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A Structural Interpretation of the Recent Weakness in Business Investment

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Abstract

Since 2012, business investment growth has slowed considerably in advanced economies, averaging a little less than 2 per cent versus the 4 per cent growth rates experienced in the period leading up to crisis. Several recent studies have attributed a large part of the weakness in business investment to cyclical factors, including soft aggregate demand, and, to a lesser degree, heightened uncertainty and tighter financial conditions. In contrast, our analysis suggests that structural factors could provide an alternative explanation for the observed weakness in Canadian business investment. As a result, there is a risk that this weakness could prove to be much more persistent than cyclical interpretations suggest. Overall, population aging combined with two factors that could prove to be structural—weak productivity growth and the 2014–15 collapse in oil prices—could plausibly reduce the investment-to-output ratio by as much as 2 percentage points by 2020 relative to the average of 12 per cent observed since 2000, or an additional 0.9 percentage points relative to its 2016 value. This would have important implications for the economic outlook.

Bank topics: Business fluctuations and cycles; Domestic demand and components; Recent economic and financial developments
JEL codes: E, E2, E22, E37

Résumé

La croissance de l'investissement des entreprises a fortement ralenti dans les économies avancées depuis 2012 : elle se situe en moyenne à tout près de 2 %, contre 4 % avant la crise. Plusieurs études récentes ont expliqué la faiblesse de l'investissement des entreprises en attribuant un rôle prépondérant aux facteurs cycliques, notamment l'incidence d'une demande globale modérée et, à un moindre degré, le rôle joué par l'incertitude accrue et le resserrement des conditions de financement. Tranchant avec ces conclusions, nous montrons que des facteurs structurels offrent une autre explication à la faiblesse des dépenses d'investissement des entreprises canadiennes. En conséquence, il est possible que cette faiblesse persiste beaucoup plus longtemps que ne le laissent transparaître les interprétations cycliques. Globalement, le vieillissement démographique et deux facteurs de nature potentiellement structurelle — la croissance limitée de la productivité et l'effondrement des cours du pétrole en 2014-2015 — ensemble pourraient, plausiblement, faire baisser le ratio de l'investissement à la production jusqu'à 2 points de pourcentage d'ici 2020 par rapport à la moyenne de 12 % enregistrée depuis 2000, ou de 0,9 point de pourcentage supplémentaire par rapport à la valeur du ratio en 2016. Cette diminution aurait des répercussions importantes sur les perspectives de croissance de l'économie.

Sujets : Cycles et fluctuations économiques; Demande intérieure et composantes; Évolution économique et financière récente
Codes JEL : E, E2, E22, E37

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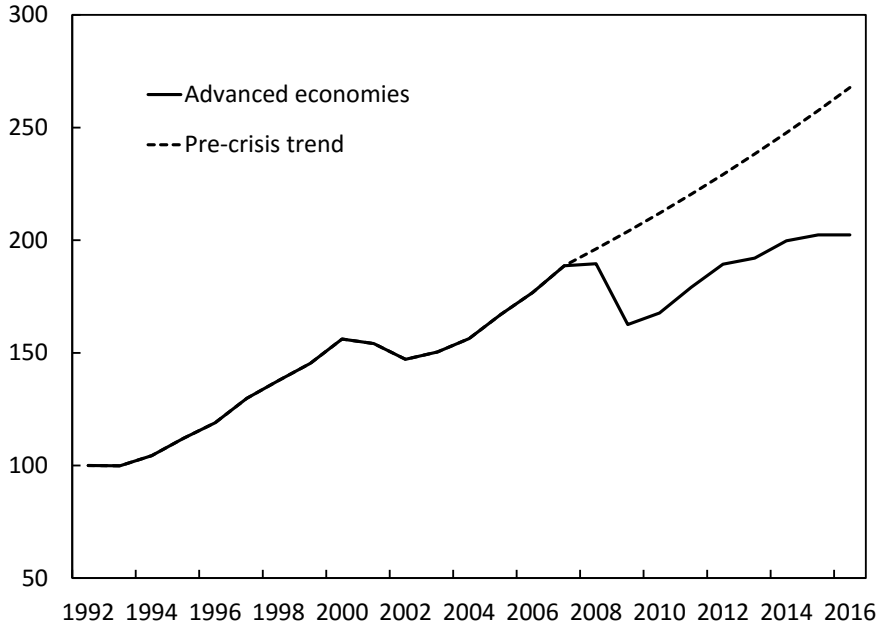
I. Key Messages

