

Staff Analytical Note/Note analytique du personnel 2019-10

# Potential Output in Canada: 2019 Reassessment



by Dany Brouillette, Julien Champagne, Carol Khoury, Natalia Kyui,  
Jeffrey Mollins and Youngmin Park

Canadian Economic Analysis Department  
Bank of Canada  
Ottawa, Ontario, Canada K1A 0G9

[dbrouillette@bankofcanada.ca](mailto:dbrouillette@bankofcanada.ca), [jchampagne@bankofcanada.ca](mailto:jchampagne@bankofcanada.ca), [ckhoury@bankofcanada.ca](mailto:ckhoury@bankofcanada.ca),  
[nkyui@bankofcanada.ca](mailto:nkyui@bankofcanada.ca), [jmollins@bankofcanada.ca](mailto:jmollins@bankofcanada.ca), [ypark@bankofcanada.ca](mailto:ypark@bankofcanada.ca)

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## **Acknowledgements**

We would like to thank Marc-André Gosselin, Jing Yang, Robert Amano and Russell Barnett for their helpful comments and suggestions. We would also like to thank Nicole van de Wolfshaar and Meredith Fraser-Ohman for their editorial assistance.

## Abstract

Potential output is expected to grow on average at 1.8 per cent over 2019–21 and at 1.9 per cent in 2022. While the contribution of trend labour input to potential output growth is expected to decrease between 2019 and 2022, the contribution of trend labour productivity is projected to increase. Relative to the April 2018 reassessment, the profile for potential output growth rates is similar, albeit revised slightly down in 2020 and 2021. Underlying this new profile are negative revisions to the business investment outlook relative to April 2018 that are mostly offset by stronger projections for population growth. Based on various alternative scenarios, the range for potential output growth estimates widens from 1.5 to 2.1 per cent in 2019 to 1.3 to 2.5 per cent in 2022.

*Bank topics: Potential output; Productivity; Labour markets*

*JEL codes: E, E00, E2, E23, E24, E37, E6*

## Résumé

La production potentielle devrait afficher une croissance moyenne de 1,8 % de 2019 à 2021 et de 1,9 % en 2022. Même si l'apport du facteur travail tendanciel à la croissance de la production potentielle devrait diminuer entre 2019 et 2022, celui de la productivité tendancielle du travail devrait augmenter. Le profil des taux de croissance de la production potentielle est similaire à celui établi lors de la réévaluation d'avril 2018, malgré une légère révision à la baisse pour 2020 et 2021. Ce nouveau profil tient compte d'un assombrissement des perspectives d'investissement des entreprises, en grande partie contrebalancé par des projections à la hausse pour ce qui est de la croissance démographique. Selon les divers scénarios étudiés, la fourchette des estimations de croissance de la production potentielle s'élargit, allant de 1,5 à 2,1 % en 2019 et de 1,3 à 2,5 % en 2022.

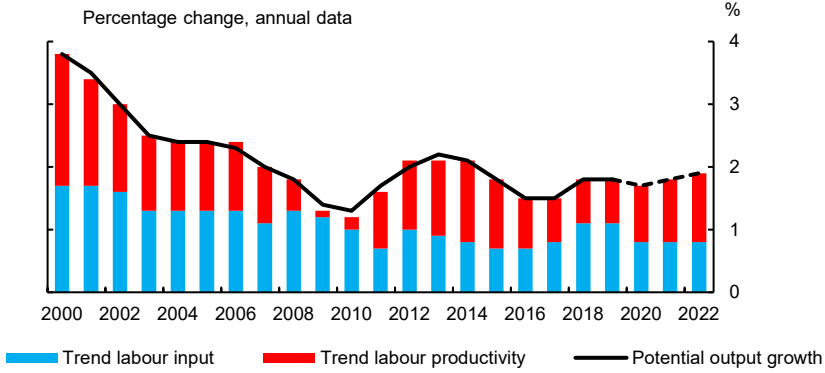
*Sujets : Production potentielle; Productivité; Marchés de travail*

