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Fiscal Anatomy of Two Crises and an Interlude

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ABSTRACT: The Global Financial Crisis (GFC) and the COVID-19 pandemic are associated with the largest increases in public debt ratios since World War II. We decompose unexpected changes in debt ratios into the role of surprises in economic growth, interest costs, policy measures, and other factors. During both crises, lower-than-expected output contributed the most to higher-than-expected debt ratios. Fiscal policy measures recorded in the public deficit were similar in the two episodes. We also analyze the decade-long interlude (2010-19). Rather than declining as foreseen in a normative scenario, debt ratios remained stable on average, as interest rates, policy adjustment and, in some countries, economic growth turned out lower than expected.

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Introduction

The Global Financial Crisis (GFC) that began in 2008 and the COVID-19 pandemic that began in 2020 have been associated with the largest increases in public debt ratios since World War II. During the intervening period (the "interlude"), debt ratios were broadly stable or rising, so that the pandemic led to another step increase beyond the levels reached because of the GFC. The two crises were different in source (financial versus health-related), incidence across countries (the GFC being more concentrated in advanced economies and thus less global, despite its name), and the causes and duration of the associated recessions (the pandemic being followed by a faster rebound of economic activity). Even so, analyzing the factors that accounted for the unexpected rise in public debt ratios during these two crises and the intervening period may shed light on the paths such ratios may take in the next decade, and the role that policies can play in that evolution.

In this paper, we decompose unexpected changes in debt ratios into the role of surprises in economic growth, interest costs, policy measures, and residual factors such as exchange rate depreciations and the fiscal cost of bailouts.[1] We consider the full impact of economic growth not only through the denominator in the debt/GDP ratio but also as key driver of fiscal revenues and thus the primary surplus.

To capture the effects of the two crises, we compare macroeconomic and fiscal outcomes (as measured today) for 2009 (GFC) and 2020 (pandemic-related economic crisis) with projections made just before the severity of the GFC and the COVID-19 crisis were understood by most analysts (October 2008 and January 2020 vintages of the IMF's World Economic Outlook projections, respectively). We also analyze the decade-long interlude (2010-19), by comparing outcomes measured today with (a) projections made in 2010 (April vintage of the IMF's World Economic Outlook) and (b) a normative scenario that IMF staff (Cottarelli and Vinals 2010) advised in early 2010 as desirable, for a gradual return of debt ratios toward pre-GFC levels.

Our key findings are as follows:

- During both crises, lower-than-expected output was the largest factor underlying higher-than-expected debt ratios, with almost equal contributions through the denominator effect and lower revenues. Fiscal measures also accounted for a significant portion of the rise in debt ratios, particularly for advanced countries with ample access to market financing. The so-called stock-flow-adjustment, which consists of changes in public debt that do not stem from the fiscal deficit, also played a role during both the GFC and the pandemic when support for banks (GFC) and nonfinancial corporations (GFC and pandemic) was provided.

- The overall size of fiscal policy measures (recorded in the public deficit) beyond those envisaged pre-crisis was similar in the GFC and the pandemic. Although announced measures were larger during the pandemic, implemented measures were about the same in the two crises.

- The post-GFC interlude turned out different—especially in advanced economies—from both projections and normative policy advice published in early 2010 (after an initial recovery from the brunt of the crisis):

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[1] The analysis is based on accounting identities. The impact of behavioral responses to economic shocks or differences in fiscal multipliers depending on whether policy rates are at the lower bound is reflected in the data but not explicitly analyzed.

- Compared with projections, countries generally benefited from substantially lower interest payments; economic growth turned out much worse than expected in some countries (especially those suffering the most during the European debt crisis); fiscal policy measures added to debt burdens on average, but with tightening in some countries that sought to stem the adverse impact of growth on debt dynamics, whereas those with more favorable economic growth used the resulting space for somewhat more expansionary fiscal policies.
- Compared with the IMF staff's normative policy scenario, the proposed ambitious fiscal policy tightening never materialized. Rather than gradually declining, debt ratios generally remained stable, thanks to lower interest payments.

Putting these results together with an early understanding of the aftermath of the pandemic, policymakers may consider the following. Whereas the post-GFC era was characterized by low inflation, the post-lockdown stages of the pandemic have seen rapid recovery in demand outstrip the economy's ability to supply goods and services, owing in part to disruptions to supply chains (initially) and energy and food (more recently). A reduction in fiscal deficits is thus advisable not only to reverse the rise in debt ratios and create buffers for future crises, but also to help the monetary authorities curb inflation. Whereas post-GFC, a much-feared increase in interest rates never materialized, post-lockdowns rapid inflation has reduced debt ratios somewhat, especially in countries with non-indexed, long-maturity debt denominated in domestic currency. Although nominal interest rates are raising rapidly, at the time of writing it is difficult to judge whether real interest rates will rise above real economic growth—an important differential for future debt dynamics. Based on the documented experience, real economic growth—notoriously hard to predict—will perhaps once again be a decisive determinant of future developments in debt ratio.

