

The Outlook for Growth in British Columbia's Private Sector

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Contents

Executive Summary / i

Introduction / 1

Determinants of Growth in British Columbia's Private Sector, 2000–2018 / 3

Outlook for the Growth of Labour / 8

Outlook for the Growth of Labour Productivity / 14

Policy Suggestions / 20

Concluding Comments / 22

References / 24

About the authors / 29

Acknowledgments / 29

Publishing Information / 30

Supporting the Fraser Institute / 30

Purpose, Funding, and Independence / 31

About the Fraser Institute / 31

Editorial Advisory Board / 32

Executive Summary

British Columbia's economy over the period from 2010 to 2019 enjoyed faster real economic growth than other Canadian provinces, on average. The primary source of British Columbia's economic performance was an exceptionally strong residential housing market associated with an above-average rate of population growth. Conversely, the growth of investment in machinery and equipment and intellectual property products, such as software, was slower in British Columbia than the average for the rest of Canada.

Capital expenditures in machinery and equipment and intellectual property are primary drivers of labour productivity growth. Hence, it is not surprising that, while British Columbia also enjoyed above-average growth in labour productivity from 2010 to 2019, the out-performance was quite modest relative to the substantially faster rate at which its Gross Domestic Product (GDP) grew.

This study focuses on the outlook for the British Columbia's economy over the next two or so decades. While the ongoing COVID-19 public-health emergency and its associated economic crisis makes any economic outlook uncertain, there are reasons for concern that private-sector economic growth in British Columbia will be slower, in both absolute and relative terms, over the next two decades compared with recent experience, even after the COVID-19 crisis ends. A prominent reason for concern is the potential for a significant slowdown in the growth of the province's labour force. The growth of the labour force reflects the growth of the working-age population multiplied by the share of the working-age population that is employed in the workforce. A slowing rate of growth of the working-age population might be expected, in part, because of the province's high cost of housing and relatively low average income level.

Relatively unaffordable housing arguably has contributed to a net interprovincial out-migration from British Columbia over the recent past, which leaves the province reliant on immigration as a source of population growth. While immigration to the province has remained relatively strong, it might weaken significantly even after restrictions on international travel prompted by COVID-19 are lifted. In particular, immigration to British Columbia has been disproportionately from China. Continued rapid economic growth in China combined with steadily rising incomes in that country, especially for technology-related jobs, might render this traditional source of British Columbia's population growth less significant in future years.

To the extent that the rate of growth of British Columbia's labour force slows, real economic growth will increasingly rely on a faster rate of productivity growth. Improvements in productivity derive primarily from investments in physical and human capital that foster the introduction and spread of new technology. As noted above, the province's investment in the main asset categories contributing to productivity improvements has been relatively slow. Moreover, the province performs relatively poorly on measures of technological intensity such as patenting and employment in technology-intensive industries.

Recent surveys have identified the Vancouver Metropolitan Area as having a relatively abundant supply of scientific and engineering talent, and wage rates for STEM workers are relatively low in Metro Vancouver compared to cities in the United States that are considered to be technology hubs. Indeed, a number of US companies such as Microsoft and Amazon have established regional facilities in Vancouver. However, the province has a dearth of what has been identified as anchor firms, large firms that have headquarters in a location and whose presence contributes to labour-market mobility, technology spinoffs and start-up companies, and other phenomena associated with thriving technology hubs.

The dearth of anchor firms in technology-intensive industries arguably reflects in part the province's tax structure, which imposes a substantial penalty on business growth in the form of a substantial increase in the provincial tax rate once a company reaches \$500,000 in annual revenues. The province's retail tax also increases the cost to companies of investing in capital assets such as machinery and equipment. Appropriate changes in the tax structure facing the province's business sector would encourage the emergence and growth of local anchor firms.

As well, while relatively low wages for technology workers are a short-term incentive for firms such as Microsoft to establish regional facilities in the province, the sustained growth of a thriving technology hub requires an on-going inflow of highly skilled scientific, engineering, and entrepreneurial talent. Research suggests that expected after-tax disposable income is the most important feature of a location that matters to star scientists and engineers. In this regard, the high marginal (federal + provincial) tax rates on upper-income workers in British Columbia compared to taxes in US states is another obstacle to developing a large and thriving technology hub in the province. Relatively unattractive disposable incomes for high-quality technology talent are exacerbated by the high cost of housing in the Lower Mainland of the province.

Introduction

Over the period from 2010 to 2019, British Columbia's real gross domestic product (GDP) grew at almost twice the average rate of that found in the other nine provinces.¹ An important reason for British Columbia's relatively strong economic growth is that the province's population and employment levels also grew at an above-average rate compared to the rest of Canada. Conversely, average hourly wages of full-time and part-time employees in British Columbia increased at a slower rate than the average increase across other provinces, which suggests that payments to other factors of production, including landowners, were disproportionately large compared to the rest of Canada.²

The relatively fast growth of British Columbia's population over the past decade increased the demand for residential housing construction—both new home-building and renovations—as well as complementary activities such as real-estate marketing and sales and architectural services. The growth of residential housing assets in British Columbia therefore substantially exceeded the growth of this asset category in other provinces.³ However, over the same period, capital investment in productivity-enhancing assets such as machinery and equipment and intellectual property such as software in British Columbia lagged such investment in the rest of Canada. This indicates relatively weak output growth across a range of other industries. Unless recent patterns change, private-sector growth in the province will continue to rely on a rising population and strong growth in the narrow range of industrial activity encompassing residential housing construction and supporting goods and services.⁴

It is difficult to predict future developments in the residential housing sector, especially in light of possible long-run changes in patterns of working from home and attitudes towards commuting brought about by the ongoing COVID-19 pandemic. Nevertheless, it seems fair to say that it is risky to tie the province's economic future so closely to a narrow set of industrial activities that are highly cyclical in nature and depend on relatively strong population growth and generate relatively low-paying jobs. More industrially balanced economic growth will require improvements in the competitiveness of sectors of the BC economy beyond residential housing. In particular, it will require increases in the supply of educated and skilled workers, as well as associated improvements in the environment for entrepreneurship and innovation.

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1. GDP is a measure of the total value of output (and, therefore, income) produced in the domestic economy.
 2. For a discussion of British Columbia's economic performance over the past decade, see Globerman, 2020.
 3. For evidence on this latter point, see Globerman, 2020 and Finlayson and Peacock, 2016.
 4. Various liquefied natural-gas facilities have been proposed in British Columbia. Two major projects have been approved, including the Kitimat LNG project. These investments will obviously help promote private -sector growth in the province.

