Assessing global potential output growth and the US neutral rate: April 2022

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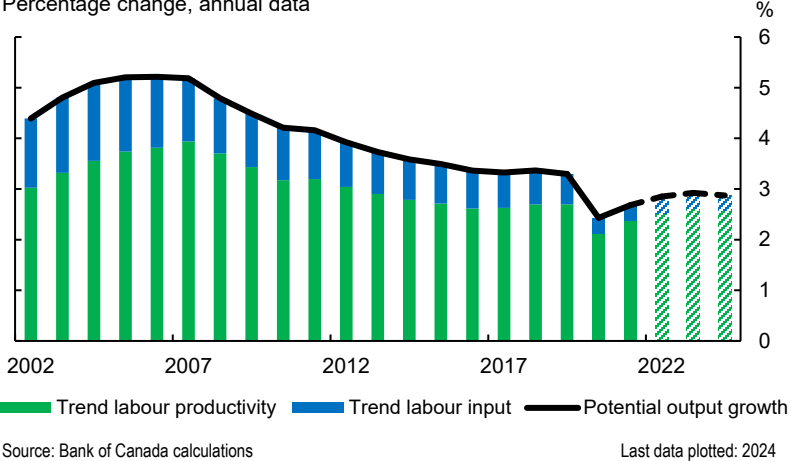
Acknowledgements

Summary

We present the annual update of Bank of Canada staff estimates for global potential output growth and the US neutral rate of interest. Both estimates serve as key inputs to the analysis supporting the April 2022 *Monetary Policy Report* (MPR).[1]

Global potential output growth

The persistent impact of the COVID-19 pandemic and the gradual recovery from it continue to be the key drivers of global potential output growth. After a sharp decline in 2020, potential output growth is projected to recover toward its pre-pandemic trend in all regions except China. Improvement in trend labour productivity (TLP) supports growth in most regions as pandemic-induced distortions dissipate and

Chart 1: Global potential output growth recovers partially
Percentage change, annual data

Source: Bank of Canada calculations   Last data plotted: 2024

Legend: Trend labour productivity — Trend labour input — Potential output growth

firms invest in new and digital technologies (**Chart 1**). The recovery in US potential output growth is further aided by easing restrictions on immigration. In China, the pre-pandemic structural decline in potential output growth is further reinforced by recent slowdowns in capital deepening. We expect global potential output growth to increase from 2.7% in 2021 to 2.9% by 2024 (**Table 1**).

Compared with the April 2021 assessment, global potential output growth is marginally slower. This reflects downward revisions in China, the United States and emerging-market economies (EMEs) partially offset by upward revisions to growth in other regions.

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[1] For overviews of methodologies used to estimate global potential output and the US neutral rate, see Bounajm et al. (2019) and Bootsma et al. (2020), respectively.

Table 1: Projection for potential output growth						
	Share of real global gross domestic product* (%)	Projected growth† (%)				
		2020	2021	2022	2023	2024
United States	16	1.2	1.3	1.6 (1.8)	1.7 (1.8)	1.8
Euro area	12	1.0 (0.9)	1.2 (1.1)	1.4 (1.2)	1.3 (1.1)	1.1
Japan	4	0.5	0.6	0.7	0.8 (0.7)	0.8
China	18	5.5	5.5	5.2 (5.4)	5.1 (5.4)	4.9
Oil-importing EMEs‡	33	2.6 (2.5)	3.1 (3.2)	3.4 (3.8)	3.7 (3.8)	3.7
Rest of the world§	16	1.4 (1.3)	1.7 (1.5)	1.9 (1.8)	1.8 (1.9)	1.8
World	100	2.4 (2.3)	2.7	2.9 (3.0)	2.9 (3.0)	2.9

* GDP shares are based on estimates of the purchasing-power-parity valuation of country GDPs for 2020 from the International Monetary Fund's October 2021 *World Economic Outlook*. The individual shares may not add up to 100 due to rounding.
† Numbers in parentheses are projections used in the April 2021 *Monetary Policy Report* and are reported only when different from the current projection.
‡ The oil-importing emerging-market economies (EMEs) grouping excludes China. It is composed of large EMEs from Asia, Latin America, the Middle East, emerging Europe 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 other economies not included in the first five regions. It is composed of oil-exporting EMEs (such as Russia, Nigeria and Saudi Arabia) and other advanced economies (such as Canada, the United Kingdom and Australia).