Although sustainable investments in people and infrastructure are crucial for growth and development, attempts to boost growth through fiscal expansion alone may well backfire, as assumed impacts of higher spending or tax cuts on economic growth have often disappointed, particularly if monetary policy is not accommodative. Similarly, when preparing forecasts or striving to design and implement policies for sustainable development, one should be mindful that the future path of economic growth and debt ratios will remain a combination of virtue and fortune.

Debt Developments During the Global Financial Crisis and the COVID-19 Pandemic

Global general government debt as a ratio of GDP jumped from 61 percent in 2007 to 75 percent in 2009,[2] with the GFC's initial blow. It edged up gradually in the following years, as the full impact of the GFC was felt and extended, especially in Europe, reaching 84 percent in 2019. It then jumped again to 99 percent following the onset of the COVID-19 pandemic (Figure 1).

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[2] Global debt is the weighted average across countries, with weights based on a three-year moving-average GDP in USD for each year, from the IMF's World Economic Outlook. The same method is used to compute averages for advanced economies and emerging market economies.

Debt rose in both advanced and emerging market economies, owing to somewhat different factors. Advanced

economy debt accumulated rapidly from 2007 to 2012, as debt troubles intensified in several European economies; it then stabilized for the remainder of the decade before spiking again with the pandemic (Figure 2). These developments took place against the backdrop of monetary policy accommodation and low interest rates. In emerging markets, debt increased by half as much as in the advanced economies during the GFC, but its rise continued throughout the 2010s, driven in part by China's deficit financing. In low-income economies, debt likewise rose in the 2010s, though by less. In all groups of countries, debts in 2022 remain well above pre-pandemic levels. Unexpected inflation in 2021-22 made a bigger dent in the advanced

Figure 1. Global General Government Debt
(Percent of GDP)

Source: WEO April 2022

economies, where a larger share of the debt is denominated in domestic currency.
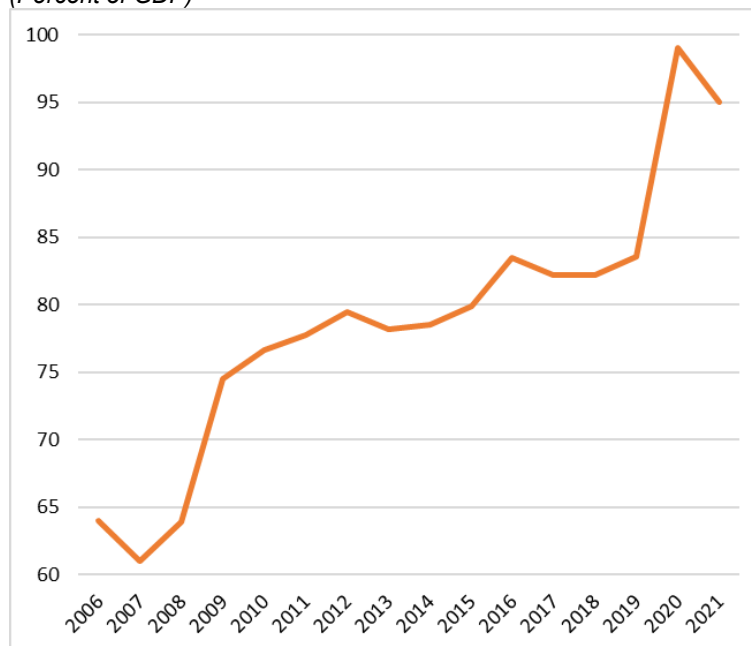
Figure 2. Gross Debt and Interest Expense
(Percent of GDP)
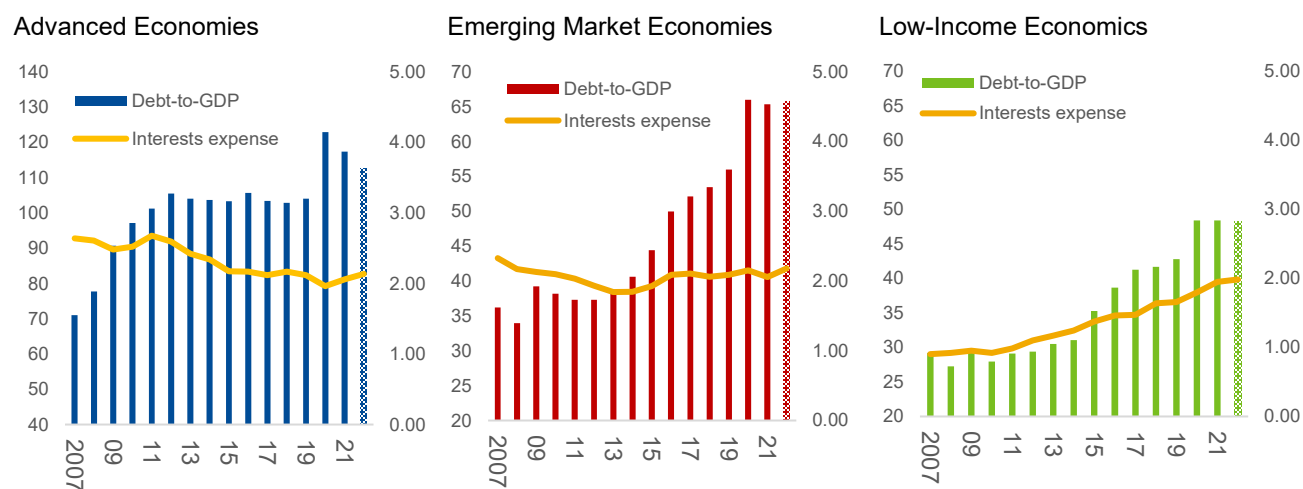
Source: IMF, World Economic Outlook April 2023.

