Assessing Global Potential Output Growth: April 2018

by Richard Beard, Anne-Katherine Cormier, Michael Francis, Katerina Gribbin, Justin-Damien Guénette, Chris Hajzler, Kristina Hess, James Ketcheson, Kun Mo, Louis Poirier and Peter Selcuk

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

rbeard@bankofcanada.ca   acormier@bankofcanada.ca   mfrancis@bankofcanada.ca
kgribbin@bankofcanada.ca   jdguenette@bankofcanada.ca   chajzler@bankofcanada.ca
khess@bankofcanada.ca   jketcheson@bankofcanada.ca   kmo@bankofcanada.ca
lpoirier@bankofcanada.ca   pselcuk@bankofcanada.ca

www.bank-banque-canada.ca

Acknowledgements

Abstract

This note presents our estimates of potential output growth for the global economy through 2020. Overall, we expect global potential output growth to remain broadly stable over the projection horizon, averaging 3.3 per cent, although there is considerable uncertainty surrounding these estimates. There are offsetting dynamics across regions. Specifically, potential output growth is expected to increase in the United States, reflecting a slight rise in capital deepening. In emerging-market economies, potential growth is also projected to strengthen, mainly due to a recovery of investment as well as structural reforms contributing to total factor productivity growth. Population aging and declining labour inputs slow potential output growth in Japan, China and the euro area. Potential output in China also slows due to moderating investment growth.

Bank topics: Potential output; Productivity; International topics
JEL codes: E10, E20, O4

Résumé

La présente note fait état de nos estimations de la croissance de la production potentielle dans l'économie mondiale jusqu'à l'horizon 2020. Dans l'ensemble, bien que nos estimations soient empreintes d'une incertitude considérable, nous nous attendons à un taux de croissance globalement stable de la production potentielle sur la période de projection, de l'ordre de 3,3 % en moyenne. On observe des dynamiques qui se contrebalancent dans les différentes régions. Concrètement, la croissance de la production potentielle devrait s'accélérer aux États-Unis, sous l'effet d'une légère hausse de l'intensification du capital. Elle devrait aussi s'amplifier dans les économies émergentes, principalement en raison d'une reprise de l'investissement et de réformes structurelles contribuant à un accroissement de la productivité totale des facteurs. Enfin, au Japon, en Chine et dans la zone euro, nous prévoyons qu'elle ralentira, compte tenu du vieillissement de la population et de la diminution du facteur travail – freins auxquels s'ajoutera, dans le cas de la Chine, la modération de la croissance des investissements.

*Sujets : Production potentielle; Productivité; Questions internationales*
Codes JEL : E10, E20, O4

1. Introduction

Each year, before the release of the April *Monetary Policy Report* (MPR), Bank of Canada staff reassess potential output growth for Canada and the global economy. This note focuses on the global economy, and is a companion piece to Agopsowicz et al. (2018), which focuses on Canada.[1] We construct potential output growth estimates for the global economy through 2020 using a growth accounting framework that decomposes potential output into trend total factor productivity (TFP), capital deepening and trend labour input (TLI). The latter is further decomposed into working-age population, trend labour force participation rate, trend employment rate and trend average hours worked to gain a better understanding of the contribution of labour dynamics to potential growth (see Appendix 1 for details). We apply the framework to different economies and country blocks, and obtain an estimate of potential output growth for the global economy by aggregating the results using an approach consistent with the Bank of Canada's global projection reported in the MPR.[2]

While there is considerable uncertainty surrounding our estimates, the analysis suggests that global potential output growth will remain broadly stable over the projection horizon (2018–20), reaching 3.4 per cent in 2020 from 3.3 per cent in 2017 (**Chart 1**). Global potential output growth is primarily driven by capital accumulation and TFP growth in China and other emerging-market economies (EMEs) over 2018–20 (**Table 1**). In the United States, potential output growth increases moderately over the projection horizon, from 1.7 per cent in 2017 to 1.9 per cent in each year from 2018 to 2020. This reflects mostly a pickup in the rate of capital deepening.