US neutral rate

Turning to the US neutral rate, our overall assessment is that it currently lies within the range of 2% to 3%, 0.25 percentage points higher than the range assessed in Bank staff's last update on the US neutral rate a year ago (Carter et al. 2021). As we explain below, this upward shift mainly reflects a lower outlook over the medium term for US income inequality and brings the assessed range back in line with the pre-pandemic benchmark range reported in Bootsma et al. (2020).

The remainder of this note is organized as follows. First, we provide a detailed regional breakdown of the potential output estimates presented in **Table 1**. Then we shed some light on the risks surrounding the estimates of potential output. Finally, we elaborate on staff's assessment of the US neutral rate.

# Regional estimates for potential output growth

United States

The COVID-19 crisis reduced US potential output growth in 2020 and 2021, mainly through a decline in trend labour input (TLI) growth—reflecting labour market scarring and lower immigration (see Chen et al. 2020).

Potential output growth is expected to recover gradually over the projection horizon (**Chart 2**). Growth in the working-age population is anticipated to contribute more to potential output growth than it did in 2020 and 2021 as immigration restrictions ease. Trend total factor productivity (TFP) growth is also expected to improve in 2023 and 2024 and surpass its pre-pandemic rate for two reasons:

Chart 2: US potential output growth to reach pre-pandemic rate
Percentage change, annual data

- Trend labour input
- Capital deepening
- Potential output growth
- Trend total factor productivity
- April 2021 potential output growth

Source: Bank of Canada calculations   Last data plotted: 2024

- the pandemic's disruptive effects on businesses are fading

- firms are adopting digital technologies and other new ways of operating that provide ongoing efficiencies

Compared with the April 2021 MPR, the recovery in potential output growth has been revised down, with its level now expected to be 0.7% lower than previously projected by 2023. Excluding historical revisions, this reflects slower population growth and less trend labour force participation. In 2021, immigration restrictions exerted more downward pressure on population growth than expected. In addition, we anticipate a somewhat lower trend participation rate, as the pandemic likely had a larger and more permanent impact on labour supply decisions than previously assumed. Labour force participation of young and prime-age workers failed to improve as much as expected in our previous assessment. Recent studies, such as Faberman, Mueller and Şahin (2022), suggest that the pandemic has played a persistent role in reducing desired work hours. Most workers now have a higher reservation wage—the lowest wage at which they are willing to work in a particular job. This is because of the fear of contracting COVID-19 as well as the higher opportunity costs of working given increased family responsibilities at home.[2]

As a partial offset to TLI revisions, TLP has been revised up over the projection horizon. Part of this revision comes from trend TFP growth, which is expected to improve at a somewhat faster rate because the

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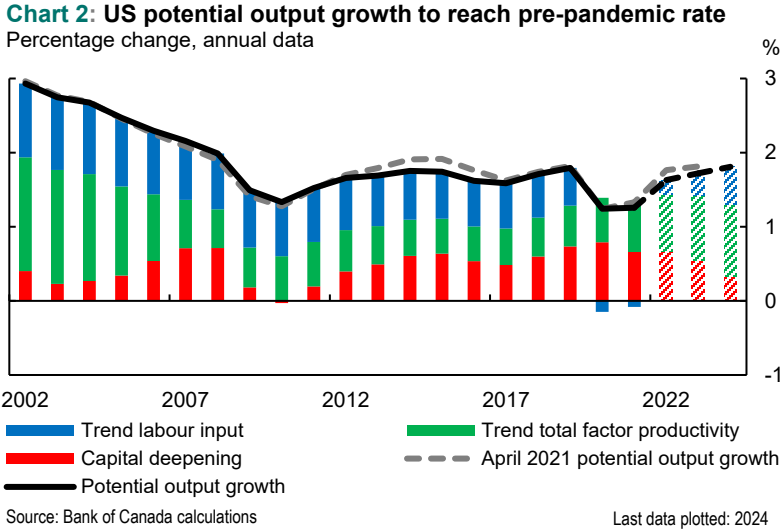
[2] This finding is corroborated by Domash and Summers (2022), who find that labour force participation is likely to remain depressed through at least the end of 2022 due to excess retirements, COVID-19 health concerns, immigration restrictions, changes in workers' tastes and shifts in the demographic structure.