A striking feature of the recovery from the 2007–09 global financial crisis has been the subdued pace of business investment growth, particularly in advanced economies. Business investment in advanced economies plummeted by 14 per cent in 2009 before gradually recovering to its pre-crisis level by 2012. However, following this recovery, business investment growth has slowed considerably. Since 2012, it has averaged a little less than 2 per cent, compared with the 4 per cent average growth rate during the pre-crisis period (1992 to 2007). Consequently, the level of investment is more than 30 per cent below the level it would have achieved had it continued to grow at its pre-crisis pace from 2008 onward (**Chart 1**).

Chart 1: Real business investment has been weak in advanced economies since the global financial crisis

Index: 1992 = 100, annual data



Sources: Organisation for Economic Co-operation and Development and Bank of Canada calculations

Several recent studies attribute the weakness in business investment primarily to cyclical factors, including soft aggregate demand, and, to a lesser degree, heightened uncertainty and tighter financial conditions. Consequently, these studies conclude that business investment will strengthen as the cyclical factors depressing it dissipate. In contrast, our analysis suggests that structural factors could provide an alternative explanation for the observed weakness in Canadian business investment. Rough calculations suggest that recent shifts in structural factors could be sufficient to explain much of the weakness in Canadian business investment.

As a result, there is a risk that this weakness could prove to be much more persistent than cyclical interpretations suggest.

We focus on population aging and two other factors that could also prove to be structural: weak productivity growth and the collapse in oil prices since the second half of 2014. Our analysis suggests that the recent and expected evolution of these three factors could reduce the investment-to-output ratio by as much as 2 percentage points relative to the 12 per cent average observed since 2000, or an additional 0.9 percentage points relative to its 2016 value.

Overall, in the absence of a policy response, an additional 0.9-percentage-point decline in the investment-to-output ratio could have material effects on the outlook for the Canadian economy. Relative to a scenario in which the ratio remains at its 2016 level, simulations suggest that a 0.9-percentage-point decline would

- reduce the levels of investment and real gross domestic product (GDP) by around 7 and 1 per cent, respectively, by 2020
- decrease the level of potential output as a result of the weaker investment profile, permanently reducing household consumption
- lower the outlook for inflation in each of 2018, 2019 and 2020 by around 0.1 percentage points because of weaker demand, despite the decreased level of potential output

The remainder of this note is organized as follows. Section II provides an overview of the recent weakness in Canadian business investment. Section III reviews some of the cyclical explanations recently put forward in the literature. Section IV discusses the potential impacts of shifting demographics, weak productivity and low oil prices on the investment-to-output ratio. The final section discusses the implications of this structural interpretation for the broader Canadian economy.

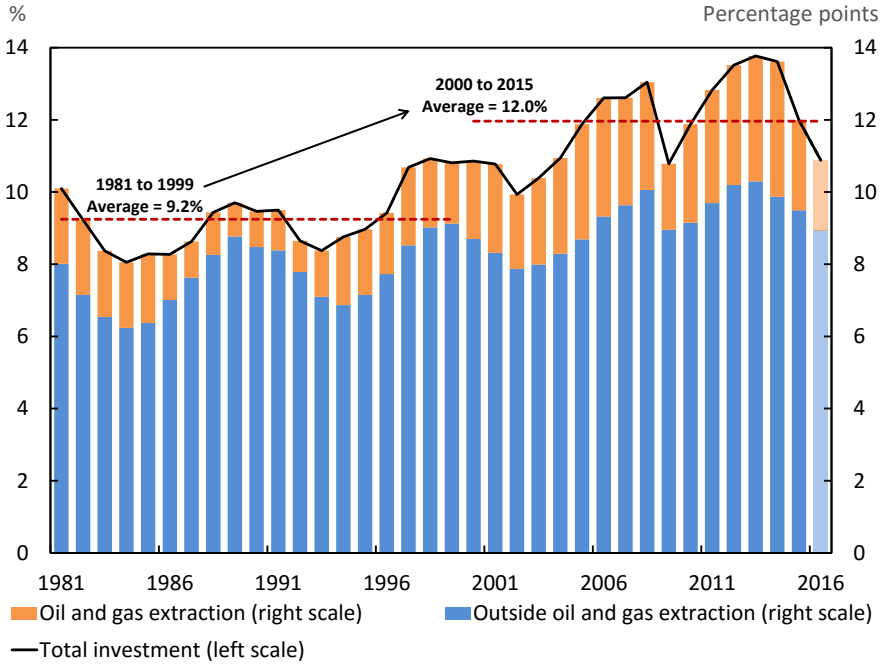
II. Recent Weakness of Canadian Business Investment

In Canada, weakness in business investment remains a concern (Schembri 2017). This underperformance of investment has led to a significant decline in the investment-to-output ratio.

