POLICY PERSPECTIVES

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WILL THE KIDS BE ALRIGHT? THE ARITHMETIC OF PRODUCTIVITY TRENDS IN CANADA AND BC

HIGHLIGHTS

- Growth in Canadian real income per person has trended lower since the 1960s. Prior to 2000, Canadian incomes per person were doubling in roughly 30 years (i.e. one generation). At recent growth rates, this feat would take four to five generations.
- A key contributor to the slowdown in income growth is labour productivity (real GDP per hour of labour input). Canadian productivity growth has trended well below 2% per annum since the 1970s.
- This pattern of slow productivity growth has opened a sizable gap in productivity levels relative to many other advanced countries: 26% below the US, and 22-23% below Germany and France.
- British Columbia has closed its historical gap in productivity levels with the Canadian average and ranks third among the provinces in recent productivity growth performance.
- Five policy priorities to support productivity growth are: removing disincentives to scaling up businesses; streamlining regulatory approvals processes that can inhibit capital formation; intensifying competition in product markets; building human capital; and promoting the commercialization and ownership of Canadian innovations.

LIVING STANDARDS IN THE LONG-RUN

The song, "The Kids Are Alright," featured on the 1965 debut album of the iconic British rock band, *The Who*. The album was titled, "My Generation." Thinking generationally is an excellent way of thinking about productivity growth and progress in living standards. Here, I discuss trends in productivity growth and the implications for the living standards of future generations.

Real gross domestic product (GDP) per person is a key measure of a country's living standards.[1][2][3] It is essentially a country's income per person.[4] Higher income per person implies a higher potential level of consumption: better food, more health and education services, better housing and so on. Charting the growth of GDP per person is therefore a good way to measure overall economic progress.

Let's put this in perspective by asking, "How long would it take to double income per person?" Table 1 lays out some simple compound interest arithmetic. If Canada could consistently grow real GDP per person at 6% per annum (we

[1] Hereafter, all figures are cited in real terms (i.e. inflation-adjusted). Inflation causes a loss of purchasing power so it is important to report income after controlling for its effects.
[2] GDP is the market value of final goods and services produced in Canada. It is also equal to the sum of income paid to domestic factors of production plus net indirect taxes.
[3] An even broader measure of income is gross national income (GNI), which includes net income earned by Canadian residents on production in other countries. However, in practice, the gap between GDP and GNI tends to be small.
[4] For simplicity, I refer to GDP as income. Strictly speaking, GDP is equal to the sum of income paid to domestic factors of production (i.e. labour and capital) plus net indirect taxes. The latter are not income. Note that I refer to the country's income per person, which strongly affects but is not identical to personal income.

achieved this only in one year, 1973), income per person would double in just 12 years. That's less than half a generation (a generation is 25-30 years). The average child would end up earning more than four times the income of an average parent.

At a sustained growth rate of 5% per annum (seen on 3 occasions: 1962, 1966 and 1984), incomes would double in 14 years. At 4% (seen on 7 occasions: 1964, 1965, 1969, 1976, 1985, 1999 and 2000), incomes would double in 18 years. At 3% (seen on 10 occasions since 1961), income per person would double in 23 years. At 2% (seen on 15 occasions since 1961), incomes double every 35 years. The corollary is that when GDP per person grows by more than 2% per annum, incomes double in about one generation or less.[5]

Now let's look at Canada's performance (Table 2). From 1961 to 2000, GDP per person grew at an average rate of 2.3% per annum. This meant it was doubling every 31 years: a parent could expect their children to grow up and earn about twice their income. However, since 2000, growth in GDP per person has slowed to 0.9% per annum. At this rate, it takes 74 years for incomes to double: a parent can only expect their great grandchildren to earn twice what they are earning (i.e. three generations hence).

In the past decade, growth in Canadian GDP per person has dwindled to just 0.6% per annum. If sustained, it will take 126 years – four to five generations – for incomes to double! A parent could only expect their great-great or great-great-great grandchildren to earn twice their income today.