pandemic has accelerated investment in information and communications technology. Additionally, the rate of capital deepening is slightly higher on average over the projection horizon, reflecting positive historical revisions to the capital stock and lower-than-expected population and trend participation rates.

Euro area

The pandemic led to a drop in potential output growth in the euro area in 2020 (**Chart 3**), mainly due to lower TLI growth. In 2021, potential output growth rebounded, reflecting an improvement in both TLI growth and capital deepening. Stronger trend participation and lower unemployment rates contributed positively to TLI growth. This was partly because of generous funding of short-time work programs—
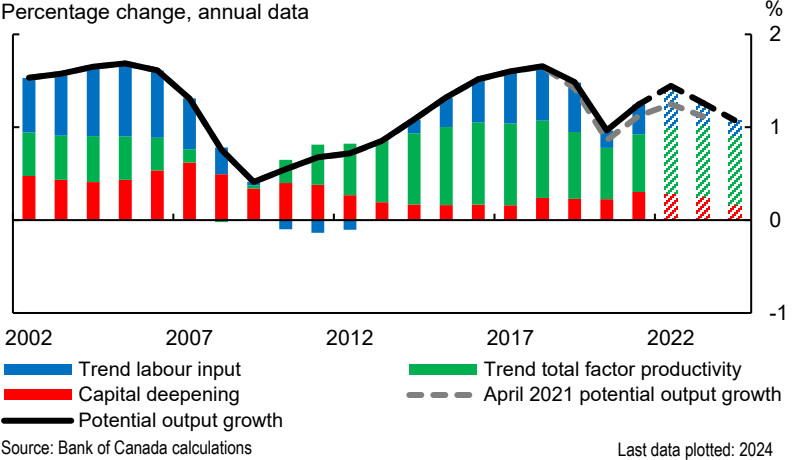
Chart 3: **Euro area potential output growth returns to its pre-pandemic trend**
Percentage change, annual data

Source: Bank of Canada calculations

Last data plotted: 2024

publicly funded compensation programs that provide income support while allowing firms to temporarily reduce workers' hours—which maintained labour attachment to firms. However, an offsetting reduction did occur in trend average hours worked, which remains below its pre-pandemic level despite the easing of restrictions and unwinding of short-time work programs. We expect potential output growth to recover further in 2022 as the pandemic's effects on the labour market dissipate. Population aging, however, continues to weigh on TLI growth and drives the slowdown in potential output growth after 2022.

Compared with the April 2021 assessment:

- potential output growth is revised up by 0.1 percentage point in each year in 2020 and 2021 and by 0.2 percentage points in 2022 and 2023
- the level of potential output is revised up by 0.7% by 2023