In the period leading up to the global financial crisis, the investment-to-output ratio rose significantly (**Chart 2**). This increase reflected two developments: (i) investment in the oil and gas sector increased substantially; and (ii) the investment-to-output ratio also increased outside the oil and gas sector, driven by an increase in the investment-to-output ratio in the service sector. Overall, the ratio of investment-to-output averaged 12 per cent during the 2000–15 period, well above the 9.2 per cent average from 1981–99.[1] However, since 2013, the investment-to-output ratio has declined meaningfully.

Chart 2: Investment as a share of GDP has fallen but remains above pre-2000 level

Contribution to real investment share of GDP, annual data



Sources: Statistics Canada and Bank of Canada calculations

Business investment has also been a major source of disappointment for economic forecasters. For example, a recent examination of the Bank of Canada's forecast errors by Guenette et al.

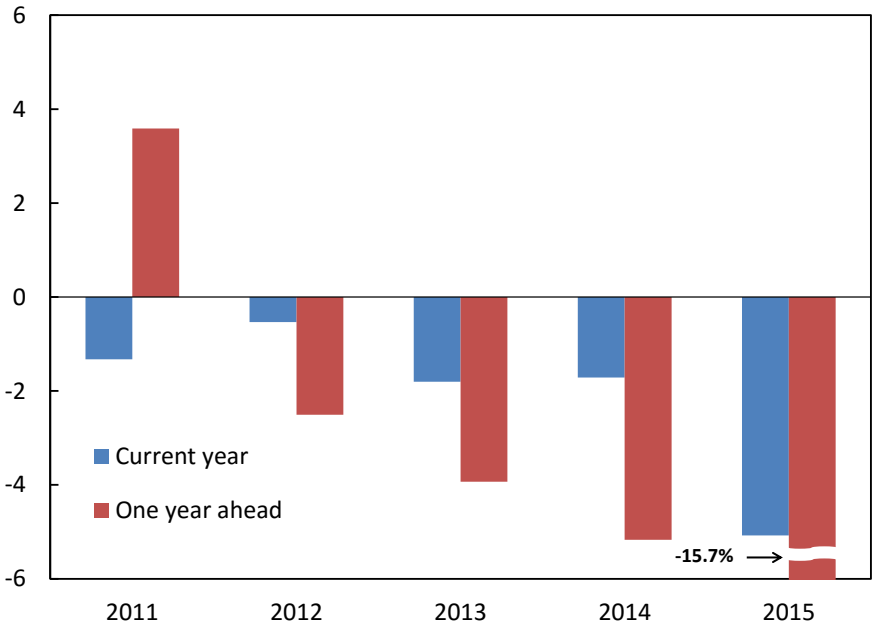
[1] We chose to focus on the period after 2000 because it captured the significant run-up in commodity prices—particularly oil—which coincided with a significant increase in the investment-to-output ratio relative to the earlier period (1981–99).

(2016) highlighted the frequent downside surprises to investment growth over the past five years for the Canadian economy (**Chart 3**).[2] Moreover, these disappointments are not unique to the Bank of Canada's forecast nor isolated to Canada, with most advanced economies exhibiting weaker-than-expected business investment growth in recent years (IMF 2015).

To what extent could this weakness reflect longer-term structural factors rather than the transitory dynamics of the business cycle? The answer to this question has important implications for the economic outlook. In particular, persistently weak investment demand would, all else being equal, lead to a lower neutral rate of interest. In turn, a lower neutral interest rate has important implications for assessing the stance of monetary policy.

Chart 3: Canadian business investment has consistently underperformed relative to the Bank's forecast

Forecast errors: percentage points, annual data



Source: Bank of Canada

III. Cyclical Explanations

A number of studies have examined the subdued pace of business investment growth since the global financial crisis. For example, Lewis et al. (2014) estimate a standard accelerator model and conclude that the majority of the investment shortfall is due to weak economic activity, with financial conditions and heightened uncertainty playing smaller roles. They find significant

[2] The Canadian forecast error in 2015 was amplified by the oil price shock, although investment outside the oil and gas sector continued to disappoint.