It is relevant to underscore that, while residential housing and related services have played an important role in British Columbia's recent economic growth, the housing sector actually constitutes a relatively small part of the overall provincial economy.⁵ It is difficult using available information on industrial output to precisely define the sectors whose output is directly or indirectly tied to residential housing. For example, it is impossible to determine the percentage of the output produced by architectural, design, and legal organizations that reflects work done exclusively for residential housing transactions. For purposes of illustration, we define the residential housing sector as consisting of residential building construction, furniture and home furnishing stores, and offices of real estate agents and brokers.⁶ In 2010, these three industries collectively accounted for approximately 5% of British Columbia's GDP as compared to 4% of Canada's total GDP. In 2017, the three industries accounted for around 6.4% of British Columbia's GDP and 4.3% of Canada's total GDP.

While the absolute and relative (to other provinces) recent increase in economic activity related to residential housing in British Columbia is underscored by the preceding data, the data also suggest the need to improve the competitiveness of other private-sector industries in the province given that residential real estate is a modest, albeit significant, source of private-sector output and employment in the province. Ultimately, real economic growth depends upon the growth of the workforce and improvements in the productivity of the workforce. Therefore, any assessment of the longer-run economic growth rate for British Columbia must address the outlook for these two phenomena.

This study has several purposes. One is to review the behaviour of two main potential sources of economic growth: the growth of labour and the growth of labour productivity over the period from 2000 to 2018 and to compare the performance of British Columbia to that of other provinces along these two dimensions. A second is to discuss the determinants of these two main sources of growth and assess their future prospects as they apply to British Columbia's private sector. In this context, residential housing can have an important influence on both the supply of labour and labour productivity growth, as will be discussed in later sections. A third is to identify government policies that are likely to influence private-sector growth in the province going forward and to recommend policy changes that promise to improve private-sector growth. The post-COVID 19 economic recovery of the BC economy will depend heavily upon renewed growth of the province's private sector, and government policies that encourage private-sector economic growth are therefore especially important.

5. To be sure, complementary activities such as real-estate brokerage and mortgage banking services indirectly add to the economic size of the housing sector.

6. The definition of these sectors and their output estimates are provided in Statistics Canada, table 36-10-0488-01.

Determinants of Growth in British Columbia's Private Sector, 2000–2018

Equation 1 states a simple identity for economic growth. Namely, the value of output (Q) produced in an economy (Gross Domestic Product or GDP) equals the amount of labour (L) used to produce output multiplied by the amount of output produced per unit of labour (Q/L). Hence, GDP growth will equal the growth in labour input plus the growth in the productivity of labour.

$$Q = L \times Q/L \quad 1$$

Table 1 reports index values for real gross domestic product (base year 2012) of all business-sector industries for British Columbia and for each of the other nine other provinces, respectively, for the years 2000, 2010, and 2018.⁷ The focus in this study is on the future of private sector business activity. Hence, public sector output is excluded from the analysis.⁸ The data reported in table 1 show a consistent improvement over the period in British Columbia's real private-sector economic growth, both absolutely and relative to other provinces. The improvement primarily occurred in the post-2010

Table 1: Index of real GDP (2012 = 100) for business-sector industries across Canada in 2000, 2010, and 2018

	2000	2010	2018
Newfoundland & Labrador	69.5	103.1	100.0
Prince Edward Island	87.3	97.3	117.9
Nova Scotia	90.9	102.8	107.0
New Brunswick	91.2	102.3	104.7
Quebec	84.3	96.2	113.1
Ontario	87.0	95.6	116.3
Manitoba	77.5	94.6	113.8
Saskatchewan	79.5	92.4	110.1
Alberta	69.5	89.2	109.9
British Columbia	76.7	94.6	122.2

Source: Statistics Canada, table 36-10-0211-01.

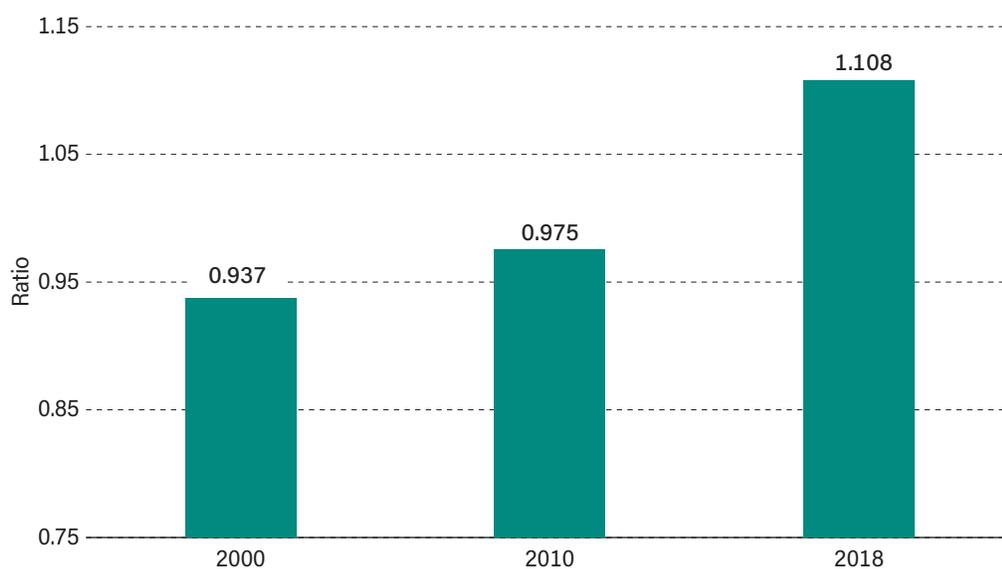
7. Business-sector industries notably exclude education, health care, and public administration.

8. By way of perspective, public-sector employment as a share of total employment in British Columbia averaged 18% over the period from 2015 to 2019 (Whalen and Globerman, 2020).

period. Whereas seven other provinces enjoyed higher real GDP index values in 2000, and six other provinces had higher index values in 2010, British Columbia had the highest index value in 2018. Over the full period from 2000 to 2018, British Columbia's index of real GDP increased by 45.5 percentage points. The next closest province, Alberta, saw an increase in its index of real GDP of 40.4 percentage points. Almost two thirds of the increase in the index of real GDP for British Columbia took place after 2010.