*Codes JEL : E, E00, E2, E23, E24, E37, E6*

# 1. Introduction

This note presents the results of the annual reassessment of potential output conducted by Bank of Canada staff ahead of the publication of the April 2019 *Monetary Policy Report*. **Chart 1** shows that we expect potential output growth to average 1.8 per cent from 2019 to 2022. This profile is similar to the one in the April 2018 reassessment, albeit slightly weaker in 2020 and 2021 (**Chart 2**). Revisions leading to the current profile are explained in Section 2, while Section 3 gives further details on the potential output dynamics. Section 4 concludes with an assessment of the uncertainty around estimates for potential output growth.

**Chart 1: Potential output growth is projected to average 1.8 per cent from 2019 to 2022**



Note: Numbers may not sum due to rounding.  
Sources: Statistics Canada and Bank of Canada estimates and projections

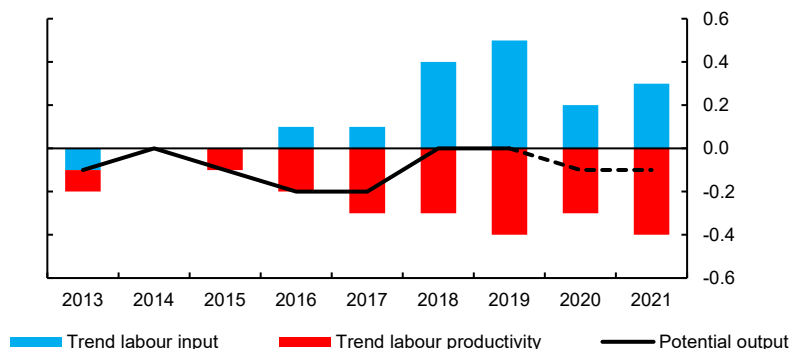
# 2. Revisions to the staff projection of potential output

**Chart 2** shows downward revisions to potential output growth relative to April 2018. These changes result from negative revisions to trend labour productivity (TLP) that are mostly offset by upward revisions to trend labour input (TLI).

TLI growth can be decomposed into the sum of growth rates for the working-age population, trend employment rate (TER) and trend average hours worked (TAHW). Consequently, new population projections by Statistics Canada and revised estimates of TER and TAHW using the latest data on employment and hours worked will affect our projections for TLI growth. Stronger growth in the working-age population explains most of the upward adjustment to TLI growth (**Chart 3**, dark and light blue bars combined) in 2018 and over the projection horizon. Meanwhile, revised estimates of TER and TAHW models with the annual data from the 2018 Labour Force Survey (LFS) have only a minor effect (**Chart 3**, red bars).

**Chart 2: Potential output growth is revised down**

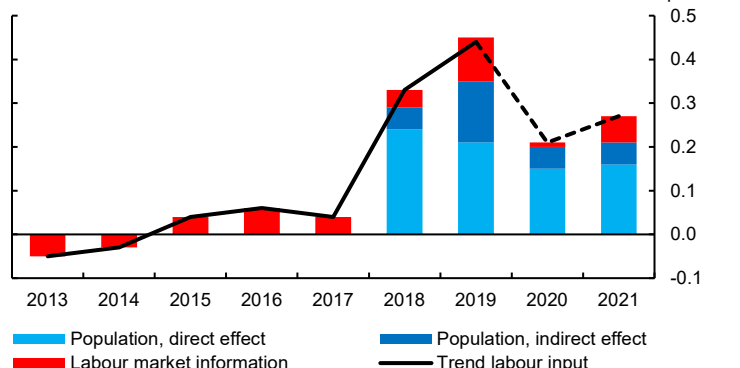
Shock minus control on growth rates (relative to April 2018), annual data Percentage points



Note: Numbers may not sum due to rounding.  
Sources: Statistics Canada and Bank of Canada estimates and projections