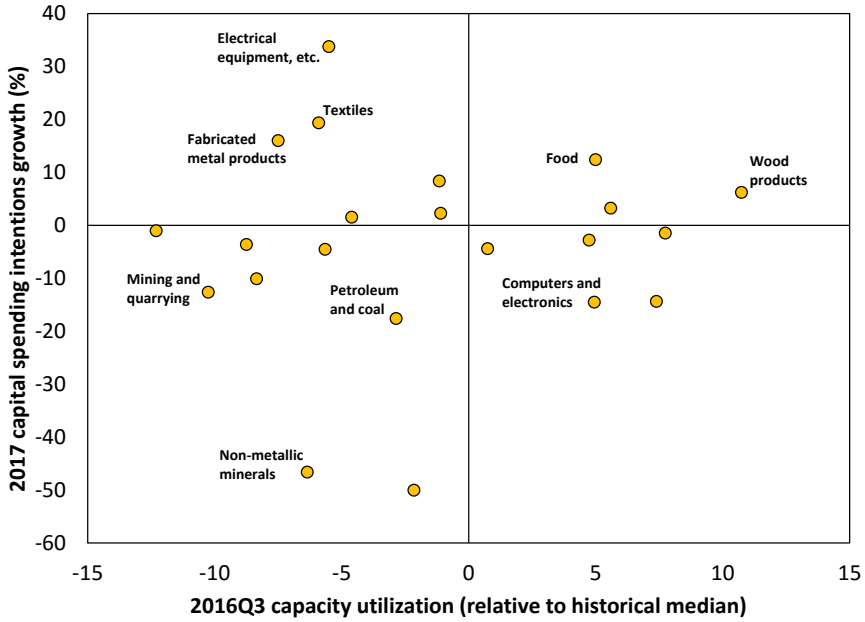
investment gaps (2 per cent or more of GDP) in a number of Organisation for Economic Co-operation and Development (OECD) countries, not only relative to past norms but also relative to projected future steady states. In addition, they highlight the role that the increase in excess capacity has played in holding back investment, which suggests that investment growth should pick up once this excess capacity has been absorbed. Bussière, Ferrara and Milovich (2015) and Leboeuf and Fay (2016) also use accelerator models but include growth expectations (as opposed to realized past growth) when assessing investment growth. They find that lower growth expectations since the crisis have been an important factor inhibiting business investment growth. Like Lewis et al. (2014), both of these papers find that heightened uncertainty has played a secondary role in constraining investment. In related work, the International Monetary Fund (IMF 2015) assesses the role of weak activity using a novel approach to control for endogeneity. This study also finds that weakness in economic activity has been the key factor holding back business investment since the crisis.

Overall, this recent work attributes the weakness in business investment primarily to past and expected weakness in economic activity and, to a lesser degree, heightened uncertainty, tighter financial conditions and the degree of excess capacity. However, we do not regard these results as sufficient to conclude that the recent weakness is entirely cyclical. First, although the studies highlight the role that weak activity has played, they don't explicitly distinguish between cyclical and structural factors. For example, if the slowdown in growth largely reflects structural factors, we would not expect to see them reversed, even as the economy gains strength. Moreover, since expectations were stronger than actual growth, the results in Bussière, Ferrara and Milovich (2015) and Leboeuf and Fay (2016) suggest that firms may have over-accumulated capital. This may imply weaker investment going forward.

Second, if cyclical factors are dominant, then firms with less excess capacity should intend to invest more in order to expand production to meet future demand. We assess this hypothesis for Canada by comparing the capital expenditure plans of industries and manufacturing subsectors with their current capacity utilization rates (**Chart 4**). Despite high rates of capacity utilization across a number of subsectors, very few expect to increase investment this year. Moreover, there does not appear to be a strong relationship between the capital expenditure plans and capacity utilization rates across those industries and manufacturing subsectors included in the chart.

Chart 4: Investment intentions remain weak

By industry, quarterly data



Sources: Statistics Canada and Bank of Canada calculations

These observations suggest that, at least in Canada, the recent evidence is not sufficient to rule out structural explanations of the weakness in investment. For this reason, in the next section we attempt to quantify the extent to which structural factors might be able to account for the weakness.