These revisions are mostly driven by the European Commission's revised estimate of the capital stock. That estimate was adjusted upward, particularly for the pandemic period, possibly because the slowdown in investment was smaller than expected. These effects are dampened slightly from 2022 onward due to higher energy prices and uncertainty from the war in Ukraine, which are expected to weigh on investment. Trend TFP growth is also revised up slightly from 2022 onward because of productivity gains from investment and accompanying reforms under the Recovery and Resilience Facility—notably targeted spending in digital infrastructure and renewable energy.
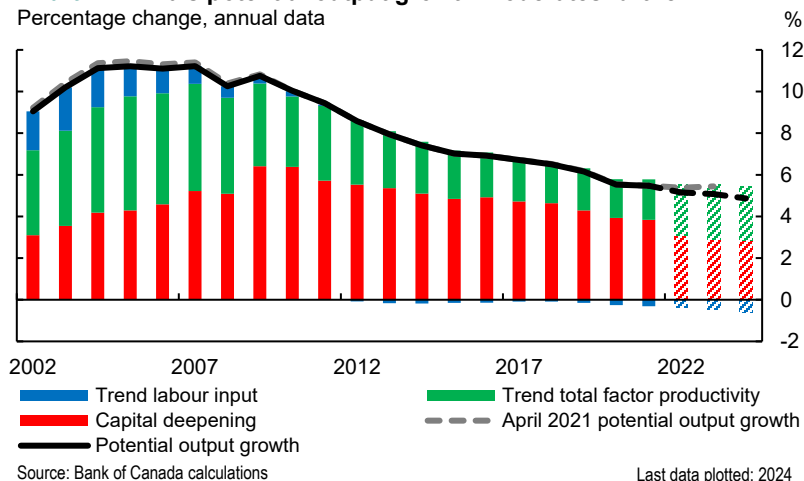
China

China's potential output growth has been moderating in recent years, largely reflecting population aging and slower capital accumulation. The pandemic has exacerbated this slowdown (**Chart 4**). Population aging continues to weigh on TLI growth. Meanwhile, improving trend TFP growth, mostly due to state-led initiatives and technological innovation of private enterprises, partially offset some of the headwinds.

Chart 4: **China's potential output growth moderates further**
Percentage change, annual data

- Trend labour input
- Capital deepening
- Potential output growth
- Trend total factor productivity
- April 2021 potential output growth

Source: Bank of Canada calculations

Last data plotted: 2024

Compared with the April 2021 assessment:

- potential output growth has been revised down by 0.2 percentage points in 2022 and by 0.3 percentage points in 2023

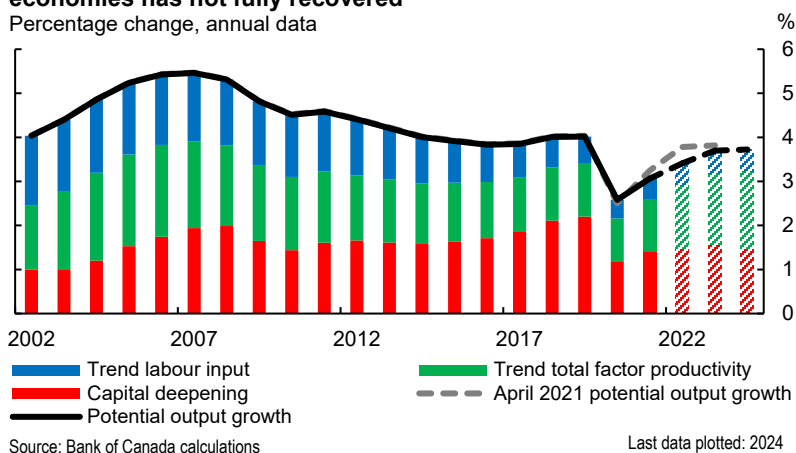- the level of potential output has been revised down by 0.6% by 2023

The downward revision reflects slower capital accumulation and lower trend TFP growth. The revision also partly reflects efforts to rebalance the economy away from growth driven by investment and exports and toward growth driven by consumption. Capital accumulation should slow as a result of government policies to rein in credit growth and encourage the reallocation of investment from speculative residential markets to less-capital-intensive high-tech research and development sectors. Less construction activity is also expected to weigh on investment in related sectors such as mining, metal products, and machinery and equipment. A weaker pickup in trend TFP growth is anticipated over the medium term due to the increased likelihood of tensions with trade partners and relocation of supply chains, which could lead to lower foreign direct investment and imports. Regulatory uncertainties could also add headwinds for TFP growth and capital deepening.

