Online Appendix:
Correcting Course: Ottawa Needs a New Approach to Fiscal Policy

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Additional Information on Debt-to-GDP Scenario Projections

A. Long-Term Fiscal Scenario – Baseline Assumptions

Our long-term fiscal modelling starts in fiscal year 2028/29 and ends in fiscal year 2055/56. This period corresponds to Finance Canada's long-term projection scenario presented in the 2022 Fall Economic Statement ("FES").

Our preferred baseline assumptions are largely based on the FES. Our starting point is the 2027/28 budget balance, primary balance, and debt charges projected in the FES downside scenario, adjusted for additional expenses discussed in the main text, i.e., unidentified savings from the strategic policy review and Canada Health Transfer increases.

The primary balance is total revenues less overall program spending, which includes net actuarial losses.

Revenues grow linearly with projected nominal Gross Domestic Product (GDP). In the FES projections, overall program spending growth does not keep pace with GDP growth, leading to a rising primary surplus over the forecast horizon. This modelling approach is based on a detailed examination of program parameters. Nevertheless, we assume that governments maintain the real value of permanent programs over time and implement new programs to replace temporary ones, so that overall program spending rises at the same pace as GDP. This approach allows us to assess the sustainability of a given level of program spending.

Projected GDP is a function of labour productivity growth and labour supply growth, as in Laurin and Drummond (2021). The GDP projection model used in Laurin and Drummond (2021) is calibrated to the FES assumptions leading to average annual nominal growth of 3.6% over the projection period (as in the FES).

We project debt charges going forward based on the assumption that effective interest rates gradually increase from 2.88 percent in 2027/28 (our estimate of the FES downside scenario rate) to 3.88 percent by 2055/56 – causing the average effective interest rate over the period to equal average projected GDP growth (3.6%). Projected effective interest rates are applied to prior-year interest-bearing debt to yield current year debt charges. Interest-bearing debt changes with the projected primary balance.

The projected debt-to-GDP ratio in our baseline (no economic shocks) scenario is presented in Figure 3 below.

B. Adding the Impact of Economic Shocks

Economic shocks affect the primary balance through cyclical changes to revenues and expenses (automatic stabilizers). In addition, downturns typically lead to additional discretionary policy responses intended to support incomes and the economy during a recession. Over a full cycle, cyclical changes should have only a minor effect on the level of debt. On the other hand, debt will rise with temporary fiscal stimulus measures. Therefore, adding potential economic shocks to our baseline (no shocks) long-run fiscal scenario will lead to a higher debt ratio.

Table 1: Cumulative Changes in Output and Budget BaIances during Recessions

	(1) % Deviation from Potential GDP	(2) Change in primary CABB (% of potential GDP)	(2)/(1)
Recession Dates (Fiscal Year)			
1974/75	–0.4	–3.3	8.25
1981/82	–4.6	–2.4	0.52
1990/92	–3.1	–1.5	0.48
2008/09	–7.0	–2.8	0.40
2020/21	–13.9	–21.6	1.55
All	–29.0	–31.6	1.09

Source: Fiscal Reference Tables, various years. Authors' calculations. CABB refers to Cyclically Adjusted Budget Balance.

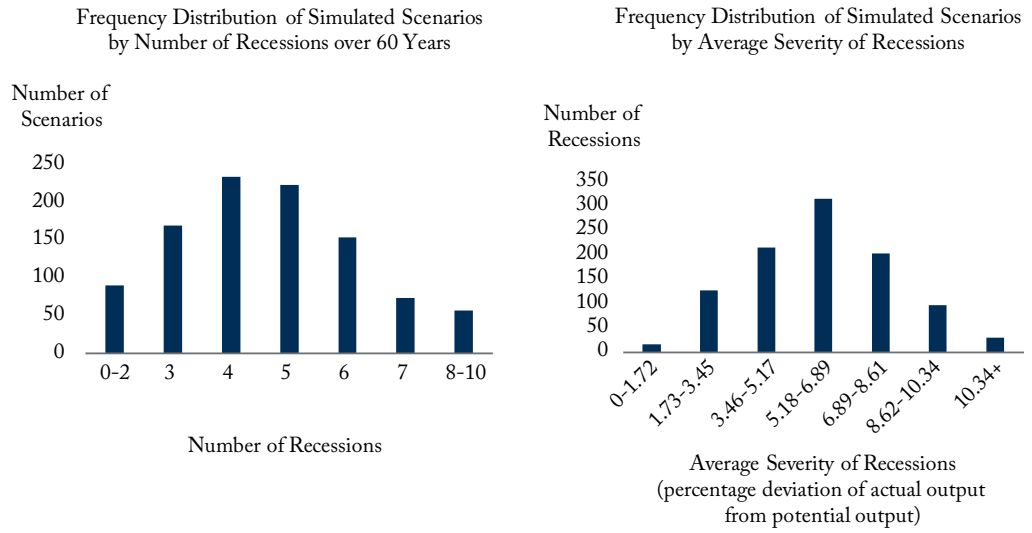
We examined the past five recessions in Canada, and calculated potential output from government reports on cyclically adjusted fiscal data, expressed as a percentage of potential GDP (Fiscal Reference Tables, various years). We calculated the severity of each recession as the cumulative deviation of actual output from potential output.