IV. Structural Influences

In recent years, several structural factors have shifted in ways that could be contributing to the weakness of investment demand (see, e.g., Summers 2014, Mendes 2014 and Rachel and Smith 2015). We provide a rough quantification of the possible impact on Canadian business investment of three factors: (i) slower labour supply growth associated with population aging, (ii) Canada's weak productivity performance over the past decade and (iii) the 2014–15 collapse in oil prices.[3] We apply simple rules of thumb to assess the possible impact of these factors on the steady-state investment-to-output ratio.[4] We focus on the steady state because it is the value to which the ratio should converge in the long run. For the purposes of our calculations,

[3] Although we focus specifically on these three factors, there are other structural shifts that could put downward pressure on the investment-to-output ratio, such as the ongoing shift from goods industries to service industries. In addition, were protectionist policies to be implemented in some jurisdictions, they would most likely also lead to a reduction in Canadian business investment in the long run. We do not address these considerations.

[4] Lewis et al. (2014) also provide a brief discussion of the steady-state level of investment in Box 1 of their paper.

we treat the trend values of variables in 2020 as the steady state. We then examine the impact of each factor relative to the average observed from 2000 to 2015.

In a neoclassical growth model, the steady-state ratio of investment to output is given by the following equation:

$$\frac{I}{Y} = \frac{K}{Y}(g + \delta), \tag{1}$$

where $\frac{K}{Y}$ is the capital-output ratio, g is the steady-state growth rate of output and δ is the depreciation rate. This equation implies that the steady-state investment-to-output ratio is positively related to the steady-state rate of growth. Therefore, any factor that lowers the steady-state rate of growth would also be expected to lower the steady-state investment-to-output ratio.

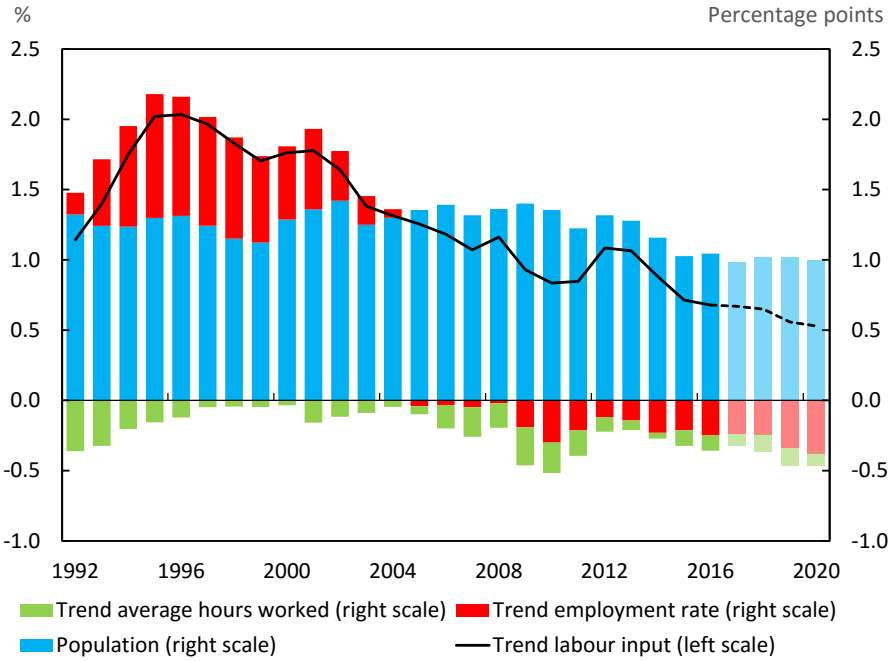
For the purposes of our calculations, we treat potential output growth in 2020 as steady-state growth. Potential growth can be decomposed into the sum of trend labour input (TLI) growth and trend labour productivity (TLP) growth (see Agopsowicz et al. 2017). We further assume that the capital-output ratio in equation 1 is equal to one. This value is close to the average ratio observed in Canada over the past decade.

Demographics and population aging are key determinants of TLI growth. These factors are expected to weigh on TLI over the foreseeable future as baby boomers continue to retire. Specifically, in Canada, TLI growth is expected to continue to slow from an average of 1.2 per cent over the 2000–15 period to 0.5 per cent by 2020 (**Chart 5**). This decline reflects both slower working-age population growth as well as the ongoing demographic transition that is expected to lower the employment rate and average hours worked (see Agopsowicz et al. 2017). In isolation, the shift in TLI growth causes potential output growth to fall by 0.7 percentage points. All else being equal, equation 1 implies that this shift would cause the investment-to-output ratio to be approximately 0.7 percentage points lower.