The out-performance of British Columbia's economy compared to other provinces as measured by an index of real GDP is summarized in **figure 1**, which shows the ratio of the province's index of real GDP to the simple (unweighted) average of the other nine provinces calculated using the data reported in table 1. In 2000 and 2010, British Columbia's index of real GDP was below the simple average of the other Canadian provinces, although the ratio did increase modestly (by around 4%) between 2000 and 2010. By contrast, the ratio increased by around 11% between 2010 and 2018, signalling that British Columbia's real GDP growth substantially out-paced that of other provinces in the post-2010 period.

Figure 1: Ratio of index of British Columbia's **real GDP** to the averaged indices of the other nine provinces, 2000, 2010, and 2018



Sources: Statistics Canada, table 36-10-0211-01; calculation by author.

Growth in real GDP reflects the growth in labour input and the growth of labour productivity. Labour productivity measures the value of real GDP produced per unit of labour input. Table 2 and table 3 provide insight into the determinants of the real GDP growth experiences of the various provinces. **Table 2** reports index values for labour input (base year 2012) for each of the provinces in 2000, 2010, and 2018, while **table 3** reports index values for the individual provinces for labour productivity in the same three years.

Table 2: Index of labour input (2012 = 100) for business-sector industries across Canada in 2000, 2010, and 2018

	2000	2010	2018
Newfoundland & Labrador	77.7	87.0	91.4
Prince Edward Island	80.5	91.6	108.1
Nova Scotia	89.2	99.7	99.2
New Brunswick	95.3	100.6	100.3
Quebec	88.0	97.5	109.3
Ontario	88.6	96.5	109.6
Manitoba	91.2	96.8	105.6
Saskatchewan	81.7	92.9	101.9
Alberta	69.7	90.7	104.6
British Columbia	87.3	97.9	109.3

Source: Statistics Canada, table 36-10-0211-01.

Table 3: Index of labour productivity (2012 = 100) for business-sector industries across Canada in 2000, 2010, and 2018

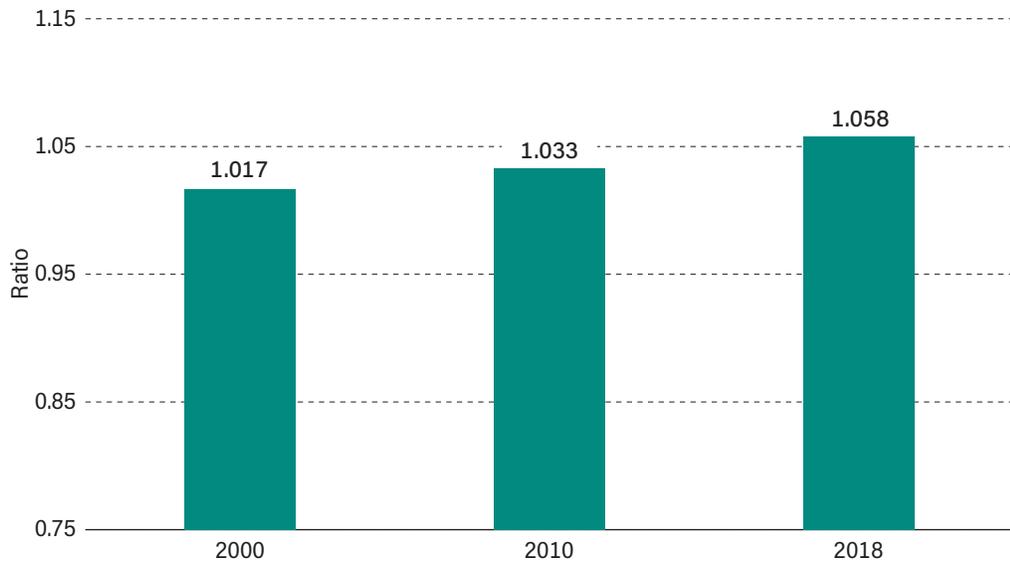
	2000	2010	2018
Newfoundland & Labrador	85.0	117.7	111.7
Prince Edward Island	89.9	104.3	109.9
Nova Scotia	97.0	102.0	108.5
New Brunswick	91.1	101.1	106.0
Quebec	91.3	97.8	105.6
Ontario	93.4	98.6	107.6
Manitoba	80.1	96.2	109.1
Saskatchewan	88.6	98.1	111.9
Alberta	95.2	96.2	107.8
British Columbia	86.0	96.2	111.9

Source: Statistics Canada, table 36-10-0211-01.

Figure 2 shows the ratio of British Columbia's labour index to the simple average of the labour index for the other nine provinces, while **figure 3** shows a comparable ratio for labour productivity.

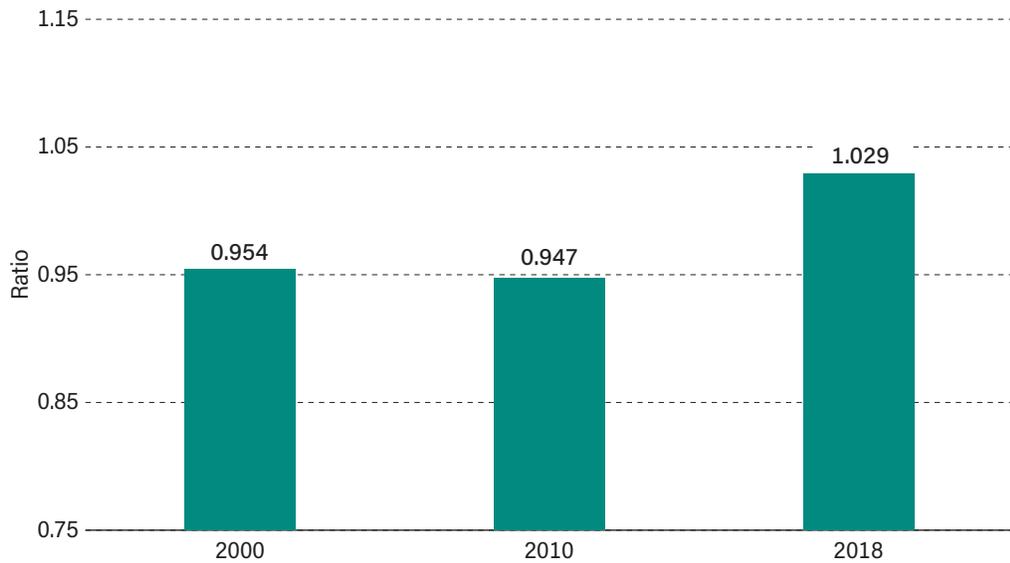
Table 2 and figure 2 show that British Columbia had a larger increase in labour input than other provinces, on average, over the period from 2000 to 2018, which is consistent with Globerman's (2020) finding that employment growth in British Columbia outpaced

Figure 2: Ratio of index of British Columbia's **labour input** to the averaged indices of the other nine provinces, 2000, 2010, and 2018



Sources: author's calculations from table 2.