For the first three recessions, we calculated the size of the discretionary policy responses as the change in the cyclically adjusted primary balance as a percentage of potential GDP, as reported in the federal fiscal reference tables. For the 2008 and 2020 downturns, the cyclically adjusted budgetary balances reported in the fiscal reference tables do not include temporary measures implemented to stabilize the economy. For these two recessions, we adjusted the reported change in the cyclically adjusted primary balance to include the value of temporary stimulus measures reported in budget documents. On average over the five recessions, we find that the cyclically adjusted primary balance deteriorates by 1.09 percentage points of potential GDP for each percentage point deviation of actual output from potential GDP (see Table 1).

Since the frequency and magnitude of future business cycles are unknown, we randomly simulate 1,000 future scenarios for the next 60 years based on the historical discrete distribution of recessions and their severity over 1961 to 2020, as measured in Table 1. In doing so, we ensured that the length of time in between recessions is randomly determined but we imposed a minimum of 2 years between recessions. We also rejected a few extreme scenarios in which the number of very severe recessions (corresponding to year 2020/21 in our sample) exceeded 2 per 60 years, and scenarios in which there was only one downturn over the 60 years.

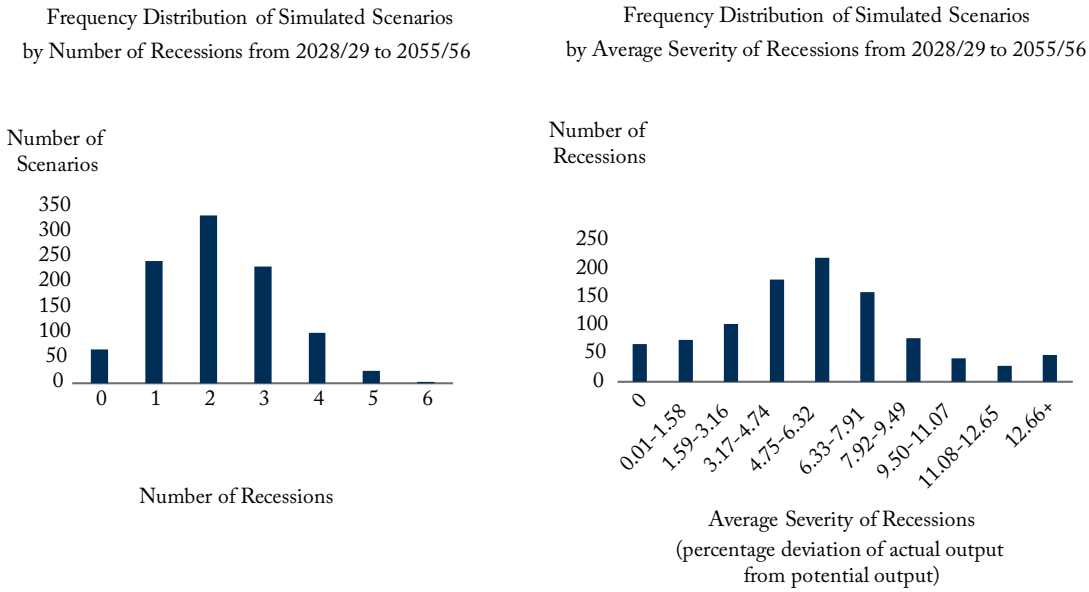
The average number of recessions (or business cycles) per simulated scenario matches almost exactly our historical sample (5 recessions), as well as their average severity (5.8%). (See Figure 1 for frequency distributions.) The panel on the left shows the count of simulated scenarios by the number of recessions per scenario. The panel on the right shows the count of simulated scenarios by the average severity of recessions per scenario.