Chart 1: Global potential output growth is expected to remain broadly stable over the projection horizon
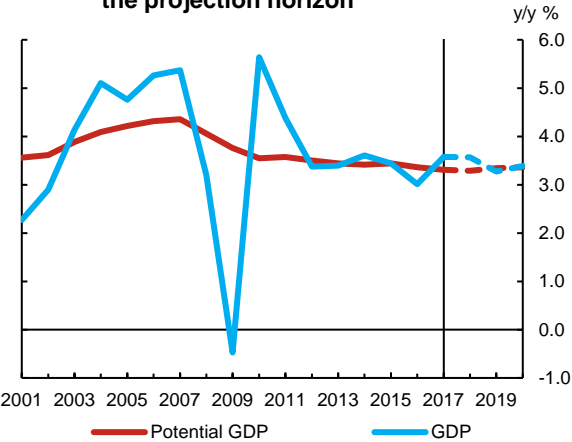
Note: GDP means gross domestic product.
Sources: national sources and Bank of Canada calculations
Last data plotted:2020

The remainder of this note is organized as follows: In Section 2 and Section 3 we discuss the potential output growth estimates for the United States and China, respectively. We focus on these two economies because of their relative size and importance for global dynamics. In Section 4 we briefly discuss the drivers of potential output growth in other regions. In Section 5 we provide an overview of key risks facing our outlook for potential growth in each region.

---

[1] Given the global scope of the exercise and the data limitations, the approach used here is simpler than that used for the Canadian reassessment.
[2] The projection of the global potential output growth is based on forecasts for major regional blocks: the United States, China, euro area, Japan, oil-importing emerging-market economies and a remaining group of countries consisting mostly of oil exporters and other small advanced economies.

Table 1: Global potential output growth driven mostly by TFP and capital accumulation in China and other EMEs

	US	CH	EA	JA	EME	World
Average potential growth, 2018-20	1.9	6.3	1.5	0.8	4.2	3.3
Contribution coming from (pp):						
Trend labour input	0.6	-0.1	0.5	-0.2	0.8	0.6
Trend labour productivity	1.3	6.4	1.0	1.0	3.4	2.7
Total factor productivity	*0.7*	*2.3*	*0.8*	*0.7*	*1.6*	*1.2*
Capital deepening	*0.6*	*4.1*	*0.2*	*0.3*	*1.8*	*1.5*
Share of real global GDP[a] (per cent)	15	18	12	4	33	100

[a]GDP shares are based on International Monetary Fund (IMF) estimates of the purchasing-power-parity valuation of country GDPs for 2016 from the IMF's October 2017 *World Economic Outlook*.

Note: TFP means total factor productivity, EMEs means emerging-market economies, GDP means gross domestic product.

2. United States

US potential output growth continues to recover from its post-crisis trough and is projected to increase moderately over the projection horizon, from 1.7 per cent in 2017 to 1.9 per cent in each year from 2018 to 2020 (**Chart 2**). Most of this increase occurs in 2018, largely reflecting a pickup in the rate of capital deepening.

a) US trend labour input

TLI growth is expected to remain relatively constant over the projection horizon (**Chart 3**). The slower growth in TLI relative to the previous decade is driven almost entirely by demographics, as an older population results in slower growth of the working-age population and a declining labour force participation rate.
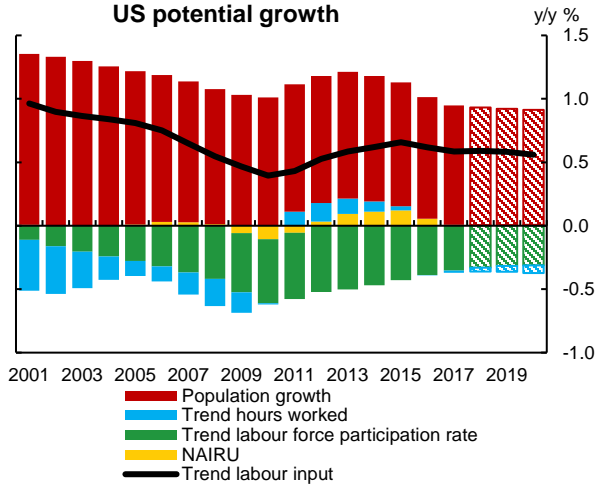
Chart 2: **US potential output is expected to increase slightly over the projection horizon**