TABLE 1: **THE ARITHMETIC OF GROWTH IN LIVING STANDARDS**

Growth rate of GDP per person (p.a.)	Years to double GDP per person
6%	12
5%	14
4%	18
3%	23
2%	35
1%	70
0.5%	139

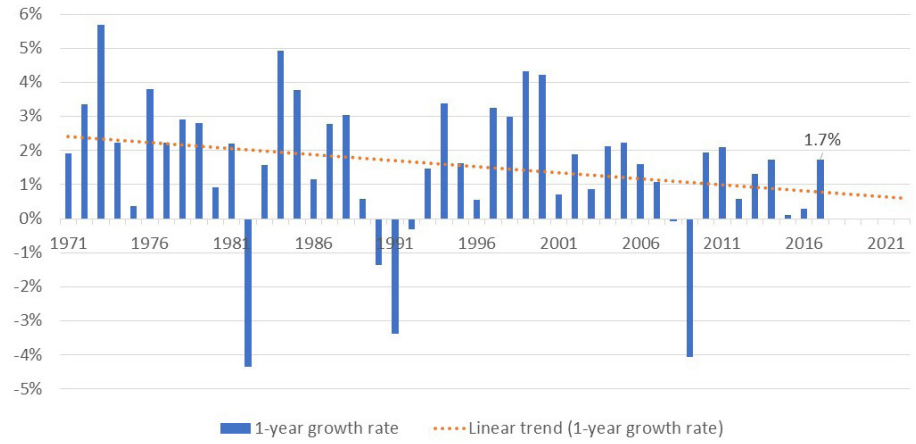
TABLE 2: **CANADA'S ECONOMIC PERFORMANCE**

Period	Growth in GDP per person (p.a.)	Years to double GDP per person
1961-2000	2.3%	31
2000-2017	0.9%	74
2007-2017	0.6%	126

Source: Centre for the Study of Living Standards

FIGURE 1: **LONG-TERM SLOWING IN THE RATE OF IMPROVEMENT IN LIVING STANDARDS**

GROWTH IN REAL GDP PER PERSON



Source: Centre for the Study of Living Standards

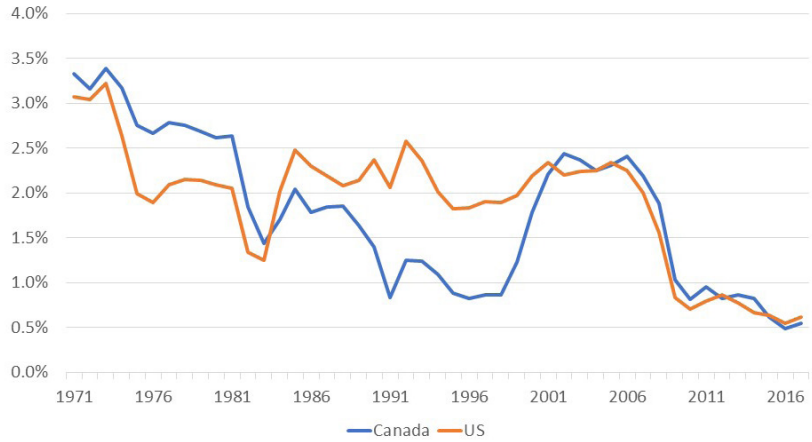
In 2017, Canada recorded 1.7% growth in GDP per person (Figure 1). This was one of the best years since the most recent recession, along with 2014 (1.7%), 2011 (2.1%) and 2010 (1.9%). Nonetheless, there is a clear, multi-decade decline in the trend growth rate of GDP per person. With productivity growth persistently averaging less than 2%, today's economy is no longer delivering incomes per person that double every generation.

The United States has been experiencing a similar and sustained slowdown. Over the past 10 years, growth in GDP per person has averaged just 0.6% per annum in

[5] To be precise, if GDP per person grows at an average rate of 2.3-2.8% per annum, incomes double in 25-30 years (i.e. one generation).

