Assessing Global Potential Output Growth

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Acknowledgements

Abstract

This note estimates potential output growth for the global economy through 2019. While there is considerable uncertainty surrounding our estimates, overall we expect global potential output growth to rise modestly, from 3.1 per cent in 2016 to 3.4 per cent in 2019. This gradual increase is expected to be broad-based, reflecting growth-enhancing reforms in oil-importing emerging-market economies (excluding China) and in the euro area and the diminishing drag on investment in commodity-producing regions stemming from the 2014–15 decline in commodity prices. Potential output growth in the United States is expected to rise modestly through 2019 driven by a small recovery in trend total factor productivity growth. China is the only major economy where potential output growth is expected to slow, albeit moderately, as it gradually transitions to a more sustainable growth path featuring slower investment growth.

Résumé

Dans la présente note, nous présentons nos estimations de la croissance de la production potentielle pour l'économie mondiale jusqu'en 2019. Bien que ces estimations soient entourées d'une incertitude considérable, globalement, nous prévoyons une légère augmentation du taux de croissance de la production potentielle à l'échelle mondiale, qui passerait de 3,1 % en 2016 à 3,4 % en 2019. Cette remontée graduelle devrait s'observer dans un grand nombre de pays, reflétant l'adoption de réformes visant à améliorer la croissance dans les pays émergents importateurs de pétrole (hormis la Chine) et la zone euro, ainsi que l'atténuation progressive de l'effet de freinage exercé sur les investissements par la baisse du prix des ressources naturelles en 2014-2015, dans les régions productrices de produits de base. La croissance de la production potentielle aux États-Unis devrait augmenter quelque peu d'ici 2019, à la faveur d'un léger rebond de la croissance de la productivité tendancielle totale des facteurs. Comme la Chine poursuit la transition qui la placera sur une trajectoire de croissance plus soutenable, caractérisée par une croissance plus lente des investissements, elle est la seule des grandes économies où la croissance de la production potentielle devrait ralentir, quoique modérément.

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. (2017), which focuses on Canada.[1] We derive potential output growth estimates for the global economy through 2019 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 employment and trend average hours worked to gain a better understanding of the contribution of labour dynamics to potential growth.[2]

We apply the framework to different economies and country blocks to obtain an estimate of potential output growth for the global economy by appropriately aggregating the results.[3] While there is considerable uncertainty surrounding our estimates, the analysis suggests that global potential output growth will rise modestly, from 3.1 per cent in 2016 to 3.4 per cent in 2019 (**Chart 1**).[4] This gradual increase is expected to be broad-based, reflecting growth-enhancing reforms in oil-importing emerging market economies (excluding China) and in the euro area and the diminishing drag on investment in commodity-producing regions following the 2014–15 decline in commodity prices. Potential output growth in the United States is expected to rise modestly through 2019 driven by a small recovery in trend TFP (**Table 1**). Potential output growth in China is expected to slow, albeit moderately, as it gradually transitions to a more sustainable growth path featuring slower investment growth.

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. 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. A detailed discussion of the factors driving potential output growth in emerging market economies is provided in Bailliu and Hajzler (2016).

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[1] Given the global scope of the exercise and the data limitations, the approach used is less intricate than that used for the Canadian projection.

[2] See Appendix 1 for details.

[3] Consistent with the Bank of Canada's global projection reported in the *Monetary Policy Report*, the projection of global potential output growth is based on forecasts for six major blocks: the United States, China, the euro area, Japan, oil-importing emerging-market economies (EMEs) and the rest of the world. EMEs are composed of large emerging markets from Asia (excluding China), Latin America, the Middle East and Africa (such as India, Brazil and South Africa), as well as newly industrialized economies (such as South Korea). "Rest of the world" is a grouping of all other economies not included in the first five regions. It is composed of oil-exporting emerging markets (such as Russia, Nigeria and Saudi Arabia) and other advanced economies (such as Canada, the United Kingdom and Australia).

[4] Uncertainty stems from two sources: First, potential output growth cannot be observed in practice and cannot be precisely measured. Second, the estimates given here rely on many assumptions about future conditions, and abstract from a number of possible risks that could affect estimates of potential output growth, notably rising trade protectionist sentiment globally.