Oil-importing emerging-market economies

Before the pandemic, potential output growth in EMEs saw a gradual decline, driven largely by slowing population growth. Following the COVID-19 shock, potential output growth fell further, mainly due to lower capital deepening, although TLI and trend TFP growth both slowed as well. We expect potential output growth in oil-importing EMEs to recover gradually as investment growth picks up and the pandemic's

Chart 5: **The fall in potential output growth in emerging-market economies has not fully recovered**
Percentage change, annual data

Source: Bank of Canada calculations   Last data plotted: 2024

Legend:
- Trend labour input
- Capital deepening
- Potential output growth
- Trend total factor productivity
- April 2021 potential output growth

effects on the labour market dissipate (**Chart 5**). Moreover, trend TFP growth is anticipated to improve because of pandemic-influenced acceleration in digitalization, including productivity spillovers from advanced economies. These spillovers are expected to mostly affect emerging Asia and Europe.

Compared with the April 2021 assessment:

- potential output growth has been revised down by an average of 0.2 percentage points per year from 2021 to 2023
- the level of potential output has been revised down by 0.6% by 2023

The downward revision to potential growth comes mostly from two channels:

- EMEs saw weaker capital accumulation during 2020–21. We expect this to persist because of limited prospects for public and private investment growth due to impaired balance sheets in the private sector, high public debt and the Russian invasion of Ukraine (which is part of this group).
- Both weaker growth of the working-age population and lower trend labour force participation are expected to push TLI growth lower than previously assessed. The deep and prolonged impact of the pandemic is likely to lead to a more sluggish recovery in labour force participation rates across most regions, but especially in Latin America where the labour force participation rate of women remains depressed. The weaker recovery likely reflects the disproportionate impact on the informal sector, which is much larger in EMEs than in advanced regions. It also could reflect the longer school closures, and limited safety nets and child care support.[3]

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[3] The International Labour Organization (2021) notes that informal workers were disproportionately affected by the pandemic and were less likely to benefit from social safety nets.

Other regions

Potential output growth in Japan is expected to recover gradually from the slowdown in 2020. The secular impact of an aging population, however, continues to weigh on growth dynamics. Relative to the April 2021 assessment, TLI growth is revised up slightly due to a stronger-than-expected rebound in trend participation rates, which is mostly offset by lower trend hours. Overall, these revisions leave the growth profile largely unchanged over the projection horizon. The level of potential output in 2023 is 0.1% above that in the April 2021 assessment.

Potential output growth in the rest-of-the-world group is expected to recover gradually but will remain below its pre-pandemic trend. This is anticipated to be driven mostly by TLI, which partly reflects government reforms in Saudi Arabia that have boosted trend labour force participation for women. TLP growth, which was weak leading up to the pandemic, is also expected to increase among advanced economies in this group. Our projections have also incorporated the negative impact on investment of the conflict in Ukraine (including the impacts of sanctions on Russia), but this is mostly offset by somewhat higher investment in other oil-exporting countries. Compared with the previous assessment, potential output growth is slightly higher, on average, between 2021 and 2023. Given large historical revisions, the level of potential output is 1.4% higher by the end of 2023; however, excluding the historical revisions, the level of potential output is only 0.2% higher by 2023. This is largely due to an upward revision to TLI in Saudi Arabia and advanced economies in the rest-of-the-world group.

Risks around the outlook for global potential output

Risks to this year's assessment of global potential output growth are tilted downward because of the Russian invasion of Ukraine. While initial estimates of the investment-related impacts of the conflict have been accounted for, staff did not have the scope to incorporate other factors, such as the:

- destruction of the existing capital stock in Ukraine

- displacement of millions of people from Ukraine to other parts of Europe

- possibility of a persistent decline in trend TFP growth in Russia from sanctions and global isolation

Moreover, the war in Ukraine could reinforce pressures to re-shore production, leading to a reduction in global trade integration. For example, sanctions on Russia's energy sector could persistently disrupt the global commodity markets and force many advanced economies to rely on other, less-efficient providers of energy.

On the positive side, productivity growth could rebound faster than anticipated due to increased investments in new digital technologies by firms worldwide. Increased remote work—a prominent outcome of the pandemic—could also increase labour productivity by allowing firms to access a wider selection of specialized talent.[4] Energy investment in both traditional and renewable energy sectors could also be

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[4] McKinsey & Company (2020), Baldwin (2020) and Bellman et al. (2021), among others, note the pandemic-induced upswing in firms' investment in digital technologies. Fernald and Li (2021) discuss potential channels through which digitalization could affect productivity.

stronger given the recent rise in oil prices and the geopolitical incentives, particularly in Europe, for alternative sources of energy.