Drivers Behind Surprise Changes in Debt

In this short paper, we analyze surprise changes in government debt—calculated as the difference between the actual and projected changes in the debt-to-GDP ratio for a given year or period—by decomposing them into the contributions of unexpected outcomes in real growth, inflation, effective interest rates, fiscal policy measures, and residual factors. We consider such surprise changes for the GFC, the COVID-19 pandemic, and the period between these two crises.

Specifically, we focus on 2009 for the GFC and 2020 for the pandemic. For each episode, these are the years when the output loss was most pronounced. Our selection of relevant WEO vintages from which to pull projection data (to represent pre-crisis expectations) was based on historical markers as well as the dates when the preponderance of G20 countries, which account for 68 percent of global GDP, entered and exited crisis-related technical recessions (Figure 3).

- For the GFC, the source for projections is the April 2008 WEO. The vintage preceded the onset of the early phase of the GFC, marked by unanticipated economic downturns in major European countries and Japan in second quarter of 2008. With the Lehman bankruptcy in September 2008, output in most G20 countries contracted in the fourth quarter of 2008. By the second half of 2009, all G20 members had exited their GFC-related technical recessions. The actual change in debt for 2009 is computed based on the April 2010 WEO, for consistency with the COVID-19 episode (see below).

- For the COVID-19 pandemic, the projections are drawn from January 2020 WEO. When this vintage was prepared, the pandemic and its severity had not been foreseen, nor had the lockdowns that became prevalent in March 2020. Although the pandemic lasted longer, we focus on debt changes in 2020 because outright recessions in many countries (including most G20 economies) ended by mid- to late-2020. The April 2022 WEO provides the actual change in debt for 2020.

To capture the full impact of economic growth not only through the denominator of the debt ratio but also through the primary surplus (as a share of GDP), we compare developments with a "no policy change" scenario where revenues rise in line with nominal GDP and primary expenditures rise in line with the GDP deflator. Such scenario seeks to capture a policy approach whereby the authorities do not change tax policy and provide a constant flow of public goods and services in real terms. (The elasticity with respect to output is 1 for revenues and 0 for expenditures. We also extended the analysis to allow for alternative or varying elasticities.)[3] Conversely, "fiscal measures" are computed as the difference between the primary surplus and the "no policy change" scenario. Annex I provides a detailed description of the framework—see also Mauro and Zilinsky (2016).

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[3] For simplicity, we assume that the elasticities are constant across crisis and across countries, and later show that the results would be similar using different elasticities.

Figure 3. Economic Recessions in G20 Countries

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021

Sources: IMF WEO April 2022, and IMF staff estimates.

Note: Areas shared in red identify recessions consisting of output decline for at least two consecutive quarters between a peak and a trough (inclusive) in real quarterly GDP. The peak is defined as the quarter preceding the first recession, the recovery is the quarter with GDP equal or greater than the peak, and the trough is the minimum point between the peak and the recovery.

Debt Surprises During the GFC and COVID-19 Pandemic

The analysis focuses on surprise changes in debt during the height of each crisis. For the GFC, this was 2009. For the COVID-19 pandemic, it was 2020. At an aggregated level, in general, unexpected growth outcomes accounted for a major part of the surprise increase in debt, particularly following the COVID-19 lockdowns. The unexpected changes in debt were larger in advanced economies and emerging markets at the peak of the COVID-19 crisis compared to those during the peak of the GFC, whereas the opposite was true for low-income countries (Figure 4, black squares).[4] Lower-than-expected output was the leading driver of debt surprises across income groups for both GFC and COVID-19 (grey plus yellow shading of bars) except for low-income countries during the GFC where stock-flow adjustments played the largest role in debt developments. Optimism bias in growth forecasts may have played some role in the lower-than-expected output (Ho and Mauro, 2016; Chatterjee and Nowak, 2016). In general, stock-flow adjustments include debt changes due to exchange rate depreciations, materialization of contingent liabilities, and any difference between the actual and projected benchmark year debt level (2008 for GFC and 2019 for COVID-19). Policy measures were most substantial in AEs, reflecting more fiscal space to provide support. Stock-flow adjustments made significant positive contributions to surprise increases in debt in AEs during the GFC, largely reflecting recourse to government loans and equity injections, especially to support financial institutions. During the height of the crises, interest and inflation surprises contributed little to changes in debt.