Canada and the US (Figure 2). The US had previously almost always enjoyed 10-year compound annual growth of 2% or more back to the 1960s. Before the current era, the only period of sub-2% growth in the US was in the decade to the early 1980s. By contrast, Canada only managed decade-long compound annual growth above 2% prior to the early 1980s and again briefly in the pre-recession 2000s. The corollary is that living standards in Canada and the US have essentially stagnated in the post-recession era.

FIGURE 2: **AGGREGATE LIVING STANDARDS IN CANADA AND US ARE STAGNATING**
REAL GDP PER PERSON, 10-YEAR COMPOUND ANNUAL GROWTH RATE



Source: Centre for the Study of Living Standards

WHAT IS PRODUCTIVITY?

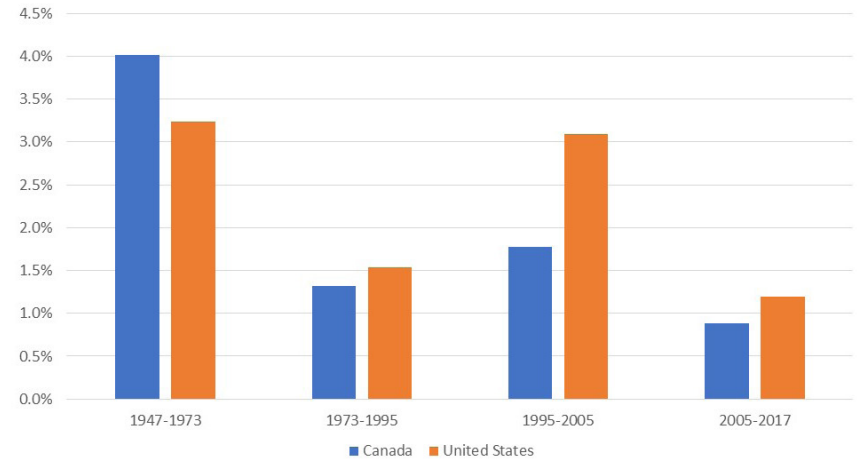
Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise output per worker. Krugman (1997, 11)

GDP per person is made up of two components: labour productivity (output per hour worked); and labour input (hours worked per head of population). Productivity is the efficiency with which an economy transforms inputs into outputs.[6] As the quote above from Nobel Laureate Paul Krugman indicates, economists emphasise productivity growth because it is usually the principal contributor to higher GDP per person and therefore higher living standards. A better showing on productivity implies higher GDP per person with the same work intensity.

CANADA'S PRODUCTIVITY PERFORMANCE

Canada saw significant and sustained growth in labour productivity in the post-war years. From 1947-1973,

FIGURE 3: **LABOUR PRODUCTIVITY GROWTH BY ERA**
BUSINESS SECTOR REAL GDP PER HOUR WORKED, COMPOUND ANNUAL GROWTH RATE



Source: Centre for the Study of Living Standards

labour productivity in the business sector grew at 4% per annum, almost 1% faster than the US (Figure 3).[7] Productivity growth slowed in both countries during 1973-1995, then accelerated in the US to 3.1% per annum during the peak of the information and communications technology (ICT) revolution of 1995-2005. Canada saw only a faint pick-up in productivity during this era. As the impetus from the ICT revolution faded, productivity growth in both countries has slowed.

Table 3 presents productivity growth by era. Applying the earlier arithmetic, during the post-war years up to 1973, a worker could double real output produced per

[6] Growth in labour productivity, or GDP per unit of hour worked, is the weighted sum of: (i) "capital deepening" (growth in capital input per hour); (ii) improvements in "labour composition" (labour quality as a function of the age and skill levels of the workforce); and (iii) "multi-factor productivity growth" (output growth that is unexplained by (i) and (ii)). The weights on each correspond to each factor's revenue share of total output.
[7] Economists often focus on business sector productivity because the sector is the main driver of technological progress. That said, productivity in the total economy can also be useful, such as when comparing across countries (as in Figure 4 below).

hour in less than one generation: 18 years in Canada and 22 years in the US. American workers achieved a similar pace during the peak of the ICT revolution between 1995-2005. However, by contrast, since the early 1970s Canadian workers have only been able to double output per hour every 2-3 generations.