**Chart 3: Revised upward population growth is pushing trend labour input growth up**

Shock minus control on growth rates (relative to April 2018), annual data Percentage points



Sources: Statistics Canada and Bank of Canada estimates and projections

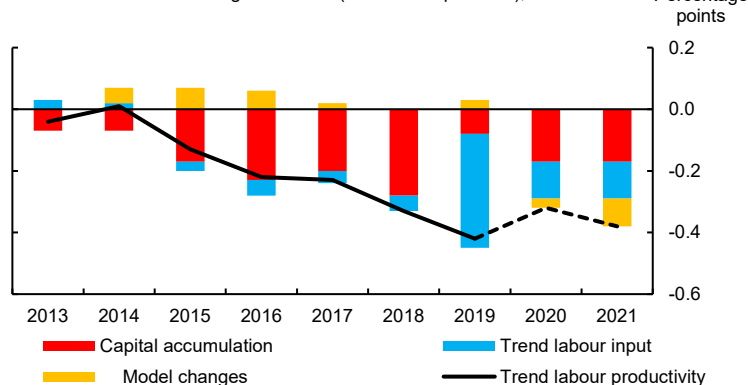
Specifically, we expect growth of the working-age population to be higher than it was in April 2018, mainly reflecting stronger immigration going forward and more non-permanent residents. The revised population projection affects TLI in two ways. First, the higher growth of the working-age population translates directly into higher TLI growth rates (**Chart 3**, light blue bars). Second, the changing composition of the working-age population positively affects TER and TAHW (**Chart 3**, dark blue bars) because the new structure puts more weight on age groups (e.g., prime age) that work more.<sup>1</sup> Over the projection horizon, the indirect effect accounts for approximately one-third of the overall impact of the revisions to population.

<sup>1</sup> **Chart A-1** in the Appendix shows an alternative breakdown of TLI growth revisions between population, TER and TAHW. In **Chart A-1**, the blue bars represent the direct effect of population. The red and green bars show growth revisions to TER and TAHW, respectively, that combine the indirect effect from population growth and estimates that have been updated with the latest data.

Positive TLI growth revisions do not fully translate to potential output because TLI growth has a negative impact on TLP growth (**Chart 4**, blue bars). Recall that TLP growth can be decomposed into trend total factor productivity (TFP) growth and capital deepening, with the latter depending on the growth of the ratio of capital stock to TLI.<sup>2</sup> Consequently, for a given labour share and stock of capital, an upward revision to TLI growth implies that the growth of TLP should be revised down because the available stock of capital per hours worked is lower.

**Chart 4: Weak investment and higher population are weighing on trend labour productivity growth**

Shock minus control on growth rates (relative to April 2018), annual data



Sources: Statistics Canada and Bank of Canada estimates and projections

Revisions to the business investment outlook are another factor weighing on TLP growth, which negatively affects capital accumulation and lowers the contribution of capital deepening, especially over the projection horizon (captured by the red bars in **Chart 4**). For instance, the staff outlook for business investment has been revised down relative to April 2018, mostly due to the decline in oil prices since mid-2018. Significant historical revisions to gross domestic product and business investment also suggest that the effects of the 2014–15 oil price shock are more pronounced and persistent than assessed in April 2018.

Other sources of revisions over the projection horizon are relatively less important (**Chart 4**, yellow bars). For example, we revisited our assumptions on trend TFP. Recall that trend TFP captures many factors, making it difficult to interpret and forecast. Over the projection horizon, we therefore assume that trend TFP growth returns to its historical average (0.7 per cent) by 2021, slightly lower than assumed in April 2018 (0.8 per cent).