Table 1: Potential output growth estimates for the United States and the world, 2017–19		
	World	**United States**
Average potential output growth, 2017–19	3.3	1.7
Percentage point contribution from:		
Trend labour input	0.6	0.6
Trend labour productivity	2.7	1.1
Total factor productivity	1.2	0.9
Capital deepening	1.5	0.2

Chart 1: Global potential output growth

Source: Bank of Canada calculations   Last data plotted: 2019
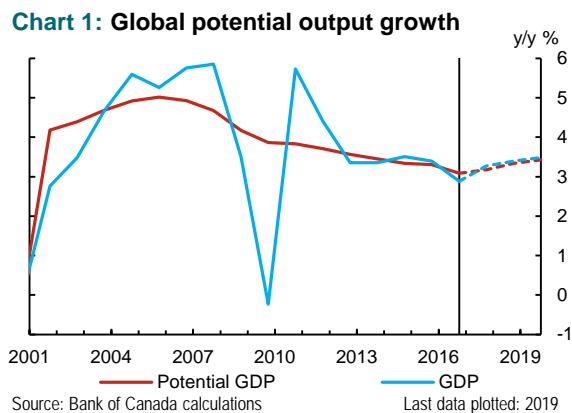
2. United States

Potential output growth in the United States is expected to rise to 1.7 per cent in 2019, from 1.5 per cent in 2016 (**Chart 2**), with the increase driven by a small improvement in TFP growth.

a) US trend labour input

We expect TLI growth to remain essentially flat, as a small decline in average hours worked is offset by a rise in the youth participation rate (**Chart 3**).

With the non-accelerating inflation rate of unemployment (NAIRU) expected to remain

Chart 2: Potential output should continue to improve gradually over the projection horizon

Source: Bank of Canada calculations   Last data plotted: 2019
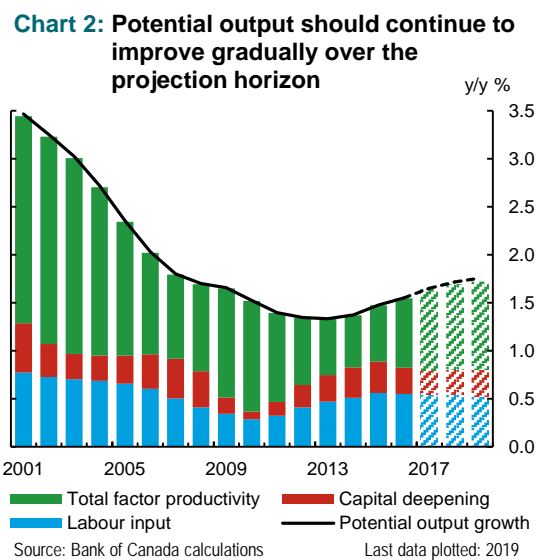
stable around 4.7 per cent,[5] trend employment growth will continue to be supported by population growth, which, according to demographic projections from the United Nations (2015), is expected to average 1 per cent for the rest of the decade. However, as more baby boomers retire, the labour force participation rate is expected to continue to fall, dampening employment growth. This effect is expected to ease gradually over the projection horizon due to a modest recovery in the youth participation rate (**Chart 4**).

Until recently, the average number of hours worked per week has had a steady downward trend (**Chart 5**). This is partially due to the movement of workers from the manufacturing sector, where workers work more than 41 hours per week, on average, into the services sector, where the equivalent figure is 32 hours per week. The trend was interrupted at the time of the financial crisis, however, as the pace of movement into services flattened. We expect a gentle downward slope to re-appear over the projection, which will act as a modest drag to potential output growth.

b) US trend labour productivity growth

Over the projection horizon, labour productivity growth will be driven primarily by TFP growth. TFP has been weak for much of the last decade, averaging only 0.8 per cent per year **(Chart 6)**. We anticipate that trend TFP

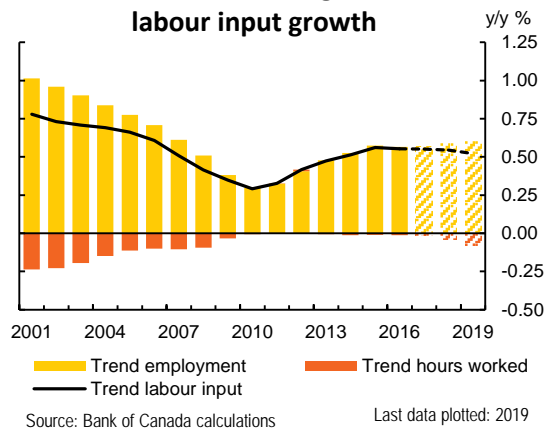**Chart 3:** **Factors affecting trend labour input growth**