TLP growth is also expected to affect the investment-to-output ratio in the long run. The Bank projects that TLP growth will gradually pick up from 0.6 per cent in 2016 to its long-run average of 1.2 per cent just beyond 2020 (Agopsowicz et al. 2017). While it is possible that labour productivity growth could return to its long-run average, it is also noteworthy that TLP growth in 2016 is only slightly below its average over the past decade (**Chart 6**). It is not inconceivable that the expected improvement may fail to materialize, with TLP growth remaining near its 10-year average.

Chart 5: Canadian trend labour input growth continues to decline

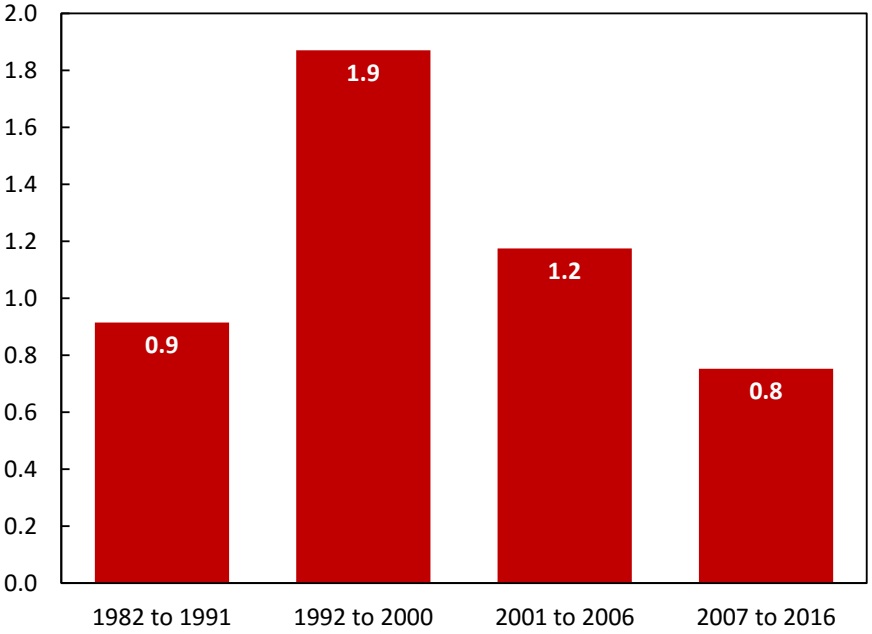
Contributions to growth, annual data



Sources: Statistics Canada and Bank of Canada calculations

Chart 6: Canadian labour productivity growth has slowed

Per cent, annual data



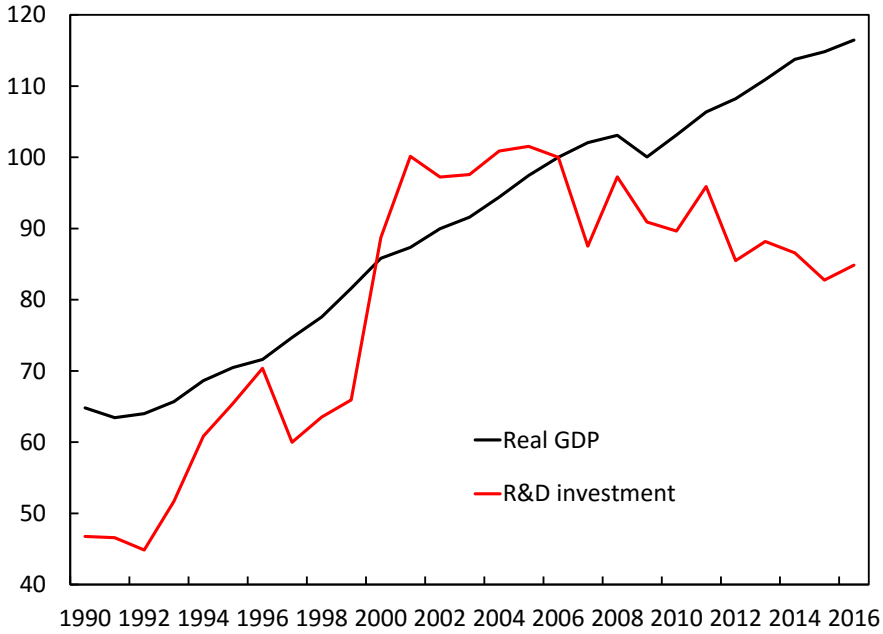
Sources: Statistics Canada and Bank of Canada calculations

