>45</sup> However, it also makes the case for policies and policy changes: (i) that support the transitioning of the oil and gas sector; (ii) that anticipate and help manage the transitioning of workers and communities; (iii) that are aimed at strengthening, stabilizing and securing the province's long term fiscal health; (iv) that focus more on the long term benefits, recognizing that these often take decades rather than years to materialize; and, (v) most importantly, consistently support a strong investment climate in the province.

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<sup>42</sup>

For example, see Spencer and McConnell (2021) and Mintz, Wilson and Tingle (2021).

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For example, with low prices, the projected average loss of oil and gas GDP would be \$4.4 billion per year to 2050 combined with an average loss of 6,300 (FTE) jobs per year. When oil price volatility is added, these respective declines grow to \$24.3 billion and 24,300 jobs, approximately equivalent to a quarter of current levels. (Crosbey, Sawyer and Stiebert, 2021, p.vii).

<sup>44</sup>

Including shifts in U.S. policies that impair access to that dominant market for Alberta oil and gas.

<sup>45</sup>

In setting these policies the lessons and principles outlined in the previous section also apply.

## 6. SUMMARY

The twin shocks of low oil prices starting in 2014 and the pandemic of 2020 have imposed substantial costs on Albertans. As in previous downturns there are renewed calls for diversification to address this economic instability. But it is seldom clear exactly what diversification means, how it is achieved and what role it can and should play in helping to stabilize the Alberta economy.

Most commonly, diversification is taken to mean industrial diversification involving the addition of new and 'better' industries. But in reality effective diversification aimed at increasing stability is more likely to involve increasing the range of goods and services produced by existing sectors and facilitating the growth and diversification of markets for all exports from the region while building competitive substitutes for imports.

By most measures, and contrary to common views, the Alberta economy has become much more diversified over time. With respect to employment diversification it ranks among the most diversified regional economies in Canada. However, in terms of incomes and value added (or GDP) it is less so, particularly reflecting the outsized oil and gas sector. By these latter measures it exhibits higher levels of cyclical instability than the benchmark provinces and, looking forward, there are concerns about secular or long-run instability related to the challenges to this sector.

There is a case for policies to encourage industrial development and growth to address the cyclical and secular instability. However, the more commonly proposed forced growth approaches targeting specific industries are often problematic, particularly given the success rates and the potential for large trade-offs resulting in lower productivity, incomes, exports and government revenues. Rather, a broad-based approach is better suited and should be focused more on expanding the range of goods and services produced within the existing industrial structure and on market diversification. Alberta has many strengths that support this broader approach to expand Alberta's economic base and thereby reduce variability. But some changes are required to achieve fiscal stability and sustainability, improve the regulatory and investment climate, increase access to risk capital, expand infrastructure and reduce trade barriers for market growth and diversification, and rebalance federal policies to reduce the fiscal drag on the provincial economy.

The potential secular instability associated with the challenges facing the province's oil and gas sector represents the highest risk to Alberta's long term prosperity. The province has many strengths of adaptability and innovation developed through previous periods of adversity that will be critical in achieving a successful transition for this dominant sector. Strong leadership and consistent policies that anticipate and support this transition will be particularly important.

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**APPENDIX Table 1: Share of Total for Employment by Two Digit Industry for Selected Provinces and Years**