Figure 3: Ratio of index of British Columbia's **labour productivity** to the averaged indices of the other nine provinces, 2000, 2010, and 2018



Sources: author's calculations from table 3.

employment growth in the rest of Canada over that period. The ratio shown in figure 2 increased by about 1.6% between 2000 and 2010 and by 2.4% between 2010 and 2018. While the ratio of labour productivity in British Columbia relative to other provinces declined slightly between 2000 and 2010, it increased by 8.7% between 2010 and 2018. Hence, faster growth of real GDP in British Columbia compared to other provinces between 2010 and 2018 reflects a faster growth in both labour input and labour productivity, with the latter being a more important contributor than the former.

The data presented to this point suggests that the likelihood of British Columbia's future economic growth out-performing growth in other provinces depends upon whether its labour force and its labour productivity will continue to grow more strongly than theirs. The next section considers prospects for these developments.

Outlook for the Growth of Labour

As noted in the preceding section, the faster growth of British Columbia's labour force compared to the other provinces and particularly after 2010 is consistent with the above-average (for Canada) population growth in the province.⁹ For Canada as a whole, population grew by 10.8% between 2010 and 2019, which is well below British Columbia's population growth of 14.3%.¹⁰ By comparison, the employed labour force increased by 13.6% in Canada from 2010 to 2018, while it expanded by 15% in British Columbia over the same period.¹¹ The slower growth of British Columbia's labour force relative to its population growth compared to the rest of Canada suggests that the growth rate of its labour force participation was below that of the average for all of Canada. Indeed, over the period from 2010 to 2019, British Columbia's labour force participation rate was 64.7 compared to 66.3 for Canada overall.¹² Hence, any future slowing down of British Columbia's population growth relative to the rest of Canada will tend to dampen its relative growth prospects unless its labour force participation rate increases relative to Canada's labour force participation rate.

Projected population growth

Table 4 reports population growth projections for Canada and for British Columbia for the period 2019 to 2030 under three scenarios: low growth, medium growth, and high growth.¹³ The projections reported in table 4 suggest that British Columbia's population will grow at about the same rate as it will in the rest of Canada and, perhaps, even slightly slower. To the extent the projections are accurate, they are a sharp contrast to recent experience from 2010 to 2019 as reported above. By itself, relatively slower future population growth in British Columbia implies slower labour-force growth compared to the rest of Canada, holding the labour force participation rate constant. In this regard, Martel

9. Population growth, specifically increases in the working-age population, is typically the main contributor to increases in the labour force. The influence of population growth on labour-force growth is mediated by changes in the employment-to-population ratio.

10. Author's calculations from Statistics Canada, table 17-10-0009-01 using fourth-quarter estimates for the beginning and end years.

11. Author's calculations from Statistics Canada, table 14-10-0287-03. The calculations are based on fourth quarter estimates in the beginning and end years.

12. Author's calculation from Statistics Canada, table 14-10-0287-03. The calculation was done using June as a representative month for each year and for all individuals 15 years and older.

13. See Statistics Canada, table 17-10-0057-01. There are actually three medium-growth scenarios reported, although the differences among them are modest. Medium-growth scenario M1 is used for the calculations in table 4.

Table 4: Projections for growth (%) of the population in Canada and British Columbia under three scenarios, 2019-2030

	Low growth	Medium growth	High growth
Canada	7.96%	11.80%	16.00%
British Columbia	7.30%	11.60%	16.10%

Source: Statistics Canada, table 17-10-0057-01.

(2014) projects a faster-than-average decline in British Columbia's labour force participation rate over the period from 2017 to 2036. In particular, the labour force participation rate for the Vancouver Census Metropolitan Area (CMA) is projected to decline from 67.4% in 2017 to 62.7% in 2036. For CMAs in other parts of British Columbia the rate is expected to decline from 62.1% to 56.8% over that period.

There are reasons to expect that British Columbia's future population growth will slow relative to other provinces. One possibly important reason is significantly less affordable housing in British Columbia, especially in the Lower Mainland, compared to elsewhere in Canada, with the exception of the Greater Toronto Area (GTA). All else constant, higher shelter costs relative to household incomes discourages in-migration to a region and may also encourage greater out-migration. **Table 5** provides data supporting the popular understanding of the relatively high cost of shelter relative to household incomes in the main areas of British Columbia, namely the Vancouver Metropolitan Area, compared to other parts of Canada.

Table 5: Indices of prices of new houses, apartment rents, and median after-tax incomes (Vancouver = 100) for selected cities across Canada, 2018

	Prices of new houses	Apartment rents	Median after-tax incomes
Vancouver	100	100	100
Victoria	72	82	100
Edmonton	45	74	117
Calgary	59	78	117
Saskatoon	40	67	100
Winnipeg	40	69	97
London	51	66	107
Toronto	111	99	107
Montreal	35	55	86
Quebec City	24	54	86
Halifax	42	70	84
St. John's	36	59	93

Sources: Statistics Canada, 2019, 2020, table 34-10-0133-01; author's calculations.

Housing affordability

Table 5 reports an index of new house prices where the price for Metropolitan Vancouver is the denominator of the index.¹⁴ Hence, the value of the index for Metropolitan Vancouver equals 100, while the index values of new house prices for other cities included in table 5 are determined by dividing the estimates for new house prices for each city by the estimate for Vancouver. A similar index series is reported for average rents for single-bedroom apartments using the average rent for Metropolitan Vancouver as the denominator of the index. The measure of income used, that is, median after-tax household income, is available at the provincial level. However, since the majority of the populations in each province live in the major metropolitan areas of those provinces, a provincial measure of household income should be a reasonably good estimate of household income in the metropolitan areas included in table 5.¹⁵ Hence, the last column in table 5 reports the ratio of the after-tax household income for the province in which the metropolitan area is located to the after-tax household income in British Columbia.