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[4] See also Alonso and Perrelli (2021) for a comprehensive analysis of debt forecast errors using a similar approach.

**Drivers of debt surprises in 2009 and 2020 in individual G20 countries**

The magnitudes of the surprise changes in debt and the principal drivers of those changes varied across G-20 members following the onset of the GFC (Figure 5). The unexpected increase in debt was greater in the advanced economy members of the G-20 than for emerging market members (except Argentina). Lower-than-expected growth was the dominating factor behind surprise increases in debt in countries such as Japan, Italy, Germany, Turkey, Brazil, and Mexico. In addition, G20 members generally undertook larger policy measures than expected, with Saudi Arabia's fiscal measures reaching 20 percent of GDP.

Stock-flow adjustments (residuals) generally contributed to the rise in debt ratios but with large variation across countries. For example, stock-flow adjustments added 19 percentage points of GDP to the surprise increase in Argentina's debt, reflecting a sizable share of foreign-currency denominated debt coupled with local currency depreciation, but reduced the debt ratio by 23 percentage points of GDP in Saudi Arabia, which financed a large portion of its policy measures by drawing on its sovereign wealth funds. The role of unexpected depreciations of local currencies is often relevant for emerging market and developing economies that issue foreign currency denominated debt. In addition, stock-flow contributions to debt surprises, including any errors in predicting the base period debt-to-GDP ratio against which unexpected changes in the ratio are calculated.

Figure 4. Drivers of Debt Surprises: GFC and COVID-19
*(Percent of GDP; Simple average)*
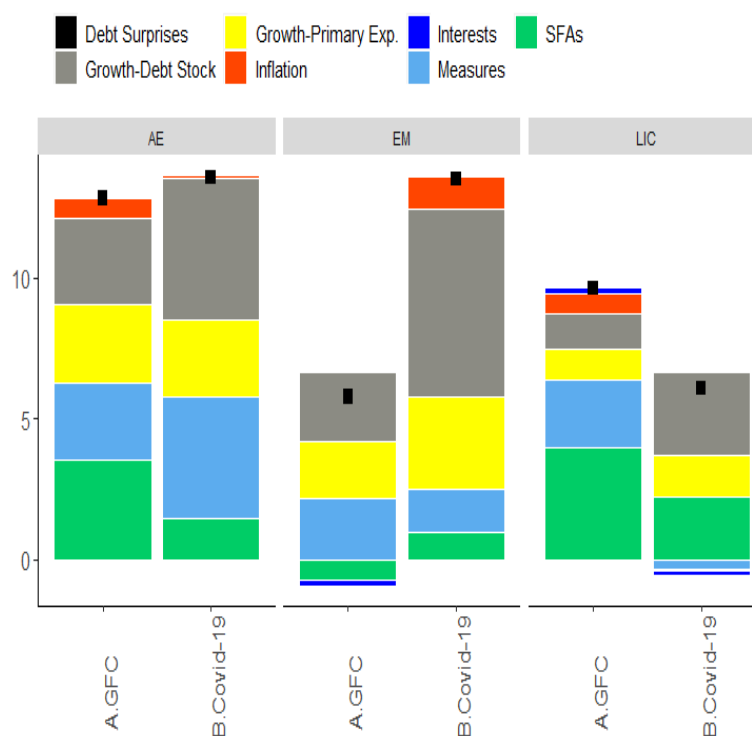
Sources: IMF WEO April 2008, WEO April 2010, WEO January 2020, WEO April 2022, and IMF staff estimates.
Note: GFC (2009) projections from WEO April 2008; actual values from WEO April 2010. COVID-19 (2020) projections from WEO January 2020; actual values from WEO April 2022. Country count for GFC: AE=33, EM=56, and LIC=24. Country count for COVID-19: AE=35, EM=84, and LIC=54. SFAs are stock flow adjustments.

Similar to the GFC, the surprise increase in debt in advanced economy members of the G20 was greater than the increase in emerging markets with the exception of Argentina and India (Figure 6). However, the unexpected increases in debt from lower-than-expected real growth were more prominent and widespread following the start of the pandemic relative to the GFC. Unexpectedly weak real growth outturns boosted debt by 10 percentage points or more of GDP to Argentina, France, India, Italy, Japan, and the United Kingdom.

Heterogeneity also marks the drivers of debt surprises during the pandemic across G20 countries. Stock-flow adjustments in Canada and the United States contributed significantly to the debt surprise in those countries. In Canada's case the stock-flow adjustment includes a material under projection of the debt-to-GDP ratio in 2019, which is the year from which the surprise change in the debt ratio is calculated.