To get a better sense of the plausibility of this risk, we decompose TLP into contributions from capital deepening and trend total factor productivity (TFP) growth. We focus on the latter since

trend TFP growth is determined by a number of factors, including the rate of technological progress and human capital accumulation. The Bank's estimate of TLP growth assumes a gradual improvement in trend TFP growth toward historical averages out to 2020. However, while this may be a reasonable baseline, there are also a number of reasons to be skeptical that this will transpire. First, Canadian business investment in research and development (R&D) has been on a declining trend over the past decade (**Chart 7**). This contrasts with the preceding 15 years, where real investment in R&D outpaced real GDP growth by a factor of almost 2 to 1. Since 2005, however, the level of real R&D investment has declined by almost 17 per cent while real GDP has expanded by over 19 per cent.[5] Since technological progress is typically greatest in R&D-intensive industries, this could restrain TFP growth in the future (Clark 2016).

Chart 7: Canadian investment in R&D has pulled back in recent years

Index: 2006 = 100, annual data



Sources: Statistics Canada and Bank of Canada calculations

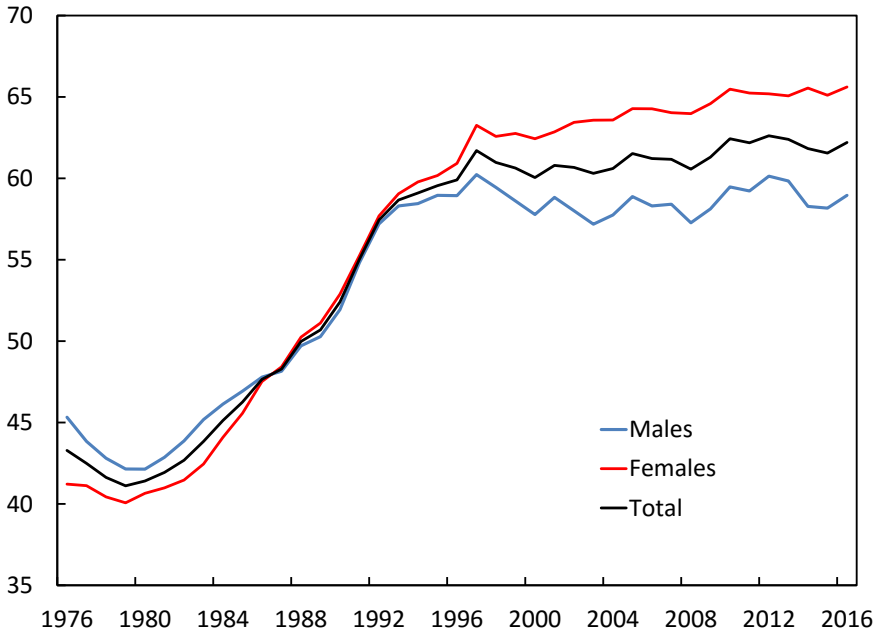
Educational attainment is an important determinant of human capital accumulation and thus of productivity growth. For example, Gordon (2016) has emphasized the role of educational attainment in explaining the past improvement in US TFP growth. He argues, however, that "the historic rise in educational attainment has slowed to a crawl" and will therefore contribute little to TFP growth in the future (Gordon 2015). Gordon (2016) estimates that the slowdown in educational attainment alone could subtract 0.3 percentage points from US labour productivity

[5] Since 2005, 7 of 17 sectors examined had seen their levels of real R&D investment decline. These 7 sectors, however, accounted for almost 87 per cent of business R&D investment in 2005.

over the next 25 years. In Canada, we have also observed a flattening in the rate of educational attainment among youth since the late 1990s, particularly for males (**Chart 8**).

Chart 8: Youth full-time and part-time school enrolment rate has been relatively stable since the late 1990s

Per cent, annual data



Sources: Statistics Canada and Bank of Canada calculations

Note: Youth are defined as those 15 to 24 years of age.