Industry	2001		2004		2007		2011		2014		2019		2020	
<b>Forestry, logging and support (11N)</b>	AB	0.3%	AB	0.3%	AB	0.2%	AB	0.2%	AB	0.2%	AB	0.2%	AB	0.2%
	ONT	0.2%	ONT	0.1%	ONT	0.1%	ONT	0.1%	ONT	0.1%	ONT	0.1%	ONT	0.1%
	QUE	0.6%	QUE	0.6%	QUE	0.5%	QUE	0.3%	QUE	0.3%	QUE	0.2%	QUE	0.2%
	BC	1.6%	BC	1.3%	BC	1.0%	BC	0.8%	BC	0.8%	BC	0.7%	BC	0.7%
<b>Mining, quarrying and oil and gas extraction (21)</b>	AB	5.3%	AB	5.9%	AB	6.3%	AB	6.3%	AB	6.5%	AB	4.9%	AB	4.9%
	ONT	0.4%	ONT	0.4%	ONT	0.4%	ONT	0.4%	ONT	0.4%	ONT	0.4%	ONT	0.4%
	QUE	0.4%	QUE	0.4%	QUE	0.4%	QUE	0.4%	QUE	0.5%	QUE	0.5%	QUE	0.5%
	BC	0.7%	BC	0.7%	BC	0.9%	BC	1.0%	BC	1.1%	BC	0.9%	BC	0.9%
<b>Utilities (22)</b>	AB	0.7%	AB	0.8%	AB	0.8%	AB	0.8%	AB	0.7%	AB	0.7%	AB	0.8%
	ONT	0.9%	ONT	0.9%	ONT	0.8%	ONT	0.9%	ONT	0.8%	ONT	0.8%	ONT	0.8%
	QUE	0.8%	QUE	1.0%	QUE	0.9%	QUE	0.9%	QUE	0.8%	QUE	0.8%	QUE	0.8%
	BC	0.5%	BC	0.5%	BC	0.5%	BC	0.5%	BC	0.4%	BC	0.5%	BC	0.6%
<b>Construction (23)</b>	AB	6.9%	AB	7.5%	AB	8.8%	AB	8.8%	AB	10.5%	AB	8.6%	AB	8.4%
	ONT	4.0%	ONT	4.3%	ONT	4.6%	ONT	4.9%	ONT	5.2%	ONT	5.5%	ONT	5.6%
	QUE	4.0%	QUE	4.5%	QUE	4.4%	QUE	5.2%	QUE	5.3%	QUE	5.4%	QUE	5.6%
	BC	4.6%	BC	5.2%	BC	6.3%	BC	6.3%	BC	6.6%	BC	7.1%	BC	7.4%
<b>Manufacturing (31-33)</b>	AB	9.2%	AB	8.0%	AB	7.8%	AB	7.0%	AB	6.7%	AB	6.1%	AB	6.1%
	ONT	18.3%	ONT	16.4%	ONT	14.2%	ONT	11.4%	ONT	11.1%	ONT	10.5%	ONT	10.5%
	QUE	18.1%	QUE	16.3%	QUE	14.4%	QUE	12.2%	QUE	11.5%	QUE	11.8%	QUE	11.8%
	BC	10.5%	BC	9.6%	BC	8.7%	BC	7.2%	BC	7.0%	BC	6.6%	BC	6.7%
<b>Trade (41-45N)</b>	AB	17.8%	AB	17.6%	AB	17.3%	AB	17.0%	AB	16.8%	AB	17.0%	AB	17.6%
	ONT	17.4%	ONT	17.4%	ONT	17.3%	ONT	17.2%	ONT	17.4%	ONT	16.5%	ONT	16.7%
	QUE	17.4%	QUE	18.1%	QUE	18.8%	QUE	18.1%	QUE	17.7%	QUE	16.6%	QUE	16.4%
	BC	17.8%	BC	18.5%	BC	18.5%	BC	17.7%	BC	17.4%	BC	16.5%	BC	16.6%
<b>Transportation and warehousing (48-49)</b>	AB	5.3%	AB	5.1%	AB	5.0%	AB	4.8%	AB	4.9%	AB	5.2%	AB	5.5%
	ONT	4.1%	ONT	4.0%	ONT	4.1%	ONT	4.1%	ONT	4.2%	ONT	4.3%	ONT	4.6%
	QUE	4.2%	QUE	4.4%	QUE	4.4%	QUE	4.4%	QUE	4.3%	QUE	4.4%	QUE	4.5%
	BC	5.7%	BC	5.5%	BC	5.3%	BC	5.3%	BC	5.2%	BC	5.0%	BC	5.1%