Figure 5. G20: Composition of the Unexpected Change in Debt in 2009
(Percent of GDP)
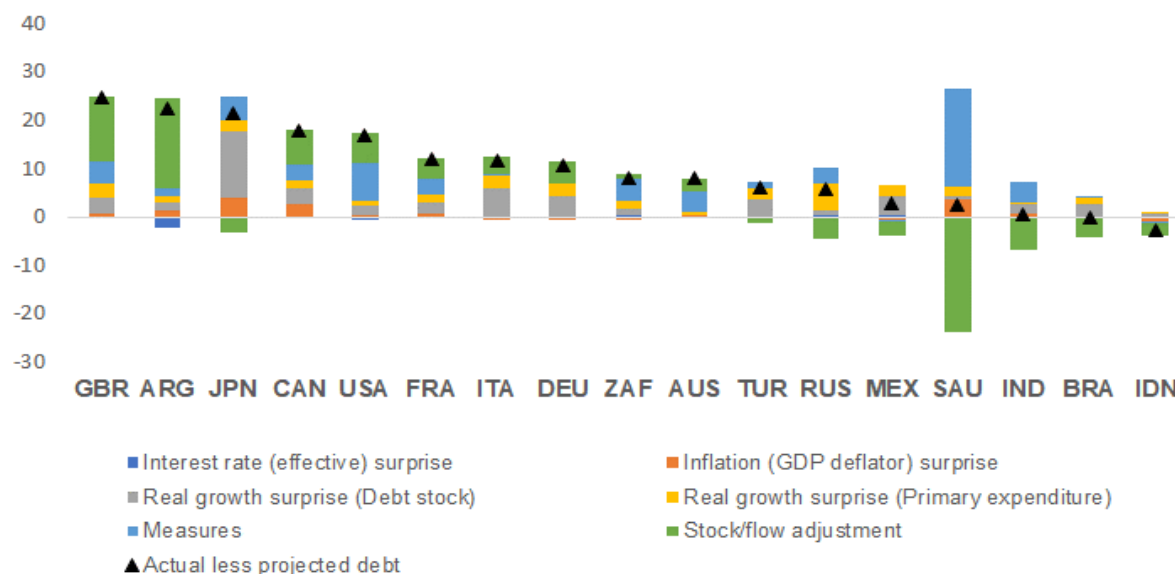
Sources: Projections for debt at the end of 2009 are based on the April 2008 WEO and actual values for 2009 are from the April 2010 WEO. Government debt data is not available for China and Korea in the April 2008 WEO.

Figure 6. G20: Composition of the Unexpected Change in Debt in 2020
*(Percent of GDP)*
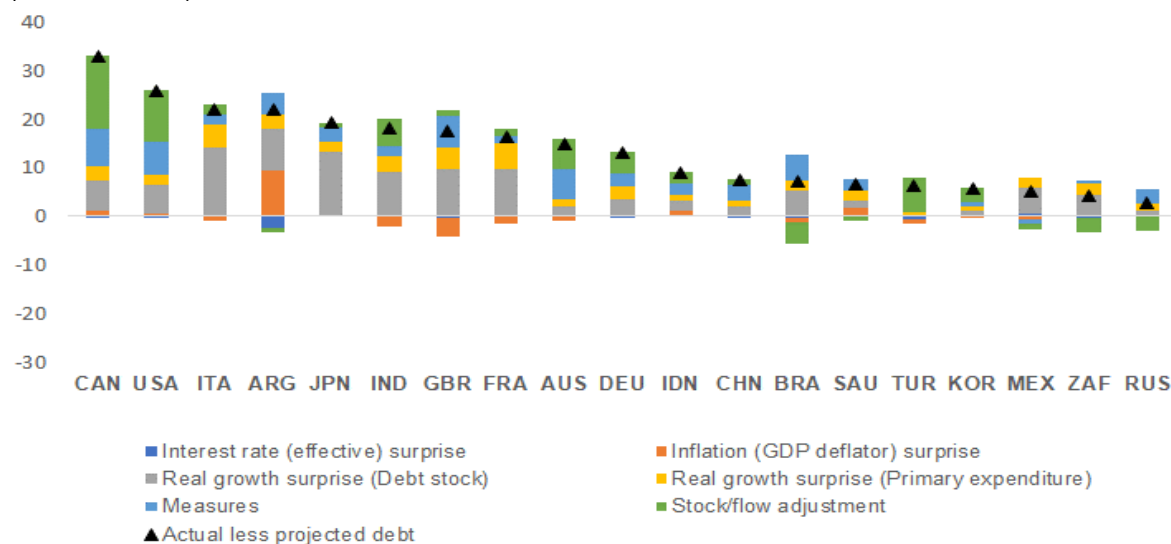
Sources: Projections for debt at the end of 2020 are based on the January 2020 WEO and actual values for 2020 are from the April 2022 WEO.