Sources: national sources and Bank of Canada calculations

Last data plotted: 2020
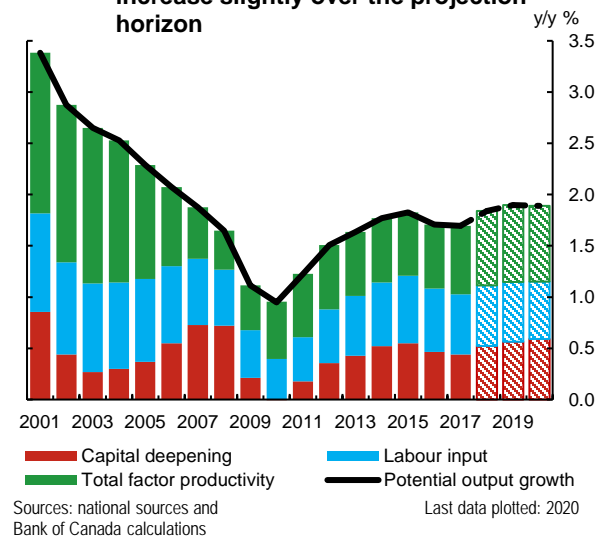
Trend employment growth will continue to be supported primarily by population growth (red bars in **Chart 3**), with a marginal amount of additional growth provided by a slight decline in the non-accelerating inflation rate of unemployment (NAIRU) over the projection horizon (yellow bars in **Chart 3**).[3] These factors will be partly offset by an ongoing decline expected in the trend labour force participation rate (**Chart 4**; green bars in **Chart 3**), mainly as a result of the continued aging of the population.

The average number of hours worked per week has declined over the past decades. This is partly due to the movement of workers from the manufacturing sector—where workers worked an average of 41 hours per week since 1990—to the services sector, where they averaged around 32 hours of work per week. However, this shift into services has slowed since the financial crisis. We expect it to proceed only gradually over the projection horizon (**Chart 5**), acting as a slight drag on potential output growth (blue bars in **Chart 3**).

Chart 3: Factors affecting trend labour input of US potential growth

y/y %

Population growth
Trend hours worked
Trend labour force participation rate
NAIRU
Trend labour input

Note: NAIRU means non-accelerating inflation rate of unemployment.
Sources: national sources and Bank of Canada calculations   Last data plotted: 2020

Chart 4: US trend participation rate is expected to continue declining

%

Trend participation rate   Observed participation rate
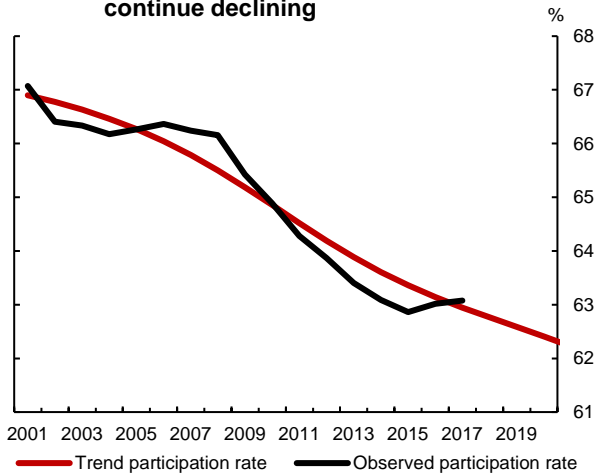
Sources: Current Population Survey and Bank of Canada calculations   Last data plotted: observed rate, 2017; trend rate, 2020

Chart 5: US average weekly hours worked are expected to decline only slightly over the projection horizon