The Bank's estimate of potential GDP growth currently embeds a 0.4-percentage-point improvement in trend TFP growth. If this improvement were to fail to materialize because of slower technological progress and/or the levelling-off in educational attainment, it would remove another 0.4 percentage points from the investment-to-output ratio by 2020.

Lastly, there has been a significant pullback of investment in the oil and gas sector since oil prices collapsed in the second half of 2014. The Bank estimates that investment in the oil and gas sector has declined by almost 50 per cent since 2014; this shift alone has already reduced the oil and gas sector's contribution to the economy-wide investment-to-output ratio by close to a full percentage point relative to the 2000–15 period. While oil prices are expected to rise in the future (see Büyükşahin et al. 2016), there are a number of reasons to believe that they will remain at significantly lower levels than observed before the collapse. First, productivity growth in shale oil production has increased at incredible rates and the repeated and standardized nature of the fracking process could lead to ongoing productivity improvements (Dale 2015). Moreover, shale technology could begin to extend beyond the United States into other regions

with shale deposits. There are also risks to oil prices from the potential decrease in oil demand resulting from substitution of non-fossil fuels such as renewables. Demand for fossil fuels could also be negatively affected by the wider adoption of electric vehicles, as well as by more stringent government environmental policies. Therefore, it is reasonable to assume that oil prices will remain near current levels out to 2020, which would imply that the recent decline in the contribution from the oil and gas sector to Canadian business investment is likely to persist.

Taken together, the structural factors examined above could reduce the investment-to-output ratio by as much as 2 percentage points relative to the average ratio observed over the 2000–15 period (**Table 1**).

Table 1: Structural factors could lower the investment-to-output ratio by as much as 2 percentage points

Risks	Impact on the investment-to-output ratio (in 2020 relative to 2000–15 average, percentage points)
Demographics	-0.7
Weaker technological progress	-0.4
Lower oil prices	-0.9
Overall risk assessment	**-2.0**

V. Potential Implications of a Lower Investment-to-Output Ratio

In this section, we provide an estimate of what the structural interpretation discussed above could imply for the outlook for the Canadian economy. To begin, we need to determine how large a risk the structural interpretation would be, given the observed changes in the investment-to-output ratio to date. Our analysis suggests that structural factors could reduce the investment-to-output ratio by 2 percentage points relative to the average ratio of 12 per cent observed from 2000 to 2015. Given that the investment-to-output ratio had already declined to 10.9 per cent by 2016, this would imply a potential additional adjustment of 0.9 percentage points.

To assess the potential impact of an additional 0.9-percentage-point decline in the investment-to-output ratio, we run two scenarios. In the first, we assume that the investment-to-output ratio remains stable out to 2020. In the second, we assume that investment demand shocks

cause the investment-to-output ratio to decline to 10 per cent by 2020 and that there is no monetary policy response to these shocks.[6]

Comparing these two scenarios suggests there are potentially important implications for the economic outlook in the absence of a monetary policy response (**Table 2**). Specifically, the impact of a further decline in the investment-to-output ratio could reduce the levels of business investment and real GDP by roughly 7 and 1 per cent, respectively, by 2020. The reduction in real GDP would, in turn, lessen inflationary pressures, although this effect would be partially mitigated by a decline in potential output as a result of a lower stock of capital. Combined, these factors would reduce the outlook for inflation by around 0.1 percentage point in the absence of a monetary policy response.

Table 2: A lower investment-to-output ratio would have a significant impact on the economic outlook

	2016	2017	2018	2019	2020
Business investment (per cent level shock)	0.0	-1.2	-3.3	-5.3	-7.3
Real GDP (per cent level shock)	0.0	-0.1	-0.4	-0.7	-0.9
Output gap (percentage points)	0.0	-0.1	-0.3	-0.5	-0.6
CPI inflation (percentage points)	0.0	0.0	-0.1	-0.1	-0.1

Finally, while these magnitudes might appear large, they could be even larger if we believe the same secular factors affecting Canada are also affecting our major trading partners. As noted earlier, the sluggishness of business investment since the global financial crisis has been a broad-based phenomenon across a number of advanced economies that, were it to continue, would also weigh on the Canadian outlook. For example, if US business investment were to grow less quickly than anticipated as a result of these structural factors, this would reduce the demand for Canada's non-energy exports and negatively affect Canadian business investment.

[6] The scenarios were produced using both of the Bank's main macroeconomic models, ToTEM and LENS (see Dorich et al. 2013 and Gervais and Gosselin 2014).

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