The Role of fiscal measures in debt dynamics during the GFC and COVID-19 crises

The distribution of the magnitude of the contribution of fiscal measures to debt surprises was broadly similar within income groups following the GFC and COVID-19 pandemic. The median contribution differed across income groups, however. The median contribution for advanced and emerging market economies was significantly higher during both crises relative to low-income countries (Figure 7). This finding likely reflects the more muted impact of the GFC in low-income countries as well as the general financing constraints such countries faced, particularly during the pandemic.[5]

Figure 7. Discretionary Fiscal Policy: GFC (2009) and COVID-19 Pandemic (2020)
(Kernel density estimate)
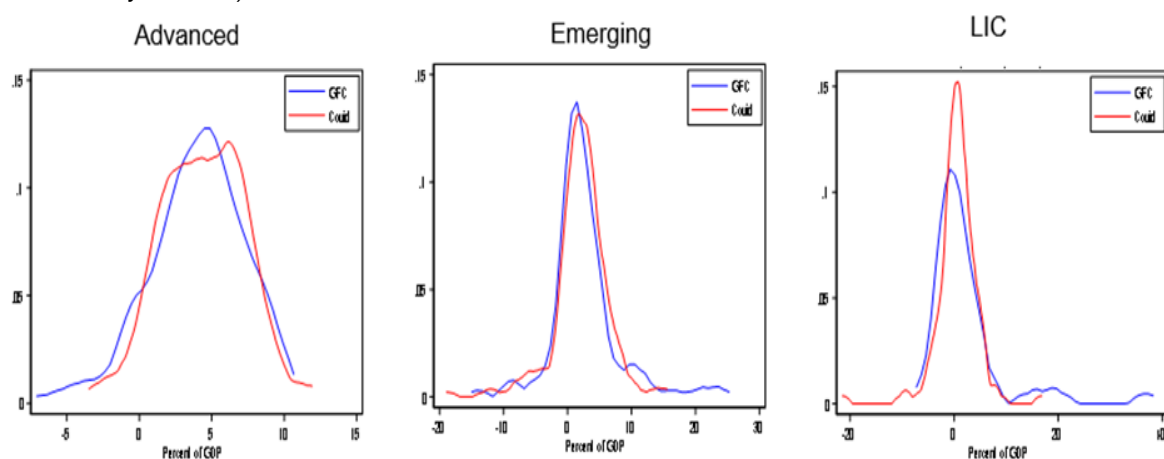
Sources: IMF WEO April 2008, WEO April 2010, WEO January 2020, WEO April 2022, and IMF staff estimates.
1/ Contribution of discretionary fiscal measures to the surprise change in debt relative to GDP. GFC projections are from the April 2008 WEO and actual values are from the April 2010 WEO. COVID-19 pandemic projections are from the January 2020 WEO and actual values are from the April 2022 WEO. Country count for the GFC estimate: AE=33; EM=56; LIC=24. Country count for the COVID-19 pandemic estimate: AE=35; EM=84; LIC=54.

The similarity in the median contribution across income groups during each crisis is striking. Announced budget measures at the onset of the COVID-19 pandemic by G-7 countries were significantly larger relative to GDP than those announced when the GFC began (Figure 8).[6] However, the estimated implementation of discretionary budget measures following the announcements was less uniform, and in some cases, estimated measures implemented in response to the GFC exceeded estimates of those implemented because of the COVID-19 pandemic. For example, total announced budget measures by the United States following the start of the GFC (late 2008) was about 5 percent of GDP compared to announced measures of close to 20 percent of GDP following the COVID-19 pandemic (early 2020). Yet the estimated contribution of measures to surprise

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[5] The medians for LIC of both crises are close zero. The fatter right tail of GFC is mainly driven by Guinea (36.8 percent) and Nigeria (17.5 percent). Both countries had planned a sharp tightening in 2009 (a primary balance of 32.5 percent of GDP for Guinea and 9.1 percent for Nigeria) but a negative primary balance materialized.

[6] The analysis focuses on G-7 countries because information on their announced measures is the most comprehensive and consistent over the GFC crisis period.

changes in debt in the two years (2009-10) after the GFC started was greater (16 percent of GDP) than the estimated contribution in the two years (2020-21) after COVID-19 lockdowns commenced (14 percent of GDP). Two factors are worth highlighting for the pandemic episode: (i) implementation was lower than the announcement;[7] and (ii) Federal government support sent to sub-national governments was saved.[8]

As a robustness check, the size of the policy measures was also estimated as the difference between actual outturns and projections using both the structural primary balance and the primary balance reported in WEO vintages (Annex II). Both approaches give similar results as in the baseline: the policy measures are similar during the two crises. The perception of some observers that fiscal support was more generous during the COVID-19 pandemic may be partially due to the announcement of large contingent liability support in some countries in response to the pandemic (Annex II).