Hours

Observed data
Trend hours worked
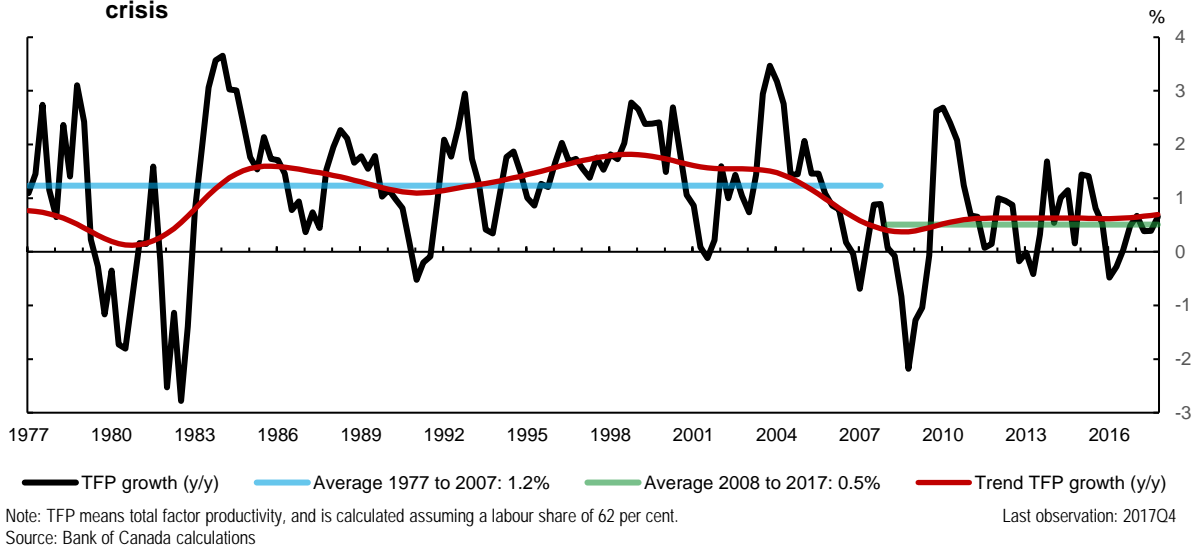Forecast of trend hours worked

Sources: US Bureau of Labor Statistics and Bank of Canada calculations   Last data plotted: 2020Q4

---

[3] The NAIRU is the rate of unemployment that is consistent with a stable inflation rate. Our projections use the US Congressional Budget Office's June 2017 estimate of the natural rate of unemployment.

b) US trend labour productivity growth

We expect that labour productivity growth will be driven by both TFP growth and capital deepening over the projection horizon. TFP growth has been weak over the past decade, averaging only 0.5 per cent per year from 2008 to 2017, down from an average of 1.2 per cent over the previous three decades (**Chart 6**). We anticipate that trend TFP growth over the projection will be marginally higher at 0.7 per cent per year. This reflects our judgment that in an economy at full employment with high rates of capacity utilization, firm entry and business investment should support stronger TFP growth. Capital deepening over the projection horizon largely reflects a pickup in the growth of capital stock, which in turn reflects increased investment by firms because of the expected rise in capacity utilization as well as the positive effects of recent tax reforms.

Chart 6: **US total factor productivity growth has remained persistently weak since the onset of the crisis**

Note: TFP means total factor productivity, and is calculated assuming a labour share of 62 per cent.
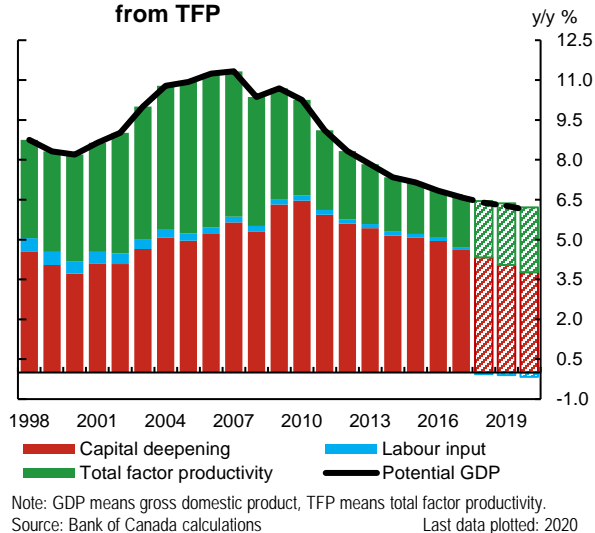Source: Bank of Canada calculations

Last observation: 2017Q4

3. China

Potential output growth in China continues to slow as the Chinese economy transitions to more sustainable, higher quality growth (**Chart 7**).[4] The slowdown in potential growth since 2010 is largely due to the declining pace of capital accumulation. Population aging has also slowed trend labour input growth.