<b>Information and Cultural (51)</b>	AB	2.0%	AB	1.9%	AB	1.7%	AB	1.7%	AB	1.4%	AB	1.4%	AB	1.3%
	ONT	2.8%	ONT	2.5%	ONT	2.4%	ONT	2.4%	ONT	2.5%	ONT	2.3%	ONT	2.4%
	QUE	2.5%	QUE	2.3%	QUE	2.3%	QUE	2.3%	QUE	2.2%	QUE	2.0%	QUE	2.0%
	BC	2.4%	BC	2.3%	BC	2.5%	BC	2.5%	BC	2.3%	BC	2.4%	BC	2.5%
<b>Finance and Insurance (52)</b>	AB	N/A	AB	2.9%	AB	3.0%	AB	3.2%	AB	2.9%	AB	3.1%	AB	3.5%
	ONT	N/A	ONT	4.7%	ONT	5.0%	ONT	5.3%	ONT	5.3%	ONT	5.3%	ONT	5.7%
	QUE	N/A	QUE	4.1%	QUE	4.3%	QUE	4.4%	QUE	4.3%	QUE	3.9%	QUE	4.2%
	BC	N/A	BC	4.0%	BC	3.9%	BC	4.1%	BC	4.1%	BC	3.9%	BC	4.1%
<b>Real Estate, rental and leasing (53)</b>	AB	N/A	AB	2.0%	AB	2.1%	AB	1.9%	AB	2.0%	AB	2.1%	AB	2.0%
	ONT	N/A	ONT	1.8%	ONT	1.8%	ONT	1.8%	ONT	1.8%	ONT	1.8%	ONT	1.7%
	QUE	N/A	QUE	1.5%	QUE	1.5%	QUE	1.5%	QUE	1.6%	QUE	1.6%	QUE	1.3%
	BC	N/A	BC	2.1%	BC	2.0%	BC	1.9%	BC	2.1%	BC	1.9%	BC	1.9%
<b>Professional, Scientific and technical services (54,541)</b>	AB	6.0%	AB	6.1%	AB	6.4%	AB	6.3%	AB	6.4%	AB	5.9%	AB	6.1%
	ONT	5.4%	ONT	5.1%	ONT	5.6%	ONT	5.7%	ONT	5.9%	ONT	6.5%	ONT	6.9%
	QUE	4.8%	QUE	4.6%	QUE	4.9%	QUE	5.2%	QUE	5.2%	QUE	5.7%	QUE	6.2%
	BC	5.1%	BC	4.8%	BC	5.0%	BC	5.2%	BC	5.4%	BC	5.8%	BC	6.3%
<b>Management of companies and enterprises (55,551,5511)</b>	AB	0.8%	AB	0.8%	AB	0.9%	AB	1.0%	AB	0.9%	AB	1.0%	AB	1.0%
	ONT	0.8%	ONT	0.8%	ONT	0.9%	ONT	0.7%	ONT	0.7%	ONT	0.6%	ONT	0.7%
	QUE	0.6%	QUE	0.6%	QUE	0.5%	QUE	0.5%	QUE	0.6%	QUE	0.6%	QUE	0.6%
	BC	0.8%	BC	0.7%	BC	0.7%	BC	0.7%	BC	0.7%	BC	0.7%	BC	0.8%
<b>Admin and support, waste mgmt. and remediation (56)</b>	AB	4.1%	AB	4.3%	AB	4.4%	AB	4.5%	AB	4.7%	AB	4.8%	AB	4.6%
	ONT	5.0%	ONT	5.9%	ONT	6.4%	ONT	5.8%	ONT	5.8%	ONT	5.8%	ONT	5.8%
	QUE	3.9%	QUE	4.1%	QUE	4.5%	QUE	4.3%	QUE	4.6%	QUE	4.6%	QUE	4.5%
	BC	3.8%	BC	4.3%	BC	4.8%	BC	4.8%	BC	4.9%	BC	4.6%	BC	4.5%
<b>Educational Services (61)</b>	AB	7.2%	AB	7.1%	AB	6.7%	AB	6.8%	AB	6.5%	AB	7.5%	AB	7.5%
	ONT	6.7%	ONT	7.2%	ONT	7.4%	ONT	7.7%	ONT	7.8%	ONT	7.8%	ONT	8.0%
	QUE	8.1%	QUE	8.0%	QUE	7.9%	QUE	8.1%	QUE	8.5%	QUE	8.6%	QUE	8.9%
	BC	7.7%	BC	7.5%	BC	7.3%	BC	7.2%	BC	7.1%	BC	7.4%	BC	7.9%