Figure 8: Estimates of Discretionary Fiscal Policy During the GFC and COVID-19 Pandemic
*(Percent of GDP)*

GFC (2009 and 2010)

COVID-19 pandemic (2020 and 2021)
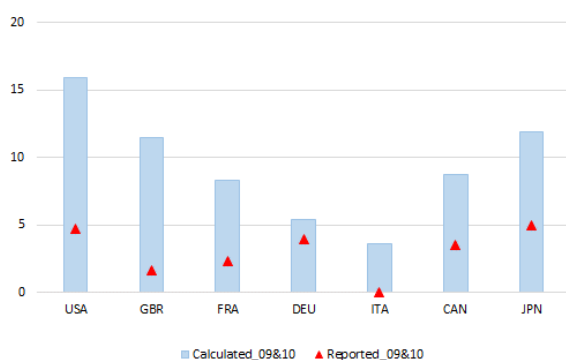
Sources: November 2010 Fiscal Monitor, IMF WEO vintages, and IMF staff estimates.
Note: GFC announced values are based on survey of IMF G-20 desks, national budget documents, and medium-term fiscal plans, relative to the 2007 pre-crisis baseline. See Fiscal Monitor, November 2010: Fiscal Exit: From Strategy to Implementation.
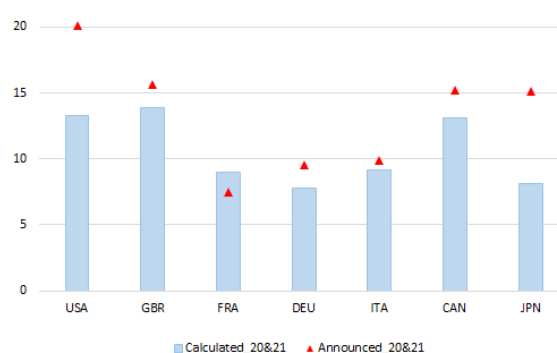
Sources: COVID-19 Fiscal Response Dataset, IMF WEO Vintages, and IMF staff estimate.
Note: The announced values are calculated based on the local currency amount reported in the responses to the survey for the COVID-19 Fiscal database divided by actual nominal GDP in the corresponding years. See COVID-19 Fiscal Response Database.

The Interlude (2010-19)

In early 2010, as the global economy began to recover from the GFC's initial blow, analysts began to consider the likely future path for debt. Policymakers in G20 members called for strong fiscal adjustment to reduce public debt to more prudent levels over the medium term (G20, 2010). In this section we delve into the debt dynamics in advanced economies, where variation in the factors underlying debt developments was especially pronounced, and a normative scenario for debt reduction was proposed at the start of the 2010s.

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[7] The budget impact as a ratio of the announcement is 0.77 based on https://www.covidmoneytracker.org/, which applied to the announcement would imply as estimated impact of 15.5 percent of GDP for two years.
[8] The estimated measure of the central government deficit for 2020 is 10.2 percent of GDP, larger than 8.2 percent of GDP in 2009.

Decomposition of debt surprises for advanced economies

For advanced economies, actual debt ratios in 2019 turned out, on average, almost the same as projected in 2010 (just 3 percentage points below projections), but the underlying factors differed from expectations (Figure 9).[9] Absent lower-than-expected effective interest rates, debt would have continued to rise throughout the decade as growth fell short of projections. Indeed, the largest difference came from a lower than anticipated interest bill, whose cumulative impact over 2011-19 was to shave off 13 percentage points of GDP from end-2019 debt. (The actual effective interest rate trended downward from 2.5 percent in 2011 to 2 percent in 2019, compared with a projected rise to 3.9 percent by 2019.) Lower interest costs largely offset factors that would otherwise have led to an even higher debt ratio, including lower the projected real growth (a cumulative contribution to the 2019 debt ratio of 5 percent of GDP), lower than projected inflation (3 percent of GDP) and larger than projected fiscal expansion (1 percent of GDP).

Figure 9. Advanced Economies: Decomposition of Cumulative Debt "Surprise" for 2010-2019
(Percent of GDP)
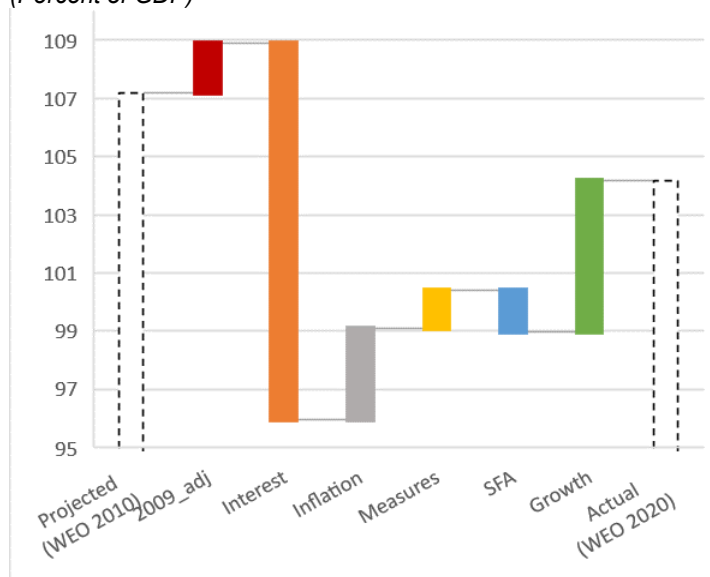
Sources: Projections from April 2010 WEO; actual values from the April 2020 WEO; and IMF staff calculations.
Note: In April 2010, IMF staff projected that the global debt-to-GDP ratio would be 107 percent in 2019; the actual turned out at 104 percent. Contributions (in percent of GDP) to the surprise change were: a subsequent upward revision of the end-2009 debt ratio; lower than expected real interest costs; lower than expected inflation; lower than expected measures to reduce the primary deficit; lower than expected stock flow adjustments; lower than expected economic growth.