Figure 1



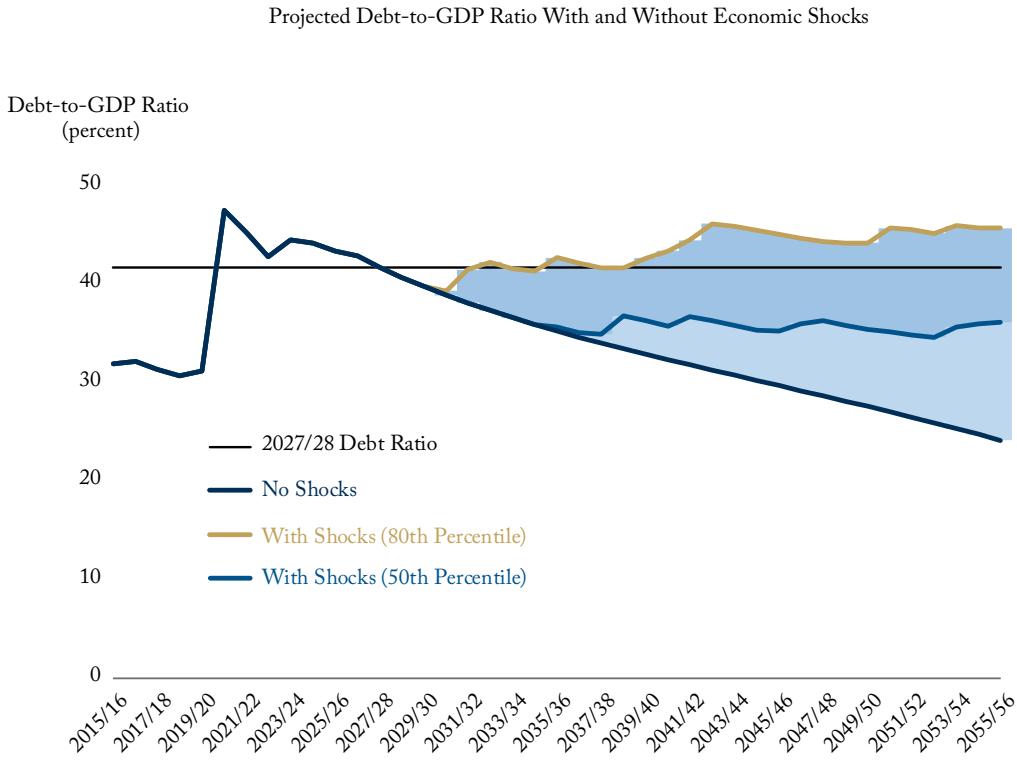
Source: Authors' calculations.

Figure 2



Source: Authors' calculations.

Figure 3



Source: Authors' calculations.

Our fiscal projections span 28 years, i.e., from 2028/29 to 2055/56, so we only use the first 28 years of each simulated scenario. Figure 2 shows the frequency distribution of recessions over the 28-year period used for our fiscal simulations.

Randomly simulated discretionary policy responses over the projection period (2028/29 to 2055/56) increase debt above our baseline (no shocks) fiscal scenario through their impact on the primary balance. Figure 3 shows the impact of simulated economic shocks on our baseline (no shocks) long-term fiscal projection at the 50th percentile (the bottom 50 percent of simulated scenarios are located inside the light-blue shaded area) and at the 80th percentile (the next 30 percent of simulated scenarios are located inside the dark-blue shaded area).

The figure illustrates the point that the probability of the debt ratio remaining below its level in 2027/28 throughout the projection period is above 50 percent but below the 80 percent threshold used by the IMF to classify debt sustainability as "highly probable." Increasing the probability to at least 80 percent throughout the projection period would require raising the primary balance by 0.3 percent of GDP in 2027/28.