<b>Health Care and Social Assistance (62)</b>	AB 8.7% ONT 9.0% QUE 10.7% BC 11.2%	AB 8.7% ONT 9.2% QUE 10.9% BC 10.9%	AB 8.1% ONT 9.5% QUE 11.0% BC 10.6%	AB 8.8% ONT 10.8% QUE 11.7% BC 11.5%	AB 8.8% ONT 10.9% QUE 12.2% BC 11.9%	AB 10.7% ONT 11.2% QUE 12.6% BC 11.9%	AB 11.4% ONT 11.7% QUE 13.7% BC 12.9%
<b>Arts, Entertainment and Recreation (71)</b>	AB 1.8% ONT 1.6% QUE 1.5% BC 1.8%	AB 1.8% ONT 1.7% QUE 1.6% BC 2.0%	AB 1.7% ONT 1.7% QUE 1.6% BC 1.9%	AB 1.7% ONT 1.6% QUE 1.7% BC 1.9%	AB 1.6% ONT 1.6% QUE 1.7% BC 1.9%	AB 2.0% ONT 1.8% QUE 1.7% BC 2.3%	AB 1.4% ONT 1.4% QUE 1.3% BC 1.6%
<b>Accommodation and food services (72)</b>	AB 8.6% ONT 6.8% QUE 6.4% BC 9.2%	AB 8.4% ONT 6.4% QUE 6.4% BC 9.3%	AB 8.0% ONT 6.5% QUE 6.5% BC 9.3%	AB 7.7% ONT 6.8% QUE 6.7% BC 9.6%	AB 8.2% ONT 7.2% QUE 6.9% BC 10.2%	AB 8.2% ONT 7.6% QUE 7.2% BC 10.1%	AB 6.8% ONT 5.8% QUE 5.4% BC 7.9%
<b>Other Services (81)</b>	AB 3.9% ONT 3.4% QUE 3.5% BC 3.6%	AB 4.1% ONT 3.3% QUE 3.5% BC 3.6%	AB 3.9% ONT 3.3% QUE 3.4% BC 3.5%	AB 3.9% ONT 3.4% QUE 3.4% BC 3.5%	AB 4.0% ONT 3.4% QUE 3.4% BC 3.6%	AB 3.8% ONT 3.1% QUE 3.4% BC 3.4%	AB 3.5% ONT 2.8% QUE 3.2% BC 3.2%
<b>Public Administration (91)</b>	AB 5.8% ONT 6.1% QUE 6.5% BC 6.1%	AB 5.5% ONT 6.4% QUE 6.3% BC 5.9%	AB 5.2% ONT 6.6% QUE 6.4% BC 5.6%	AB 5.5% ONT 7.1% QUE 6.9% BC 6.1%	AB 5.1% ONT 6.6% QUE 6.8% BC 5.7%	AB 5.4% ONT 6.6% QUE 6.8% BC 5.7%	AB 5.7% ONT 6.9% QUE 7.3% BC 6.1%