What is obvious from table 5 is that only Toronto approaches Vancouver in terms of the unaffordability of housing. Indeed, even Victoria is relatively unaffordable from the perspective of shelter costs relative to income. Specifically, both new house prices and rents in the Vancouver and Victoria CMAs are high compared to other Canadian metropolitan areas, while the median after-tax household income in British Columbia is lower or approximately equal to that of most other provinces. While housing affordability is only one, albeit important, factor influencing decisions to relocate, it seems fair to say that unless housing affordability improves in British Columbia's major metropolitan regions, those areas are likely to be less successful competing for new residents compared to other metropolitan areas in Canada than in the past decade.¹⁶

This latter concern might be less relevant to international immigration, an issue considered below. However, there is some evidence that inter-provincial net migration patterns have become less favourable for in recent years. For example, comparing 2015/2016 to 2019/2020, net out-migration from British Columbia to other provinces increased by about 18%, while net in-migration from other provinces declined by 9.6%.¹⁷

14. House prices for other cities also reflect the CMAs of those cities.

15. New house prices are reported in Statistics Canada, 2019. Apartment rents are reported in Statistics Canada, table 34-10-0133-01. Median after-tax household incomes are reported in Statistics Canada, 2020.

16. The increase in shelter costs in British Columbia's major cities reflect the relatively fast growth in population in the province. It also reflects a relatively weak supply response to increased demand for housing, particularly in the Vancouver Metropolitan Area, related to regulations that restrict density and increase construction costs. For evidence on this latter point, see CMHC, 2018. For an argument that demand-side factors dominated supply-side influences on Vancouver shelter costs, see Gordon, 2020.

17. Author's calculations from data reported in Statistics Canada, table 17-10-0022-01.

International immigration

In considering possible population growth and the related growth in the labour force for British Columbia relative to other regions of Canada, it is necessary to focus on immigration, as population demographers project that immigration will account for virtually all of Canada's population increase over the next decade (el-Assai, 2020). The federal government's target for immigration will obviously have a major influence on population growth in Canada's metropolitan areas and estimates of new immigrant arrivals are built into the population forecasts set out in table 4. However, the population forecasts for British Columbia might prove overly optimistic.

One possible reason is the additional and increased taxes placed on real estate by the BC Government to discourage "speculation" and reduce housing demand by non-residents. The Speculation and Vacancy Tax was enacted in 2018. Its application is based on several criteria including the property owner's residency status and where property owners earn and report their incomes. In addition, the tax rate varies based on whether the property owner is a Canadian citizen, a permanent resident of Canada or a "satellite" family.¹⁸ The purposes of the tax are to promote the renting of houses that would otherwise be vacant and to ensure that foreign owners and those with primarily foreign income contribute to the province's income-tax system. Properties deemed to be empty faced a 2% tax on the properties' values in 2019 if owned by foreigners and 0.5% for properties owned by Canadian citizens or permanent residents (IMF, 2019). The BC Government also imposes a surcharge on its general property-transfer tax that applies to non-Canadians. Specifically, foreign nationals and foreign companies must pay an additional 20% on the deemed property-transfer tax when buying a home in most parts of British Columbia.¹⁹ Separately, the City of Vancouver implemented an Empty Homes Tax in 2017. Properties deemed empty were subject to a tax of 1% of the property's assessed taxable value.²⁰ The tax does not apply to principal residences or homes that are occupied for at least six months of the year.

While non-residents are not part of the provincial labour force, discouraging ownership of residential property might indirectly discourage future applications for residency by foreign nationals planning or considering relocating to Canada. On the other hand, the taxes were ostensibly introduced to dampen the growth of shelter costs. To the extent they are doing so, they might improve housing affordability, particularly in the Lower Mainland, which, in turn, could encourage population inflows from other

18. A satellite family is one where the main income earner resides outside Canada.

19. See Government of British Columbia (undated a). It might be noted that a comparable non-resident tax surcharge was also introduced for Toronto by Ontario's government.

20. The tax will increase to 1.25% in 2021 (City of Vancouver, undated).

provinces and countries. However, while there is no definitive evidence bearing on this latter possibility of which I am aware, the impact of these various tax initiatives on shelter costs has arguably been limited to date. For one thing, foreign investors in Vancouver favour more expensive properties that may be unaffordable for most other immigrants to the province, including people from other provinces (CMHC, 2018).²¹ For another, foreign investors do not seem to have been significantly affected by the taxes imposed or increased by the province and the City of Vancouver over the past few years (Gordon, 2020).²²

A more important possible reason to anticipate a slowdown in the rate of immigration to British Columbia's Lower Mainland is related to the historical importance of immigrants of Chinese ancestry. Over the period from 2011 to 2016, around 22% of permanent immigrants to British Columbia were from the People's Republic of China.²³ The likelihood that China's economy will continue to grow at a substantially faster rate than Canada's economy combined with more career and business opportunities in China for STEM-trained and other university graduates suggest that an increasing percentage of university-trained workers will remain in China rather than emigrate in future years. In addition, a growing percentage of Chinese students (and other international students) may choose to do their university education in China rather than in Canadian universities, as China continues to make major investments in its higher education system and bolsters its research capabilities (el-Assal, 2020).²⁴

Since the Canadian Government has announced an increase in the target number of immigrants to be accepted to Canada after the COVID-19 pandemic, it is certainly reasonable to expect that British Columbia will receive an absolutely greater number of immigrants over the next decade.²⁵ However, it is also reasonable to expect, for the rea-

21. Moreover, over 99% of British Columbians have been exempted from the speculation and vacancy tax (Government of British Columbia, undated b).

22. CMHC (2018) cites a Statistics Canada survey from 2017 reporting that non-residents accounted for slightly less than 5% of residential properties in Vancouver. Smith (2020) notes a recent drop off in Vancouver real-estate transactions from foreign buyers who have been unable to travel and visit properties in person because of COVID-19 travel restrictions. However, Smith argues that foreign buyers of luxury properties are likely to return to the Vancouver market after travel restrictions are lifted.

23. Statistics Canada, 2019. Around 81% of all immigrants to British Columbia during that time period chose Vancouver as their place of residence.

24. In his article, el-Assal (2020) notes that half of Canada's international students indicate that they wish to become permanent residents. Of the students in British Columbia's post-secondary system, almost 40% were from China over the past decade (Heslop, 2018).

25. The current uncertainty surrounding Hong Kong's governance increases the possibility of many holders of Canadian passports currently living in Hong Kong migrating to Canada.

sons mentioned earlier, that the advantage British Columbia enjoyed over other provinces from 2010 to 2019 as a result of the growth of its population and labour force will be reduced, if not reversed. If so, a prominent source of British Columbia's relatively strong economic growth over the past decade, that is, faster population and employment growth rates, will be undermined.²⁶ To the extent this occurs, a greater burden will be placed on labour productivity growth as the principal source of private-sector growth in the province.

26. A projected aging of British Columbia's population will also dampen employment growth. Ip and Lavoie (2019) project that the proportion of the working-age population in British Columbia will decline from around 62% in 2019 to 45% by 2041.