The differential in Canada-US labour productivity growth has led over time to a sizable gap in productivity *levels* (i.e. GDP per hour worked) between the two national economies. Figure 4 shows Canada's level of labour productivity for the total economy relative to the US. In the late-1970s, Canadian workers' output per hour was only 10% less than that of US workers. Thereafter, Canada's relative performance deteriorated, especially during the peak of the ICT revolution during 1995-2005. By 2016, Canadian workers were producing 26% less output per hour than their American counterparts – a significant gap. By contrast, in 2016 the average worker in a G7 country produced 12% less output per hour than a similar worker in the United States. Advanced countries like Germany and France closed their post-war productivity gaps with the US by 1995 and have more or less kept pace with the US since then. Canada has fared less well.

BC'S PRODUCTIVITY PICTURE

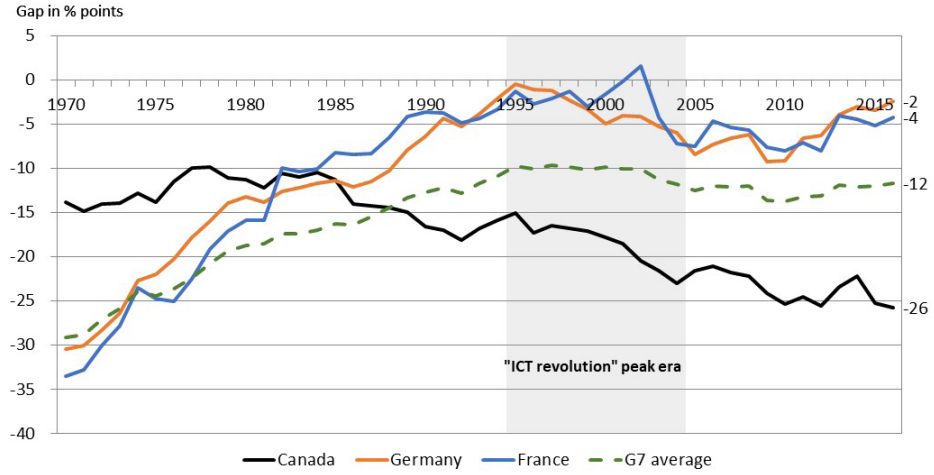
British Columbia has long had lower labour productivity levels compared to the Canadian average. That is no longer the case, however. BC's productivity levels, which were once around 2% to 5% below the Canadian average, started to gain ground relative to Canada in the aftermath of the 2008-09 recession. Over the past four years, BC's labour productivity

TABLE 3: **CANADA VS US LABOUR PRODUCTIVITY GROWTH (BUSINESS SECTOR)**

PERIOD	CANADA		UNITED STATES	
	Growth in labour productivity p.a. (business sector)	Years to double output per hour	Growth in labour productivity p.a. (business sector)	Years to double output per hour
1947-1973	4.0%	18	3.2%	22
1973-1995	1.3%	53	1.5%	45
1995-2005	1.8%	39	3.1%	23
2005-2017	0.9%	79	1.2%	58

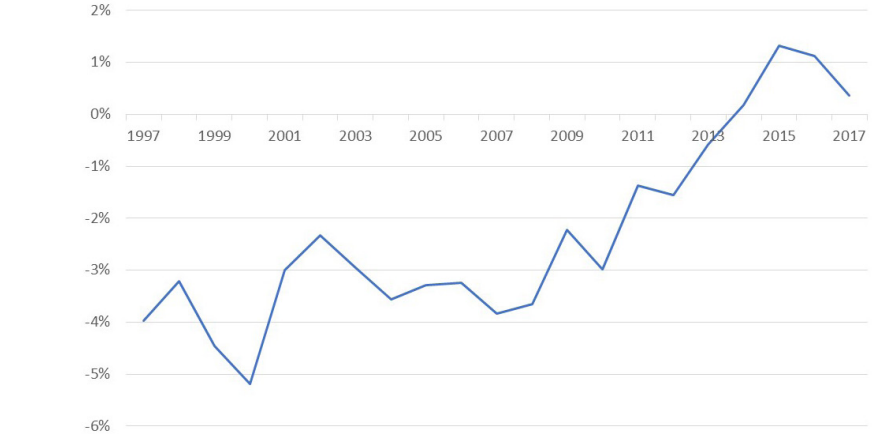
Source: Centre for the Study of Living Standards