Source: calculations using data from Statistics Canada, Table 14-10-0202-01. Available at: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410020201>

**APPENDIX Table 2: Share of Total GDP by Two Digit Industry for Selected Provinces and Years**

Industry	2001			2004		2007		2011		2014		2019		2020	
Agriculture, forestry, fishing and hunting (11)	AB	1.6%		AB	2.2%	AB	1.6%	AB	1.7%	AB	1.6%	AB	1.8%	AB	2.2%
	ONT	0.9%		ONT	0.9%	ONT	1.0%	ONT	1.0%	ONT	1.0%	ONT	1.2%	ONT	1.5%
	QUE	2.3%		QUE	2.3%	QUE	1.8%	QUE	1.9%	QUE	1.9%	QUE	2.0%	QUE	2.1%
	BC	3.1%		BC	3.1%	BC	2.8%	BC	2.6%	BC	2.6%	BC	2.2%	BC	2.2%
Mining, quarrying and oil and gas extraction	AB	27.7%		AB	26.2%	AB	23.7%	AB	23.3%	AB	23.7%	AB	27.2%	AB	26.0%
	ONT	1.5%		ONT	1.4%	ONT	1.2%	ONT	1.2%	ONT	1.2%	ONT	0.9%	ONT	0.9%
	QUE	1.9%		QUE	1.6%	QUE	1.4%	QUE	1.5%	QUE	1.9%	QUE	2.3%	QUE	2.2%
	BC	5.7%		BC	4.9%	BC	4.2%	BC	4.6%	BC	4.4%	BC	4.3%	BC	4.5%
Utilities (22)	AB	1.8%		AB	1.7%	AB	1.5%	AB	1.4%	AB	1.4%	AB	1.4%	AB	1.5%
	ONT	2.1%		ONT	2.2%	ONT	2.1%	ONT	2.1%	ONT	2.0%	ONT	1.9%	ONT	1.9%
	QUE	3.0%		QUE	3.0%	QUE	3.4%	QUE	3.5%	QUE	3.5%	QUE	3.4%	QUE	3.4%
	BC	1.9%		BC	2.1%	BC	2.3%	BC	2.2%	BC	2.1%	BC	1.9%	BC	2.1%
Construction (23)	AB	7.6%		AB	7.9%	AB	9.9%	AB	9.9%	AB	11.7%	AB	7.3%	AB	7.0%
	ONT	6.6%		ONT	6.7%	ONT	6.8%	ONT	6.7%	ONT	6.7%	ONT	6.8%	ONT	7.2%
	QUE	5.7%		QUE	6.7%	QUE	6.3%	QUE	7.0%	QUE	6.5%	QUE	6.5%	QUE	6.7%
	BC	5.8%		BC	6.7%	BC	7.5%	BC	7.4%	BC	8.3%	BC	8.8%	BC	9.5%
Manufacturing (31-33)	AB	9.6%		AB	8.9%	AB	9.2%	AB	8.2%	AB	7.4%	AB	7.3%	AB	7.1%
	ONT	18.4%		ONT	17.8%	ONT	15.5%	ONT	12.7%	ONT	12.5%	ONT	11.7%	ONT	11.0%
	QUE	19.5%		QUE	17.6%	QUE	16.3%	QUE	14.0%	QUE	13.7%	QUE	13.5%	QUE	13.0%
	BC	8.8%		BC	8.7%	BC	8.4%	BC	7.1%	BC	7.0%	BC	6.7%	BC	6.4%
Wholesale Trade (41)	AB	4.2%		AB	4.3%	AB	4.5%	AB	4.8%	AB	4.6%	AB	4.2%	AB	4.3%
	ONT	5.4%		ONT	5.5%	ONT	6.1%	ONT	6.4%	ONT	6.7%	ONT	6.5%	ONT	6.7%
	QUE	4.8%		QUE	4.9%	QUE	5.4%	QUE	5.3%	QUE	5.5%	QUE	5.3%	QUE	5.6%
	BC	3.8%		BC	4.0%	BC	4.1%	BC	3.8%	BC	4.0%	BC	3.7%	BC	3.8%
Retail Trade (44-45)	AB	3.5%		AB	3.6%	AB	4.2%	AB	4.1%	AB	4.2%	AB	4.0%	AB	4.2%
	ONT	4.5%		ONT	4.8%	ONT	4.9%	ONT	4.9%	ONT	4.8%	ONT	4.9%	ONT	5.0%
	QUE	5.2%		QUE	5.4%	QUE	5.7%	QUE	5.8%	QUE	5.9%	QUE	5.8%	QUE	6.0%
	BC	5.4%		BC	5.5%	BC	5.8%	BC	5.8%	BC	5.8%	BC	5.7%	BC	5.9%
Transportation and warehousing (48-49)	AB	4.4%		AB	4.3%	AB	4.5%	AB	4.4%	AB	4.2%	AB	4.7%	AB	4.2%
	ONT	3.9%		ONT	3.6%	ONT	3.7%	ONT	3.8%	ONT	3.9%	ONT	4.0%	ONT	3.2%
	QUE	4.3%		QUE	4.1%	QUE	4.2%	QUE	4.0%	QUE	4.1%	QUE	4.4%	QUE	3.6%
	BC	5.8%		BC	5.5%	BC	5.3%	BC	5.3%	BC	5.5%	BC	6.0%	BC	4.9%