Outlook for the Growth of Labour Productivity

Given the real possibility that the provincial labour force will grow at a significantly slower rate over the next decade compared to the previous decade, one can infer that the growth of labour input will be a weaker contributor to provincial economic growth. This implies that labour productivity improvements will need to accelerate if British Columbia's relatively rapid economic growth is to be sustained going forward.

As noted earlier in the essay, British Columbia's labour productivity performance relative to other provinces worsened during the period from 2000 to 2010 but then improved between 2010 and 2018. Finlayson and Williams (2018) note that over the period from 2012 to 2017, British Columbia had the third-highest labour productivity growth rate in Canada, behind only Newfoundland & Labrador and Saskatchewan. However, they suggest that British Columbia's relatively good performance primarily reflects the anaemic productivity performance of Central Canada's manufacturing sector, and that its average 1.6% per-annum rate of growth of labour productivity over the period from 2012 to 2017 is far from a stellar performance.

The growth of labour productivity depends upon increases in the amount of physical capital available to workers, as well as on technological change. The latter is a complex phenomenon that primarily reflects increased innovation and entrepreneurship. A variety of factors influence innovation and entrepreneurship, and it is beyond the scope of this essay to discuss these factors in detail.²⁷ Suffice it to say that urban clusters are the predominant locus of new innovative business startups and fast-growing innovative firms, and that a concentration of educated STEM (Science, Technology, Engineering and Math) talent, along with venture capital and legal expertise typically underlies the growth of technology clusters.²⁸ In a later section, we will assess the prospects for Vancouver (and the Lower Mainland more generally) to attract innovative and entrepreneurial businesses in competition with other urban clusters in North America. In the next section, we assess the "capital deepening" experience of British Columbia relative to the rest of Canada.

27. For an extensive discussion of factors influencing innovation, see Globerman and Emes, 2019.

28. For a discussion of the factors contributing to the attractiveness of different locations as technology clusters, see Kim and Globerman, 2017 and Kerr and Robert-Nicoud, 2020. Educated STEM talents work in universities as well as in private-sector firms.

Capital deepening

Capital deepening, an increase in the ratio of capital to labour, directly contributes to improvements in labour productivity. However, the major improvements are primarily associated with increases in machinery and equipment investment and new technologies embodied in machinery and equipment, especially software (DeLong and Summers, 1990).²⁹ In this regard, as noted earlier, British Columbia has had an undistinguished record of growth of investment in the asset categories of machinery and equipment and intellectual property critical for improved labour productivity.

Table 6 reports ratios of capital investment to total employment for three categories of capital assets for Canada and British Columbia for periods from 2010 to 2014 and 2015 to 2019. The three asset categories are machinery and equipment plus intellectual property products, non-residential building construction, and residential building construction. One inference that can be drawn from table 6 is that, while investment in machinery and equipment and intellectual property products per employee increased in British Columbia between the two periods, the increase was quite modest. The decline in this ratio for the country as a whole is quite notable and supports Finlayson and William's (2018) assertion that British Columbia's improvement in labour productivity relative to the rest of Canada in recent years largely reflects a collapse of investment in the manufacturing sectors of central Canada. Table 6 also underscores the dramatic increase in the ratio of residential building investment per employed person in British Columbia between the two periods. While there was actually a decline in the ratio for Canada as a whole, this ratio increased in British Columbia by approximately 44% between

Table 6: Investment (current \$) per employee for three asset categories, Canada and British Columbia, 2010–2014 and 2015–2019

	Machinery and equipment plus intellectual property	Non-residential construction	Residential construction
2010–2014			
Canada	7,949	2,818	5,321
British Columbia	5,509	2,266	5,731
2015–2019			
Canada	6,842	2,843	5,312
British Columbia	5,653	2,704	8,234

Sources: Globerman, 2020; Statistics Canada, table 14-10-0009-01; author's calculations.

29. I am unaware of any more recent evidence that contradicts this finding.

2010–2014 to 2015–2019. It is remarkable that shelter costs relative to household income increased so dramatically in British Columbia's main population centres given the substantial increase in residential housing construction that occurred relative to the growth of the labour force.

Several policy inferences can also be drawn from table 6. One is that, if British Columbia is to accelerate its labour productivity growth, there needs to be increased investment in machinery and equipment and accompanying intellectual property assets. While British Columbia's recent investment increases look good compared to declines in some other provinces, in current dollar terms such investment hardly increased in British Columbia between the two periods. A second inference is that while investment in residential housing increased substantially in British Columbia, the supply response was obviously inadequate in the context of deteriorating housing affordability. Housing unaffordability, in turn, can be expected to discourage decisions by highly educated STEM workers to locate in British Columbia's major metropolitan areas, other things constant.

Competing to be a technology cluster

There is increasing competition—even among mid-sized cities—to attract innovative companies and skilled STEM workers (Taylor, 2020; Kerr and Robert-Nicoud, 2020). Taylor notes that there is some randomness in that the choice of a location made by a few key actors, sometimes for non-financial reasons, can determine where leading technology companies initially locate as start-ups. An example he cites is Bill Gates' decision to move his early-stage Microsoft start-up from Albuquerque, New Mexico to Seattle, Washington to be near his family. Kerr and Robert-Nicoud also note that the out-sized influence of a few important anchor firms generates ample room for random influences on decisions about location vital to future clusters.

While there is undoubtedly some randomness in where innovation and entrepreneurship occur, specific characteristics of clusters highlight locational attributes that are likely to influence where entrepreneurship and innovation activities will be more or less robust. Two such attributes are a concentration of specialized skilled workers, especially in the areas of science and technology, and the co-location of a handful of anchor firms (Kerr and Robert-Nicoud, 2020). Anchor firms contribute to improved labour mobility, as technology workers have alternative employment opportunities. They also are a source of spin-off startup firms that further enhance employment opportunities and deepen the market for specialized skills.³⁰

30. Beyond anchor firms, top-tier research universities also feature in the history of clusters (Taylor, 2020).

Several recent consulting reports identify Metro Vancouver as being relatively competitive as a mid-size tech hub location. For example, **table 7** reports the results of a survey done by CBRE Research (2019) that offers a league table of the top 50 cities in North America based on the depth and attractiveness of available technology talent. For ease of exposition, only the top 20 cities and their associated league score are reported. Three Canadian cities rank among the top 15. Notably, Toronto ranks third on the list, while Vancouver ranks twelfth, followed by Montreal. Two key aspects of the league table's criteria are a relatively high level of educational attainment among the workforce and a preference for tech workers to live in the city.