FIGURE 4: **CANADA'S RELATIVE PRODUCTIVITY PERFORMANCE HAS STEADILY DETERIORATED SINCE THE EARLY 1980S**
LABOUR PRODUCTIVITY GAP WITH US IN PERCENTAGE POINTS, GDP PER HOUR WORKED (TOTAL ECONOMY), SELECTED COUNTRIES



Source: OECD.stat

FIGURE 5: **BC HAS CLOSED ITS LABOUR PRODUCTIVITY GAP WITH CANADA**
% POINT GAP BETWEEN BC AND CANADA, GDP PER HOUR WORKED, TOTAL ECONOMY



Source: CANSIM 383-0033

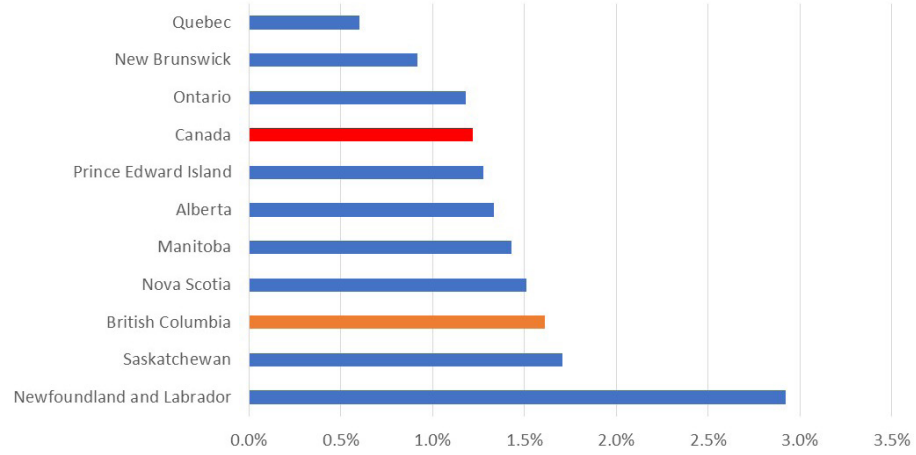
growth has been 1% higher on average compared to the Canadian benchmark (Figure 5). Unfortunately, the catch-up is more a function of anemic productivity growth in the big economies of central Canada rather than a stellar performance on the part of BC.

BC now ranks third among the ten provinces in terms of recent productivity growth (Figure 6). Labour productivity growth averaged 1.6% per annum over the period 2012-2017. At this pace, output per hour would double every 43 years. That is not particularly impressive. But it compares to post-2012 productivity growth of just 1.2% for Canada, which implies that output per hour would double every 57 years. Canada's productivity growth weakness is concentrated in the largest economies of Ontario and Quebec, which have struggled with excess capacity since the recession.

Taking a decade-long perspective, BC compares reasonably well to other provinces. Figure 7 shows the 10-year compound annual growth rate in labour productivity from 1997-2017. BC shows similar or higher productivity growth than Canada in the ten rolling decades shown. Over the most recent decade, BC ranks second after Manitoba among the provinces.