<b>Information and Cultural (51)</b>	AB ONT QUE BC	2.1% 3.5% 3.2% 3.2%	AB ONT QUE BC	2.4% 3.8% 3.3% 3.7%	AB ONT QUE BC	2.4% 3.8% 3.3% 3.7%	AB ONT QUE BC	2.4% 3.8% 3.3% 3.5%	AB ONT QUE BC	2.1% 3.8% 3.1% 3.5%	AB ONT QUE BC	2.2% 4.0% 3.3% 3.5%	AB ONT QUE BC	2.4% 4.1% 3.3% 3.7%
<b>Finance and Insurance (52)</b>	AB ONT QUE BC	3.2% 7.8% 5.1% 5.4%	AB ONT QUE BC	3.2% 7.7% 5.4% 5.4%	AB ONT QUE BC	3.5% 8.5% 5.9% 5.7%	AB ONT QUE BC	3.7% 8.4% 5.6% 5.7%	AB ONT QUE BC	3.5% 8.8% 5.7% 5.5%	AB ONT QUE BC	4.0% 9.8% 6.3% 5.9%	AB ONT QUE BC	4.6% 10.8% 6.9% 6.2%
<b>Real Estate, rental and leasing (53)</b>	AB ONT QUE BC	8.5% 11.7% 9.3% 15.3%	AB ONT QUE BC	8.7% 11.8% 9.7% 15.6%	AB ONT QUE BC	8.8% 12.0% 10.1% 15.9%	AB ONT QUE BC	9.5% 12.9% 10.8% 17.4%	AB ONT QUE BC	9.4% 13.0% 11.2% 17.9%	AB ONT QUE BC	10.5% 13.1% 11.2% 18.1%	AB ONT QUE BC	11.4% 14.0% 11.9% 19.6%
<b>Professional, Scientific and technical services (54)</b>	AB ONT QUE BC	5.2% 6.4% 5.4% 5.2%	AB ONT QUE BC	5.3% 6.2% 5.5% 5.1%	AB ONT QUE BC	5.6% 6.4% 5.5% 5.7%	AB ONT QUE BC	5.8% 6.4% 5.9% 5.6%	AB ONT QUE BC	5.9% 6.5% 6.1% 6.2%	AB ONT QUE BC	4.8% 7.2% 6.5% 6.6%	AB ONT QUE BC	4.8% 7.4% 6.9% 6.8%
<b>Management of companies and enterprises (55)</b>	AB ONT QUE BC	0.7% 0.6% 0.6% 0.7%	AB ONT QUE BC	0.7% 0.7% 0.7% 0.7%	AB ONT QUE BC	0.7% 0.7% 0.7% 0.7%	AB ONT QUE BC	0.7% 0.7% 0.7% 0.7%	AB ONT QUE BC	0.6% 0.7% 0.7% 0.6%	AB ONT QUE BC	0.3% 0.4% 0.4% 0.3%	AB ONT QUE BC	0.3% 0.4% 0.3% 0.3%
<b>Admin and support, waste mgmt. and remediation (56)</b>	AB ONT QUE BC	2.1% 3.1% 2.6% 2.2%	AB ONT QUE BC	2.3% 3.4% 2.8% 2.4%	AB ONT QUE BC	2.4% 3.5% 2.9% 2.8%	AB ONT QUE BC	2.3% 3.2% 2.9% 2.5%	AB ONT QUE BC	2.4% 3.3% 2.9% 2.5%	AB ONT QUE BC	2.4% 3.1% 2.7% 2.4%	AB ONT QUE BC	2.3% 2.9% 2.5% 2.1%