US neutral rate

We have also updated the staff assessment of the US neutral rate—the policy rate that should prevail in the medium to long term to maintain stable inflation and output at its potential level (Mendes 2014). This assessment is a key input in Bank staff's projections for the global economy, as well as the estimation of the Canadian neutral rate presented in Faucher et al. (2022).

Our overall assessment is that the US neutral rate currently lies in the range of 2% to 3%. This range is 0.25 percentage points higher than that assessed in the April 2021 update (Carter et al. 2021) and coincides with the pre-pandemic benchmark range reported in Bootsma et al. (2020). As we explain below, this upward shift mainly reflects a lower outlook for US income inequality over the medium term.

The current assessment was reached using the same three structural models as in the April 2021 update.[5] As such, it accounts for the new US potential output profile described above along with changes in several other key factors that influence the level of the US neutral rate. These other factors notably include:

- the level of US income inequality, for which higher values are associated with a lower neutral rate because they imply a concentration of resources among wealthier households with higher propensities to save; and

- the level of US government debt as a share of GDP, for which Bootsma et al. (2020) find higher values to be associated with a higher neutral rate. This positive relationship reflects the fact that higher levels of government debt are associated with an increase in the supply of safe, liquid assets available to savers.

Changes in both of these factors play important roles in shaping our current assessment. Regarding inequality, we have updated our estimate of the medium-term impact that the COVID-19 recession will have on US income inequality. In particular, we now expect a significantly more modest increase in inequality than was suggested by the estimated historical patterns that staff relied on for the April 2021 update.[6] This change accounts for the fact that the US labour market has recovered relatively quickly in comparison with previous recessions and implies less inequality-related drag on the US neutral rate.

For the US government's debt-to-GDP ratio, we have also updated our estimate on its medium-term outlook to reflect recent projections from the Congressional Budget Office (2021). These projections point to a somewhat lower profile for the debt-to-GDP ratio relative to staff's last neutral rate update, which would imply some downward pressure on the US neutral rate (all else being equal).

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[5] See Bootsma et al. (2020) for details on these models.

[6] As explained in Carter et al. (2021), these patterns were estimated using regressions similar to those in Roine, Vlachos and Waldenström (2009).

Taken together, these changes imply that our revisions to the US neutral rate largely reflect the balance of upward pressures associated with a lower outlook for inequality versus downward pressures associated with a lower profile for the US government debt-to-GDP ratio. The lower outlook for inequality was found to dominate quantitatively, driving an overall upward shift in the assessed range.

The upper rows of **Table 2** provide details on this upward shift, namely the current and previous ranges supported by each of the models in question after gauging their sensitivity to key parameters and other inputs. As shown in the right-hand column, the models collectively point to a current range centred at or near 2.5%, with a lower bound of 2%. While the most appropriate upper bound is less clear, we note that an upper bound of 3.25% would be supported only by specific calibrations of one of three models. For this reason, we maintain our usual practice of focusing on a symmetric range of plus or minus 50 basis points, resulting in an overall range of 2% to 3%. As noted above, this implies a return to the pre-pandemic benchmark range reported in Bootsma et al. (2020).

Table 2: Summary of the three structural models' current and previous assessed ranges for the US neutral rate*		
	April 2021 range (%)	Current range (%)
HALO model†	1.75 to 3	2.25 to 3.25
Risk-augmented neoclassical growth model	1.75 to 3	2 to 3
Overlapping generations model	2 to 2.5	2 to 2.5
Full range of estimates	1.75 to 3	2 to 3.25
Staff's overall view	1.75 to 2.75	2 to 3

* All estimates have been rounded to the nearest 25 basis points.
† As explained in Bootsma et al. (2020), the full name of the HALO model is "heterogeneity- and liquidity-adjusted semi-open economy model."

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