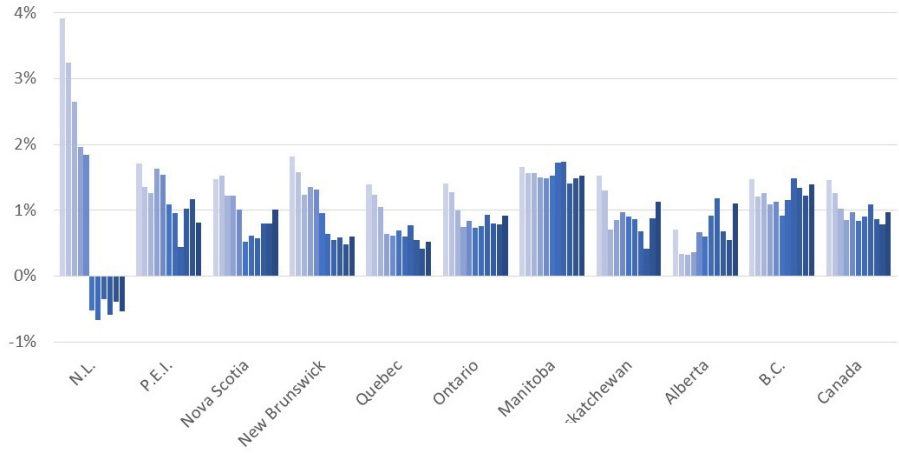
Where has this growth occurred? Figure 8 shows BC labour productivity by industry. Services-producing industries are shown in blue, goods-producing industries in orange. The largest gains in output per hour over 1997-2016 have been in wholesale trade, manufacturing, transportation and warehousing, and retail trade. Firms in these industries are increasingly being challenged

FIGURE 6: **BC SAW THE THIRD HIGHEST LABOUR PRODUCTIVITY GROWTH OVER THE PAST 5 YEARS**
GDP PER HOUR WORKED, TOTAL ECONOMY, COMPOUND AVERAGE GROWTH RATE, 2012-2017



Source: CANSIM 383-0033

FIGURE 7: **BC LABOUR PRODUCTIVITY GROWTH IS CONSISTENTLY ABOVE THE CANADIAN AVERAGE**
GDP PER HOUR WORKED, ALL INDUSTRIES, 10-YEAR COMPOUND AVERAGE GROWTH RATE, 1997-2017



Source: CANSIM 383-0033

and transformed by digital technologies (D'Souza and Williams 2017).

By contrast, there has been little or no growth in output per hour in less technologically-intensive (relatively more labour-intensive) industries such as: construction; arts, entertainment and recreation; accommodation and food services; finance, insurance and real estate; and administrative and support services. Most of BC's employment growth in the last decade or more has been in the latter group of industries (see Williams 2018a).

HOW CAN CANADA AND BC IMPROVE PRODUCTIVITY?

The good news is that BC's

productivity performance has improved relative to Canada. The bad news is that Canada's productivity levels have deteriorated relative to other advanced economies and our national productivity growth rate has been notably lacklustre. This has contributed to a trend slowdown in the growth of GDP per person.

Below are five key areas where policy could help foster higher productivity growth over time.[8]