y/y %

- Trend employment
- Trend hours worked
- Trend labour input

Source: Bank of Canada calculations   Last data plotted: 2019

Chart 4: **US trend participation rate should continue to edge down**

%

- Trend participation rate
- Observed participation rate

Sources: Bureau of Labor Statistics and Bank of Canada calculations

Last data plotted: Observed participation rate - 2016 Trend - 2019
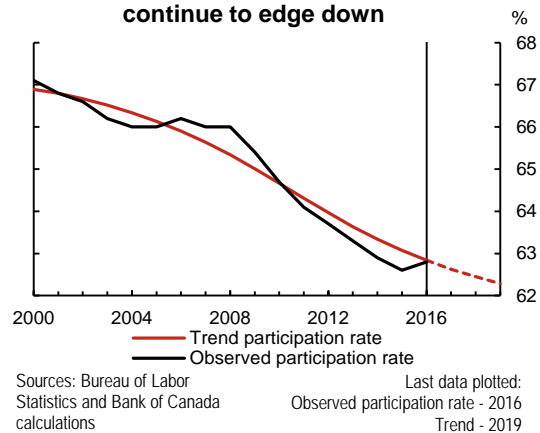
Chart 5: **Downward trend in US weekly hours expected**

Hours

- Average weekly hours
- Trend hours worked

Source: Bureau of Labor Statistics and Bank of Canada calculations

Last data plotted: 2019Q4

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[5] The NAIRU is the rate of unemployment that is consistent with a stable inflation rate.

growth over the projection will be only slightly faster, at 0.9 per cent per year. This is consistent with recent work showing that TFP growth is weakly procyclical (Fernald and Wang 2016).[6] Capital deepening will contribute another 0.2 percentage points to trend labour productivity growth each year.

3. China

Potential output growth in China has fallen significantly since the global financial crisis, largely due to a slowdown in capital deepening and TFP growth **(Chart 7)**.[7]

Capital deepening spiked in 2009 and 2010 as a result of the government's countercyclical stimulus policy. Moreover, China's economy is transitioning away from heavy industry and towards services, slowing the growth of physical capital. TFP growth also slowed, partly owing to weaker import growth and a decreasing contribution from the sectoral reallocation of labour (Bailliu et al. 2016).

We project potential output growth to slow from 6.7 per cent in 2016 to 6.3 per cent in 2019, as the reduced pace of capital deepening is partially offset by stronger TFP growth. Increased research and development spending, private sector participation in sectors such as telecommunications and oil and gas, and market-oriented reforms are expected to support TFP growth. That said, population aging is expected to continue to be a modest drag on potential labour input growth over the medium term (see **Chart 7**, blue bars).

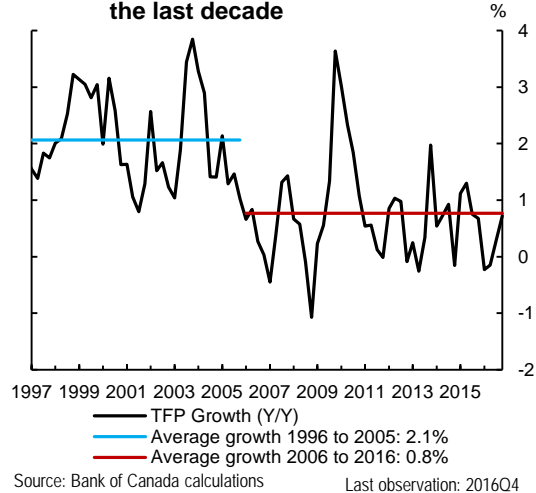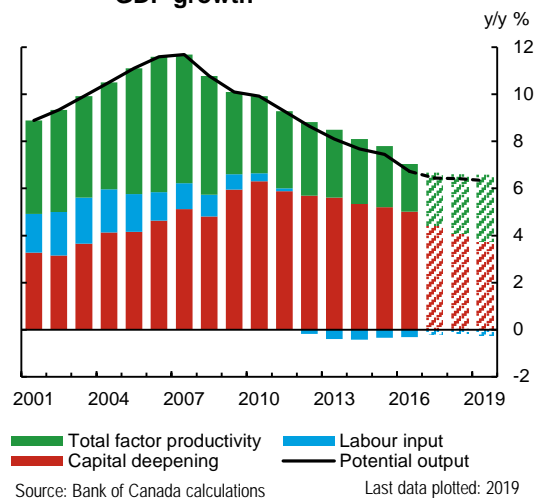**Chart 6:** **Total factor productivity growth has remained persistently weak over the last decade**

TFP Growth (Y/Y)
Average growth 1996 to 2005: 2.1%
Average growth 2006 to 2016: 0.8%

Source: Bank of Canada calculations   Last observation: 2016Q4

Chart 7: **Contributions to China's Potential GDP growth**

Total factor productivity   Labour input
Capital deepening   Potential output

Source: Bank of Canada calculations   Last data plotted: 2019

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[6] Since capital is assumed to be fully utilized in our growth accounting framework, variations in the utilization of capital can cause cyclicality in trend TFP growth (Fernald 2014). In recent years, the decline in the capacity utilization rate in the energy sector, following the 2014–15 decline in oil prices, has weighed on trend TFP growth.