### 3. The dynamics of the projection of potential output growth

The revisions described in Section 2 lead to the potential output growth dynamics shown in **Table 1**. Over the projection horizon, potential output growth will average 1.8 per cent. The narrative for the dynamics of potential output growth remains the same as in the April 2018

<sup>2</sup> Technically,  $\Delta TLP = \Delta trend\_TFP + capital\_share \times \Delta \left( \frac{capital\_stock}{TLI} \right)$ , with  $\Delta$  representing the growth operator.

annual reassessment: the increase in TLP growth will offset the decline in TLI growth over the projection horizon.

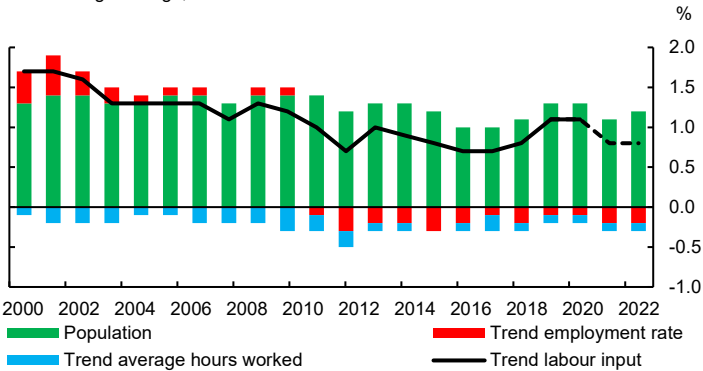
Table 1: Potential output growth rates (%)			
	Potential output	TLI	TLP
2010–17	1.8 (1.9)	0.8 (0.9)	0.9 (1.0)
2018	1.8 (1.8)	1.1 (0.7)	0.7 (1.0)
2019	1.8 (1.8)	1.1 (0.6)	0.7 (1.1)
2020	1.7 (1.8)	0.8 (0.6)	0.9 (1.2)
2021	1.8 (1.9)	0.8 (0.5)	1.0 (1.4)
2022	1.9	0.8	1.1

Note: Estimates of annual growth rates from the April 2018 reassessment appear in parentheses. TLI is trend labour input, and TLP is trend labour productivity. Numbers may not sum due to rounding.

**Chart 5** presents the contributions to TLI growth of working-age population, TER and TAHW over history and the projection horizon. We expect TLI growth to decline from 1.1 per cent in 2019 to 0.8 per cent by 2022 (**Table 1**). We maintain our narrative that this slowdown in TLI growth will be driven by population aging.

**Chart 5: Trend labour input growth is projected to decline, largely due to population aging**

Percentage change, annual data



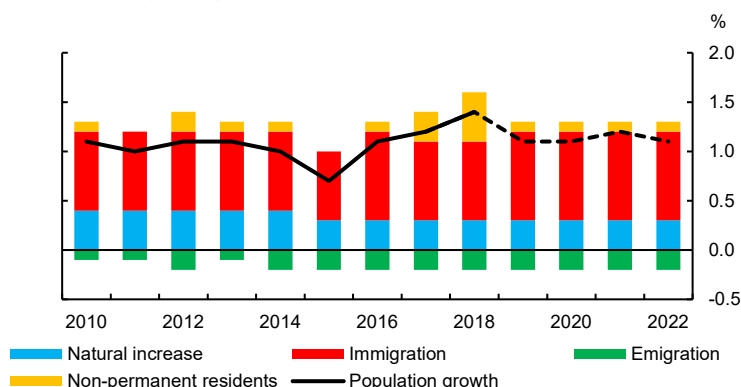
Note: Numbers may not sum due to rounding. Sources: Statistics Canada and Bank of Canada estimates and projections

Because it puts more weight on age groups with lower employment rates, population aging can explain the drag from TER in its entirety (**Chart 5**, red bars). The drag from TAHW (**Chart 5**, blue bars) reflects other factors, such as the secular decline in average hours worked, higher employment in the services sector and higher employment of women. Overall, population aging removed 0.5 percentage points from TLI growth over 2011–18 and will likely remain so over the projection horizon.