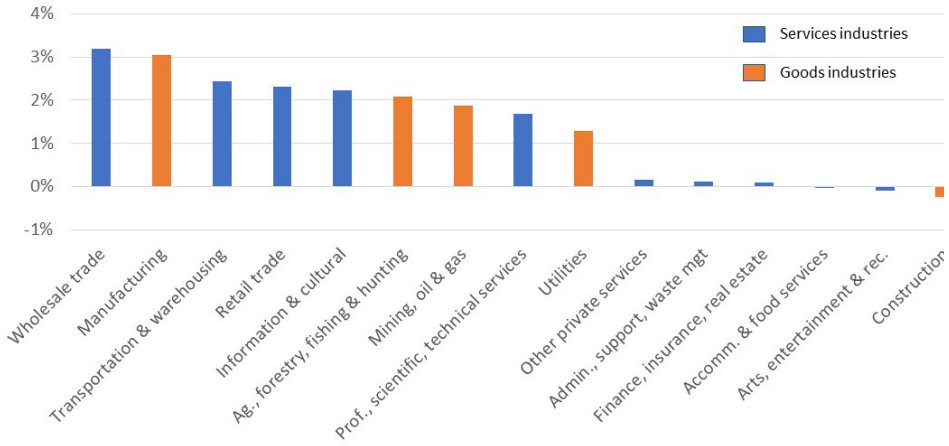
- **Remove disincentives to scaling up Canadian/BC businesses.** Canada and BC need to own a larger piece of the digital, post-industrial global economy. Digital technologies allow service companies to produce at vast scale. The so-called FAANG companies are examples (Facebook, Apple, Amazon, Netflix and Google/Alphabet). BC has among the highest concentrations of small businesses among the provinces: only 2% of registered businesses employ 50 or more people. The business tax structure in Canada/BC features significantly lower statutory rates and effective tax burdens on "small business" income, which can blunt the incentives for some firms to grow. Larger businesses generally have higher productivity, spend more on research and development, pay higher wages, and are more likely to participate in global markets (Finlayson and Peacock 2017). A smart economic policy would encourage firms to scale up and minimize tax-related incentives for businesses to stay small.

- **Streamline and modernize regulatory processes.** Capital deepening raises productivity. Yet Canada's regulatory processes for infrastructure investment and major projects increasingly resemble Shelob's Lair in J.R.R. Tolkien's *Lord of the Rings* trilogy. According to the World Bank (2016), Canada ranks 34th out of 35 OECD countries in the time required to obtain a permit for new general construction projects. That is four times longer than Denmark, three times longer than the United States and a third longer than France. Every major economy in the world ranks ahead of Canada on major project approval and permitting. This is an area where policy change can make a positive difference.

- **Promote more intense product market competition.** Creative destruction involves economic renewal whereby innovative new firms and entrepreneurs force outdated firms to exit. Labour and capital are freed and reallocated to better uses, which in turn raises overall productivity and living standards (Williams 2018b). The principal catalyst for innovation is competition. Canada's product markets are relatively sheltered, which dampens the imperative for firms to innovate to survive.[9] Souare (2013) finds that the lack of competition in Canadian product markets and low levels of investment in R&D (research and development) and M&E (machinery and equipment) are mutually-reinforcing and have contributed to the Canada-US productivity gap.

- **Develop and attract human capital.** In the digital age, the most important and scarce resource for building highly-productive firms may be human capital (i.e. "talent") rather than physical capital. Firms will need people with social and creative intelligence, for example, with advanced skills in entrepreneurship, management, and science, technology, engineering and mathematics (STEM). During the ICT revolution, firms with high-quality management and organizational practices, and with access to pools

FIGURE 8: **PRODUCTIVITY GAINS ARE HIGHEST IN TECHNOLOGY-INTENSIVE INDUSTRIES**
BC LABOUR PRODUCTIVITY (GDP PER HOUR WORKED), COMPOUND ANNUAL GROWTH RATE, 1997-2016



Source: CANSIM 383-0026

[8] For a summary of the literature on what drives productivity, see Syverson (2011).
[9] For example, Industry Canada (2013) found that four or fewer companies control more than half the market in pharmacy and personal care; electronics and appliances; general merchandise; home improvement; and food groceries.

of skilled labour, tended to reap large productivity benefits from their investments in technology (Bloom, Sadun and Van Reenen 2012 and Van Reenen et al. 2010). Through its education policies and immigration programs, Canada should prioritize developing and attracting highly-skilled labour.

- **Support research and innovation... *and* stimulate its commercialization.** Canada has world-leading research institutions but has long struggled to commercialize its innovations. New technologies created in Canada but sold to non-Canadian companies will lead to Canada missing out on the lion's share of the economic benefits from scaling up locally-developed technologies. Moreover, digital technologies are increasingly capital-biased: the economic gains from their adoption are skewed toward the owners and developers of the technologies (i.e. firm owners, managers, and highly-skilled workers with technology-complementary skills, see Williams 2018a). Canadian firms need to scale up and retain ownership of Canadian innovations.

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