<b>Educational Services (61,611)</b>	AB ONT QUE BC	3.7% 5.2% 5.9% 5.5%	AB ONT QUE BC	3.8% 5.3% 5.9% 5.3%	AB ONT QUE BC	3.6% 5.7% 5.9% 5.3%	AB ONT QUE BC	3.7% 6.0% 6.0% 5.5%	AB ONT QUE BC	3.4% 6.0% 6.1% 5.2%	AB ONT QUE BC	3.8% 5.7% 5.9% 5.2%	AB ONT QUE BC	3.8% 5.6% 5.9% 5.1%
<b>Health Care and Social Assistance (62)</b>	AB ONT QUE BC	4.9% 6.6% 8.4% 8.4%	AB ONT QUE BC	5.1% 6.7% 8.3% 7.8%	AB ONT QUE BC	4.9% 6.7% 8.3% 7.3%	AB ONT QUE BC	5.2% 7.1% 8.3% 7.4%	AB ONT QUE BC	4.9% 6.8% 8.3% 7.1%	AB ONT QUE BC	5.7% 6.7% 8.1% 7.0%	AB ONT QUE BC	5.8% 6.6% 8.2% 6.7%
<b>Arts, Entertainment and Recreation (71)</b>	AB ONT QUE BC	0.6% 1.1% 1.1% 1.2%	AB ONT QUE BC	0.6% 1.0% 1.0% 1.2%	AB ONT QUE BC	0.5% 0.9% 1.0% 1.1%	AB ONT QUE BC	0.5% 0.8% 0.9% 1.0%	AB ONT QUE BC	0.5% 0.8% 0.9% 1.0%	AB ONT QUE BC	0.6% 0.8% 0.9% 1.0%	AB ONT QUE BC	0.4% 0.5% 0.5% 0.7%
<b>Accommodation and food services (72)</b>	AB ONT QUE BC	2.2% 2.1% 2.2% 3.4%	AB ONT QUE BC	2.1% 1.9% 2.4% 3.2%	AB ONT QUE BC	2.0% 1.8% 2.3% 3.0%	AB ONT QUE BC	2.0% 1.9% 2.2% 2.9%	AB ONT QUE BC	2.1% 2.0% 2.3% 2.9%	AB ONT QUE BC	2.1% 2.0% 2.3% 2.9%	AB ONT QUE BC	1.6% 1.4% 1.6% 2.1%
<b>Other Services (81)</b>	AB ONT QUE BC	1.9% 2.1% 2.2% 2.6%	AB ONT QUE BC	1.9% 2.1% 2.3% 2.5%	AB ONT QUE BC	1.9% 2.0% 2.3% 2.4%	AB ONT QUE BC	2.0% 2.0% 2.3% 2.4%	AB ONT QUE BC	2.0% 2.0% 2.2% 2.3%	AB ONT QUE BC	2.0% 1.9% 2.1% 2.2%	AB ONT QUE BC	1.8% 1.7% 1.9% 1.9%
<b>Public Administration (91)</b>	AB ONT QUE BC	4.2% 6.5% 7.1% 6.4%	AB ONT QUE BC	4.3% 6.7% 7.2% 6.1%	AB ONT QUE BC	4.2% 7.0% 7.2% 5.8%	AB ONT QUE BC	4.5% 7.9% 8.0% 6.5%	AB ONT QUE BC	4.2% 7.2% 7.6% 5.7%	AB ONT QUE BC	4.6% 7.2% 7.4% 5.4%	AB ONT QUE BC	4.9% 7.4% 7.7% 5.6%

Source: Calculations using data from Statistics Canada, Table 36-10-0402-02, available at: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610040202>

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