[7] For China, we estimate potential output growth using the approach outlined in Bailliu et al. (2016), in which human capital accumulation is estimated separately from the Solow residual. This approach is slightly different to that used for the United States, where the Solow residual includes human capital. To facilitate comparison with the estimates for the United States, **Chart 7** shows the combined Solow residual and human capital contribution as the TFP growth estimate for China.

4. Other Regions

In the block of oil-importing emerging market economies, potential output growth slowed from 2010 to 2016 due to weaker investment and TFP growth. The decline in non-energy commodity prices from 2011 to 2015 was likely a contributing factor, leading to weaker investment growth among commodity exporters, particularly in Brazil, Chile, Indonesia and South Africa.

In the future, investment and TFP growth should contribute to a pickup in potential output growth from 2016 to 2019, supported by structural reforms in the block's major economies and the adjustment of commodity producers to lower non-energy commodity prices. Moreover, assuming that non-energy commodity prices will remain nearly flat from 2017 to 2019, the negative terms-of-trade effects should dissipate by the end of 2017. This translates into a lower expected drag on the potential output growth of these countries.

In the euro area, potential output growth is expected to rise gradually, with modest improvements coming from TLI growth, capital deepening and TFP growth. TLI growth should benefit from the gradual integration of migrants, as well as ongoing and anticipated labour market reforms that are designed to enhance labour market flexibility and alleviate skills mismatches. An improvement in investment is expected to contribute to further capital deepening, reflecting an easing of financing constraints and continued accommodative monetary policy. Structural reforms, particularly those aimed at enhancing competition in product and service markets and those aimed at streamlining regulations for businesses, should contribute to stronger TFP growth.

In Japan, potential output growth is expected to remain stable at a modest rate over the projection. TFP growth is expected to be the main driver, reflecting the importance of investment in intellectual property. With respect to TLI growth, the effects of population aging are expected to be offset by greater participation of women in the labour force. The contribution to potential output growth from capital deepening is also expected to remain stable and modest.

In the rest of the world, we expect potential output growth to increase over 2017–19 as these countries adjust to lower oil prices, and domestic conditions in distressed economies improve. Potential output growth had slowed in recent years, largely reflecting the lagged effects of the oil price shock on capital accumulation and TFP in large oil-exporting emerging-market economies such as Russia, Nigeria and Saudi Arabia. Domestic factors, including political tensions in Russia and disruptions to economic activity due to domestic conflict in Nigeria, also contributed to weaker investment and TFP growth in 2016. While we anticipate these drags on potential output growth to be gradually resolved, investment growth is not expected to reach the pace seen during the oil-boom years.

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Appendix 1. Overview of the Methodology for Estimating Potential Output Growth

Potential output growth is estimated for all regions 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 %Δx denotes the percentage change in variable x):

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

where *Y* is real GDP, *K* is the real capital stock, *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 based either on national accounts investment data or on detailed asset-level investment data, as well as data on average depreciation rates and prices of various asset types.[8]

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. 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 improvements in technology, efficiency gains resulting from innovation, structural reforms, terms-of-trade shocks, financial and geopolitical crises and human capital accumulation.

To abstract from the business cycle, potential labour input and TFP are measured by their estimated trend levels. This notion of potential output coincides with equilibrium values, i.e., the level consistent with full employment and long-run TFP growth. On the other hand, actual capital stocks are used to calculate potential because current stock values, including those affected by cyclical changes in investment over history, determine the limits on an economy's productive capacity today. Potential output growth is then constructed as the sum of trend TFP growth ($\overline{TFP}_t$), trend labour input growth ($\overline{L}_t$) and a contribution from capital deepening based on a rearrangement of the relationship in equation 1:

$$POG = \%\Delta \overline{TFP}_t + \%\Delta \overline{L}_t + \alpha\, \%\Delta(K_t/\overline{L}_t)\,. \tag{2}$$

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[8] 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.