While population growth is lower than it was in the 2000s, it has stabilized in recent years. Immigration has recently been an important source of total population growth in Canada and is expected to remain its main driver in the coming years (**Chart 6**, red bars).

**Chart 6: Immigration remains the main contributor to population growth**

Percentage change, annual data

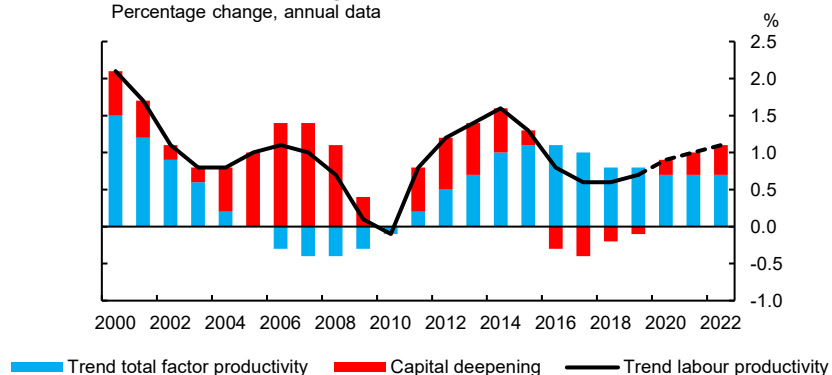


Note: The chart shows total population. Numbers may not sum due to rounding.  
Sources: Statistics Canada and Bank of Canada calculations

On the productivity side, TLP growth is expected to increase from 0.7 to 1.1 per cent by 2022 (**Table 1**). **Chart 7** shows the TLP growth decomposition. This decomposition is useful because it provides a breakdown of TLP growth between capital deepening and trend TFP. Since trend TFP growth is assumed to be flat after 2020, capital deepening remains the main driver of the increase in TLP growth. The rising contribution of capital deepening reflects the recovery of business investment levels in the wake of the sharp decline in commodity prices at the end of 2014.

**Chart 7: Trend labour productivity increase remains driven by increases in capital deepening**

Percentage change, annual data



Note: Numbers may not sum due to rounding.  
Sources: Statistics Canada and Bank of Canada estimates and projections

Finally, we compare our profile for potential output growth over the projection horizon with those from outside sources, such as the Parliamentary Budget Officer, the Organisation for Economic Co-operation and Development and the International Monetary Fund (**Table 2**). Overall, our estimates lie within those of these three sources. We highlight that forecasts released by these institutions would likely be lower considering the weaker data from the fourth quarter of 2018.



	<b>April 2019 Monetary Policy Report</b>	<b>PBO (October 2018)</b>	<b>OECD (November 2018)</b>	<b>IMF (Article IV, July 2018)</b>
<b>2018</b>	1.8	1.6	1.7	2.0
<b>2019</b>	1.8	1.7	1.7	2.0
<b>2020</b>	1.7	1.7	1.7	1.9
<b>2021</b>	1.8	1.7		1.9
<b>2022</b>	1.9	1.7		1.8

Note: PBO is Parliamentary Budget Officer; OECD is the Organisation for Economic Co-operation and Development; and IMF is the International Monetary Fund.

## 4. Alternative scenarios

Projections of potential output growth are subject to much uncertainty. **Table 3** presents a range for potential output growth built around three scenarios described in this section.<sup>3</sup>

	2019	2020	2021	2022
<b>Range</b>	[1.5–2.1]	[1.3–2.1]	[1.2–2.4]	[1.3–2.5]
<b>Midpoint of the range</b>	1.8	1.7	1.8	1.9

### 4.1 Population

We obtained scenarios depicting high and low population growth rates from Statistics Canada. The low population growth scenario reflects decreased assumptions on immigration and non-permanent residents and higher assumptions about mortality and emigration than in the medium population growth scenario (base case). The higher population growth scenario assumes these effects are reversed. Under the high population growth scenario, TLI growth rates would be higher by 0.2 percentage points by 2022. In contrast, under the low population growth scenario, TLI growth rates are lower by 0.3 percentage points by 2022. Under these two scenarios, potential output growth will lie between -0.2 to +0.1 percentage points around the base case by 2022.