Table 5: Tech talent scorecard ranking, 2018

Rank	City	Score	Rank	City	Score
1	San Francisco Bay Area	84.8	9	Atlanta	58.1
2	Seattle	73.8	10	Raleigh-Durham	57.7
3	Toronto	69.9	11	Dallas-Fort Worth	57.6
4	Washington, D.C.	69.8	12	Vancouver	56.3
5	New York	65.1	13	Montreal	55.5
6	Austin	62.1	14	Baltimore	55.3
7	Boston	60.3	15	Salt Lake City	53
8	Denver	59.4			

Sources: CBRE Research, 2019.

The CBRE report also identifies the estimated one-year cost of operating a hypothetical “tech firm” in the same top 50 North American cities. Costs of operating include estimated expenditures for rent and labour for a company employing 500 employees and using 75,000 square feet of space. The most expensive location is the San Francisco Bay area with an estimated cost of US\$59.7 million. The next most expensive is Seattle with an estimated cost of US\$50.9 million. Canadian cities are substantially less expensive in comparison. The cost for Ottawa is estimated to be around US\$32 million, while Toronto's cost is US\$30.5 million, Vancouver's, US\$29.8 million, and Montreal's, US\$28.6 million.

What is especially interesting about Vancouver's cost structure are the relatively low wages for technology workers in Canadian cities. For its sample of 50 cities, the average wage of a “tech talent” in the San Francisco Bay Area is 135% of the average for all 50 cities. In Seattle, it is 122% of the average. By contrast, in Toronto, Vancouver, and Montreal, it is 66%, 64%, and 61% of the average, respectively (CBRE, 2019). The tech-talent wage advantage of Canadian cities is somewhat offset by differences in shelter costs, particularly in the case of Vancouver. CBRE (2019) reports the ratio of apartment rent to tech wage for its sample of cities. While housing in the San Francisco Bay area is less affordable than in

Vancouver, the difference is relatively modest: the ratio is .264 in the former compared to .207 in the latter. That is, the average tech worker in the Bay Area spends around 26% of their wages on rent, whereas the average tech worker in Vancouver spends around 21% of their wages on rent. The Vancouver ratio is higher than that of several other West Coast cities.³¹ It is also higher than that of other Canadian cities. While it is marginally higher than the ratio for Toronto (.20), it is substantially above the .126 ratio for Montreal.³²

Technology workers in Vancouver presumably earn higher wages than the average worker in British Columbia, and housing is therefore more affordable for them.³³ Nevertheless, the relative inelasticity of the housing-supply curve in the Lower Mainland will act as a disincentive to future growth of the technology labour force, particularly in comparison with many US cities, which exhibit significantly more price-elastic housing-supply curves.³⁴ Housing affordability issues in Canadian cities compared to US cities would be greater than outlined above if one compared shelter costs to after-tax household incomes, as personal income-tax rates in Canada are higher than those in the United States.³⁵ In short, addressing the bottlenecks to the creation of greater housing affordability in British Columbia's major cities is an important policy imperative to improve the province's growth prospects.

The availability of a relatively low-cost tech labour force certainly contributes to the attractiveness of any location as a tech hub. However, as noted above, the presence of anchor firms is also an important attribute, as the evolution of Silicon Valley from the early presence of Hewlett-Packard and the development of Seattle as a tech hub leveraging the headquarter presence of Microsoft and Amazon, among other firms, illustrate. While specific definitions vary, an anchor firm is typically thought of as a large, innovative firm that produces knowledge that benefits the region where it is located. It also produces spin-offs of new companies and attracts other companies in the activity's supply chain (Niosi and Zhequ, 2010).

31. The ratio for Seattle is .173, while the ratio for Portland is .178.

32. The ratio for Ottawa is .161.

33. It is difficult to compare tech workers' salaries to average salaries in the absence of a detailed and common database of occupational wages.

34. The supply elasticity of housing is measured by the percentage change in dwelling units divided by the percentage change in shelter costs. The more elastic the housing supply curve, the smaller the increase in average shelter costs required to provide housing accommodation for a growing population. For evidence that most medium- and large-sized US cities are characterized by more elastic housing-supply curves than their urban Canadian counterparts, see Filipowicz, Globerman and Emes, 2020.

35. For a comparison of tax rates at the level of the individual states and provinces, see Hill, Li, and Palacios, 2020. One calculation shows the combined statutory marginal income-tax rate at CA\$300,000 to be higher in Ontario (53.53%), Quebec (53.31%), British Columbia (49.80%), and Alberta (47%) than in any US state. The closest US states are Oregon (44.90%) and California (44.30%).

Various observers have noted that Vancouver has attracted established tech giants such as Microsoft, Amazon, and SAP to set up regional facilities in the city (Wilson, 2019). Others have documented the accelerating growth of local start-up technology companies (Lewis, 2020). Still, the largest BC organizations classified as being technology companies are old-line telecommunications firms: Telus, Shaw Communications, Bell Canada, and Rogers Communications are four of the top five companies by employment (BIV, 2020). These companies are unlikely to be strong anchor companies for promoting the advance of new general-purpose technologies such as artificial intelligence (AI) and robotics in British Columbia going forward. Indeed, a recent report lists the top 10 cities for AI (Kenworthy, 2020): while Toronto and Montreal make the list, Vancouver does not.³⁶

To be sure, major universities and research centres can also anchor technology hubs.³⁷ As well, regional affiliates of large foreign-owned technology companies might become sufficiently large to begin to play an anchor role. Perhaps most promising, start-up firms might enjoy major success and emerge as home-grown anchor organizations in the local market. For the latter to occur, the public-policy environment needs to support the growth of small and medium-sized companies. In the next section of the essay, we discuss a number of policy initiatives that might be taken by the BC Government to encourage the growth of small and medium-sized firms, as well as to promote capital investment in the province more generally, especially in the critical asset categories of machinery and equipment and intellectual property.

36. Tansey (2018) references other surveys that assign relatively low ranks to Vancouver as a tech cluster based on measures of innovation capacity such as patenting and investment in creating intellectual property assets.

37. British Columbia's universities, especially the University of British Columbia, are highly regarded for their output of trained scientists and engineers.

Policy Suggestions

The analysis to this point in the essay suggests that British Columbia's future economic growth will likely require greater reliance on increased labour productivity rather than growth in the labour force, at least in comparison to the past decade. Improvements in labour productivity growth are primarily a function of capital deepening and innovation.