---

[4] Most notably, Chinese authorities are implementing their "Made in China 2025" strategy, which aims to upgrade the country's manufacturing sector, particularly in high-priority industries including robotics, aerospace, electric vehicles and bio and medical products.

We project that potential output growth in China will slow from 6.6 per cent in 2017 to 6.1 per cent in 2020. A continued decline in capital stock growth is expected as the industrialization process matures and structural reform policies to foster higher quality economic growth are implemented. These reforms also support the anticipated pickup in TFP growth, providing a partial offset to the decreasing contributions from capital and labour. For example, increased R&D spending and private sector participation in industries where foreign ownership restrictions are being lifted (e.g., financial services) should help strengthen TFP growth over the projection.[5]

Chart 7: **China's potential GDP growth expected to slow, with increased contribution from TFP**

Note: GDP means gross domestic product, TFP means total factor productivity.
Source: Bank of Canada calculations   Last data plotted: 2020

4. Other regions

In the euro area, potential output growth is expected to decrease slightly over the projection, reflecting dynamics in total labour input and TFP growth. TLI growth should slow as the aging of the population gradually offsets the positive yet diminishing contribution from the integration of migrants to the labour force. TFP growth should also slow after several years of increases, as the positive impacts from past structural reforms diminish—particularly those aimed at enhancing competition in product and service markets as well as those that reduce regulations for business. An improvement in investment is expected to contribute to an increase in capital deepening, reflecting favourable financing conditions and still relatively accommodative monetary policies, as well as diminished uncertainty, strong sentiment and strengthened foreign demand.

In Japan, potential output growth is expected to slow over the projection, reflecting a decrease in total labour input growth. TLI growth should decrease as the aging of the population affects labour force growth. TFP is expected to be the main driver of growth, reflecting the importance of investment in intellectual property. The contribution to potential output growth from capital deepening is also expected to increase over the projection as the decline in labour input helps

---

[5] The moderate decline in TFP growth since 2010 is largely attributed to weaker import growth and transitory losses in productivity associated with a sectoral reallocation of labour (Bailliu et al. 2016).

5

to boost capital per worker and investment continues to grow in line with favourable prospects for the global economy.

In oil-importing EMEs,[6] potential output growth began to improve in 2017, following a protracted decline since 2011. The decline in potential output growth was quite broad-based due to slowing working-age population growth and weak productivity growth in many EMEs. In addition, investment in non-energy commodity-exporting countries slowed as commodity prices declined in the 2011 to 2014 period. Over the projection horizon, EME potential growth is expected to pick up as the drag from lower commodity prices fades and structural reforms support stronger investment growth and continued improvements in TFP. Most notably, ambitious reforms are being implemented in several large EMEs, and infrastructure investment has also begun to pick up, which should contribute to an increase in potential growth over the projection.[7]

5. Risks to the Outlook

Our outlook for potential GDP growth is subject to both upside and downside risks from a variety of sources. Some of these risks are common across regions. There is an upside risk that digitalization may increase trend TFP more than expected through efficiency gains, automation and new business models (Charbonneau et al. 2017). Downside risks include uncertainty around trade policy and the potential tilt toward protectionism, which may inhibit innovation and global diffusion of technology.

In addition to these common risks, our outlook for potential output is subject to several country-specific risks:

- In the **United States,** an upside risk is that persistently strong aggregate domestic demand may generate a sustained increase in US potential output growth. A downside risk is that trend TFP growth may not strengthen as assumed if structural factors (e.g., lower business dynamism, greater market power) continue to restrain growth. In addition, potentially restrictive immigration policies may imply lower growth in trend labour input.