### 4.2 Investment

In our base-case scenario, we assume that the weakness in business investment observed in recent quarters—due to a combination of trade uncertainty, softening in global activity and

<sup>3</sup> While other factors can influence our estimates of potential output growth, we do not discuss them in detail due to the uncertainty around their magnitude and timing. For instance, the digitalization of the economy could drag on TLP growth in the short term because firms' operations and productivity could be disrupted as they learn how to best use new technologies (such as artificial intelligence). However, digitalization may boost TLP growth in the long run because efficiency gains outweigh the initial losses. The timing of these phases is uncertain, however, and subject to much debate.

possible spillover from the oil and gas sector—is amplified in the short run (2019H1) and remains persistent over the projection horizon. We provide two scenarios around this base case:

- an upside scenario, which assumes this weakness is temporary and reversed by the end of 2020; and
- a downside scenario, where the weak momentum observed over the last quarters of 2018 is carried over the short run (2019H1), and the factors weighing on investment are affecting capital spending more heavily than they are in the base case.

Taken together, these scenarios imply that potential output growth could range from -0.1 to +0.2 percentage points around the midpoint estimates.

### 4.3 Human capital

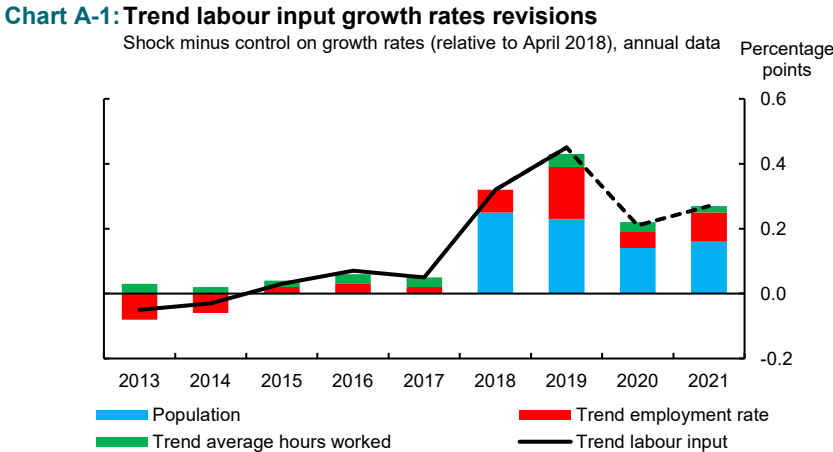
As seen in **Chart 7**, the unexplained part of TLP (which we call trend TFP) is relatively large because it captures all the factors not included in hours worked and the capital stock. One factor often cited as an important driver of trend TFP is human capital, defined as efficiency units of labour input. We follow the methodology in Bowlus and Robinson (2012) and estimate the contribution of human capital to trend TFP. While this work is still preliminary, we find that the contribution of human capital to trend TFP is important. Depending on certain identifying assumptions, the contribution of human capital to potential output growth over the projection horizon could be -0.3 to +0.3 percentage points lower or higher than the base case.

## References

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- International Monetary Fund (IMF). 2018. “Canada: 2018 Article IV Consultation.” [July](#).
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# Appendix: Alternative trend labour input decomposition

**Chart A-1** presents an alternative decomposition of TLI growth into the sum of growth rates from working-age population, TER and TAHW. The blue bars represent the direct effect of population (similar to the light blue bars in **Chart 3**). The red and green bars show growth revisions to TER and TAHW, respectively, that combine the indirect effect from population growth (dark blue bars in **Chart 3**) and estimates that have been updated with the latest data.



Sources: Statistics Canada and Bank of Canada estimates and projections