Increased investment in productivity-improving asset categories, particularly machinery and equipment and software would arguably be encouraged by tax reform. In particular, Finlayson and Williams (2018) recommend reforming the province's retail tax system (the PST) to reduce the fiscal burden on investments in capital assets such as machinery and equipment. They argue that the province's current PST regime raises the cost of investing in physical capital and process technologies relative to such costs in most other provinces and jurisdictions in other developed countries.

Tax reform might also encourage the growth of small and medium-sized BC-based companies into anchor companies that can serve as engines of innovation and entrepreneurship. In this regard, Finlayson and Williams (2018) highlight the province's progressive business-tax rate structure, which jumps from a statutory provincial tax rate of 2% to 12% once a company's revenues reach \$500,000 per year. The progressive structure acts as a disincentive to growth and/or an incentive to relocate corporate headquarters to locations with less progressive tax structures. A flatter corporate rate structure would mitigate the latter disincentives.

Canadian provinces generally, and British Columbia especially, are unusual among developed jurisdictions in the extent to which lower business income-tax rates apply to small companies and not to mid-sized and larger firms. It is no surprise, therefore, that of some 400,000 businesses in British Columbia, only about 8,000 or so had more than 50 paid employees (Finlayson, 2017).

Productivity generally, and innovation activity specifically, is strongly promoted by competition (Globerman and Emes, 2019). Finlayson and Williams (2018) suggest that the BC Government could promote competition and more open markets in the province by limiting the role of state-owned monopolies, such as ICBC, and working with other provinces to eliminate barriers to trade and barriers to labour mobility.

Innovation and entrepreneurship underlying productivity growth also depend upon a skilled and educated local labour force, particularly individuals trained in science

and engineering disciplines. Highly educated immigrants have been shown to play a particularly important role in promoting innovation and entrepreneurship.³⁸ While non-pecuniary considerations, such as quality of life, certainly influence the location choices of highly educated individuals, Moretti and Wilson (2017) identified expected after-tax (disposable) income as a particularly important factor influencing the location decisions of “star” scientists.

As noted earlier, while the combined statutory federal plus provincial personal income-tax rates for higher-income individuals are lower in British Columbia than in the main competing provinces for highly educated immigrants, that is, Ontario and Quebec, they are significantly higher than the combined statutory rates for individuals earning similar incomes in all US states, including high tax jurisdictions such as California and New York. The BC government could consider lowering provincial tax rates on high-income individuals as a policy measure to make the province a more attractive location for highly educated tech workers. At a minimum, the province could raise the income threshold at which its highest personal income-tax rate applies from where it stands today.³⁹

Finally, more affordable housing would indirectly increase the disposable incomes of highly educated and skilled professionals, thereby improving the locational attractiveness of British Columbia's major metropolitan areas, primarily Vancouver, to those professionals and, hence, to companies that employ them. While zoning restrictions and most other regulatory initiatives that reduce the elasticity of housing supply in the Lower Mainland of British Columbia are not the direct responsibility of the provincial government, the latter could bring legal and financial pressure to bear on local and regional authorities who resist urban and exurban densification.⁴⁰

38. For a review of the empirical literature on the contribution of highly educated immigrants to innovation and productivity growth, see Globerman, 2019.

39. By way of illustration, British Columbia's top provincial personal income-tax rate of 20.5% kicks in at \$330,430 in 2021. In Alberta, the top personal tax rate of 15% does not apply until personal income reaches \$315,000.

40. Tansey (2018) reports relative low population density across the Vancouver Census Metropolitan Area (CMA). The City of Vancouver has roughly one half the density of Manhattan. By comparison, the city of Surrey has less than one quarter of the population density of Vancouver, while Burnaby has just under one half of the population density of Vancouver. Green, Filipowicz, Lafleur and Herzog (2016) highlight zoning and lengthy and costly approval processes as particularly important factors limiting housing construction in Vancouver's CMA.

Concluding Comments

British Columbia's economy enjoyed relatively rapid real economic growth over the period from 2010 to 2019 period, particularly after 2014, compared to other provinces. The faster growth was tied to a relatively rapid growth in British Columbia's population and an associated and remarkably strong increase in investment in residential housing construction.

Amid the still uncertain (at the time of writing) unfolding of the COVID-19 public-health and economic crises, it is especially difficult to assess the future prospects of the BC economy relative to the rest of Canada. However, there are reasons to believe that the main recent sources of the province's out-sized economic growth are likely to be weaker in the foreseeable future than there were in the relatively recent past. In particular, population growth, especially in Vancouver's metropolitan area, is likely to slow given the high costs of housing relative to household disposable incomes, as well as a strong possibility of a slowdown in inflows of immigrants from China and increased net inter-provincial outmigration.

The transition from relying on real-estate development and real-estate transactions as a major driver of economic growth to a more broad-based growth profile that emphasizes productivity improvements tied to innovation and entrepreneurship could build on Metro Vancouver's progress in becoming a sustainable hub for technology oriented commercial businesses. However, a number of public-policy changes would assist the transition. Needed increases in business investment, including machinery and equipment, software and other intellectual-property products, would be encouraged by changes in the province's PST regime. A more graduated corporate income-tax structure would strengthen the incentives of small and medium-sized enterprises to invest and grow in size, thereby increasing the likely number of domestically headquartered anchor firms.

Attracting world-class scientists and engineers, both locally trained and from outside the province, is a critical part of the province's transition to productivity based economic growth.⁴¹ While British Columbia's major metropolitan areas boast a high quality of life, which attracts highly educated individuals, expectations of earning relatively high long-run after-tax incomes are a stronger incentive for top scientists and engineers, as well as the best managers and skilled professionals. On this front, Vancouver is competing against numerous mid- and large-sized cities around the world for top talent.

41. The province's Provincial Nominee Program should emphasize the importance of attracting world class scientists and engineers.

While British Columbia's personal income-tax rates at the higher income levels are comparable to or lower than those in Ontario and Quebec, the combined federal and provincial governments' statutory personal income-tax rates for higher income earning residents of British Columbia are uniformly higher than those for residents in US cities that compete for the same talent. Combined with Metro Vancouver's high housing costs relative to household incomes, high income tax rates will arguably be a barrier to attracting star scientists and engineers to British Columbia's emerging technology hub, especially if the Biden administration in the United States increases allowable immigration of skilled professionals. Since there is limited scope for the provincial government to reduce combined marginal tax rates in any substantial manner, initiatives to lower the direct and indirect costs of new housing will be important to any strategy to promote Metro Vancouver's competitiveness as a tech hub.

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