---

[6] This grouping is composed of large emerging markets from Asia, Latin America, the Middle East and Africa (such as India, Brazil and South Africa) as well as newly industrialized economies, such as South Korea.

[7] See Bailliu and Hajzler (2016) for a detailed discussion of structural reforms over 2014–16 and their impact on potential output in large EMEs. More recently, India also adopted a goods and services tax, reformed its bankruptcy laws and launched other banking sector reforms. Brazil reformed its national development bank to improve credit allocation and promote competition, and enacted labour market reforms to reduce termination costs and raise part-time employment.

- In **China**, an upside risk to potential growth could arise if innovation reforms boost TFP more than expected, or if delays to rebalancing result in less slowing of investment growth than expected.[8] An important downside risk for China is that material financial stress may disrupt bank lending, reducing investment.
- In **EMEs**, the pace and impact of ongoing reforms are inherently uncertain, and may entail both upside and downside risks to our projected potential growth rates.

References

Agopsowicz, A., D. Brouillette, B. Gueye, J. McDonald-Guimond, J. Mollins and Y. Park. 2018. "Potential Output in Canada: 2018 Reassessment." Bank of Canada Staff Analytical Note No. 2018-10.

Bailliu, J. and C. Hajzler. 2016. "Structural Reforms and Economic Growth in Emerging-Market Economies." *Bank of Canada Review* (Autumn): 47–60.

Bailliu, J., M. Kruger, A. Toktamyssov and W. Welbourn. 2016. "How Fast Can China Grow? The Middle Kingdom's Prospects to 2030." Bank of Canada Staff Working Paper No. 2016-15.

Charbonneau, K., A. Evans, S. Sarker and L. Suchanek. 2017. "Digitalization and Inflation: A Review of the Literature." Bank of Canada Staff Analytical Note No. 2017-20.

---

[8] TFP growth over the projection is assumed to remain below the rates implied by historical relationships with foreign direct investment, R&D and imports estimated in Bailliu et al. (2016). Progress on structural reforms that reduce barriers to competition and other market distortions is expected to result in convergence toward this model-based estimate in the longer term.

Appendix 1. Overview of methodology for estimating potential output

We estimate potential output growth for every region using a growth accounting framework centred on a Cobb-Douglas aggregate production function. This framework assumes the following relationship between a country's aggregate output and each factor of production (where $\%\Delta x$ denotes the percentage change in variable x):

$$\%\Delta Y_t = \alpha \, \%\Delta \left(\frac{K_t}{L_t}\right) + \%\Delta L_t + \%\Delta TFP_t \, , \tag{1}$$

where Y is real GDP, K/L is real capital stock per worker, L is labour input, TFP is total factor productivity, and α is the share of capital income in output.

Country-level capital stocks are constructed using the perpetual inventory method (PIM) based either on national accounts data on gross fixed capital formation or on detailed asset-level investment data, as well as data on average depreciation rates and prices of various asset types.[9] Potential is evaluated based on actual capital stocks because current stock values determine the limits on an economy's productive capacity today. Labour input, the total number of hours worked in the economy, is the product of average work hours per person employed, the working-age population, the labour force participation rate and one less the unemployment rate. Finally, TFP is calculated as the Solow residual in equation (1) using national accounts data on real GDP growth. Thus, TFP captures contributions to productivity from many factors, including global improvements in technology, efficiency gains resulting from domestic innovation, structural reforms, terms-of-trade shocks, financial and geopolitical crises and human capital accumulation.[10]

To abstract from the business cycle, trend levels of labour input and TFP are used to construct potential GDP growth as the sum of the respective input contributions according to the decomposition in equation (1). This notion of potential output coincides with production at full capacity, i.e., the level consistent with full employment and long-run TFP.

---

[9] Where national accounts investment data are used, geometric depreciation rates for the total capital stock are calculated as the weighted average of depreciation rates across underlying asset classes.
[10] For those regions in which human capital is estimated separately from the Solow residual, the reported potential TFP estimates include contributions from human accumulation.