Within the advanced economies group, differences across countries in debt developments and underlying factors stemmed primarily from differences in real economic growth, fiscal measures, and stock flow adjustments, in order of importance. For example, the actual debt-to-GDP ratio in 2019 turned out lower than projected (a "positive" surprise) for Germany, Japan, and Spain, and United States (Figure 10). In all four countries, unexpectedly low effective interest rates reduced debt to GDP relative to projections—especially in the United States. Germany, Japan, and Spain undertook greater fiscal contractions than expected, to varying degrees, whereas the United States expanded more. Adverse real growth surprises boosted debt relative to

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[9] The projection horizon in the WEO is six years. Projections from the April 2010 WEO cover the period 2010-15. To capture the debt surprise over the 10 years from 2010-19, projections for the years 2016-19 are based on the following assumptions: the rate of change in real and nominal growth, the nominal effective interest rate, and revenues relative to GDP are set at the final projection year (2015) values for 2016-19. Primary expenditures adjust in line with the annual change in the GDP deflator. Also, debt amortizations are assumed to be fully rolled over and annual stock-flow adjustments are zero. Fiscal measures are obtained vis-à-vis a "no policy change" benchmark in which nominal revenues evolve in line with nominal GDP whereas nominal expenditures evolve in line with the GDP deflator. Projected nominal interest expense and debt evolve in line with these assumptions. Outturns are from the April 2020 WEO. See Annex III for charts depicting how the underlying projections and outturns for the key macroeconomic and fiscal aggregates in the analysis evolve over the period 2010-19 for the WEO advanced economy group.

GDP in Japan, Spain, and United States. However, in Germany a tighter than expected fiscal stance and a favorable growth surprise helped lower its debt ratio relative to projections.

Conversely, actual debt relative to GDP in 2019 exceeded projections in France, Greece, Italy, and the United Kingdom. Negative nominal growth shocks played a key role as both real growth and inflation outturns were lower than expected. In Italy and Greece, debt rose despite fiscal consolidations that were likely driven in part by market access concerns as their debts were relatively high.

Figure 10. Decomposition of Lower-than-expected Debt Ratios for 2019
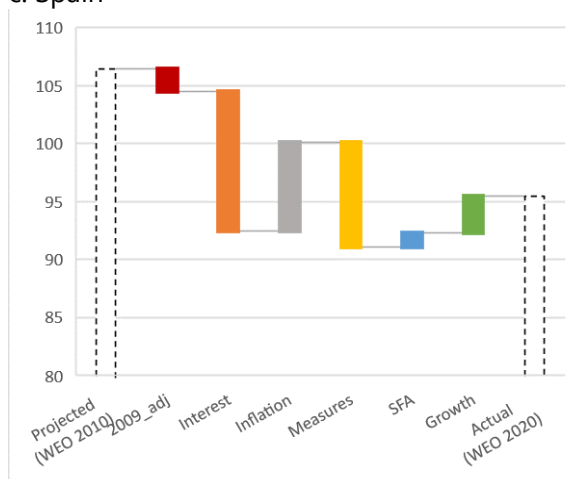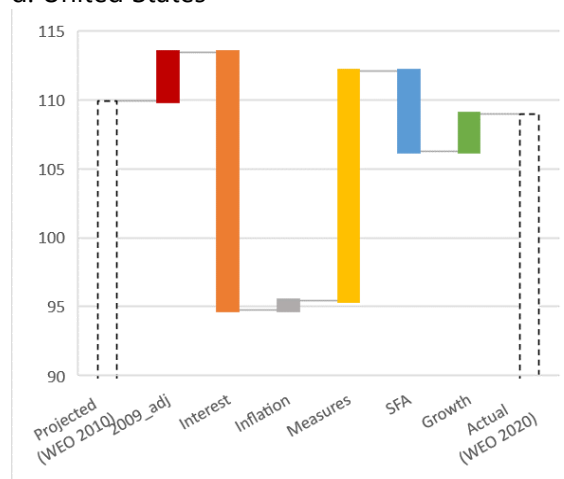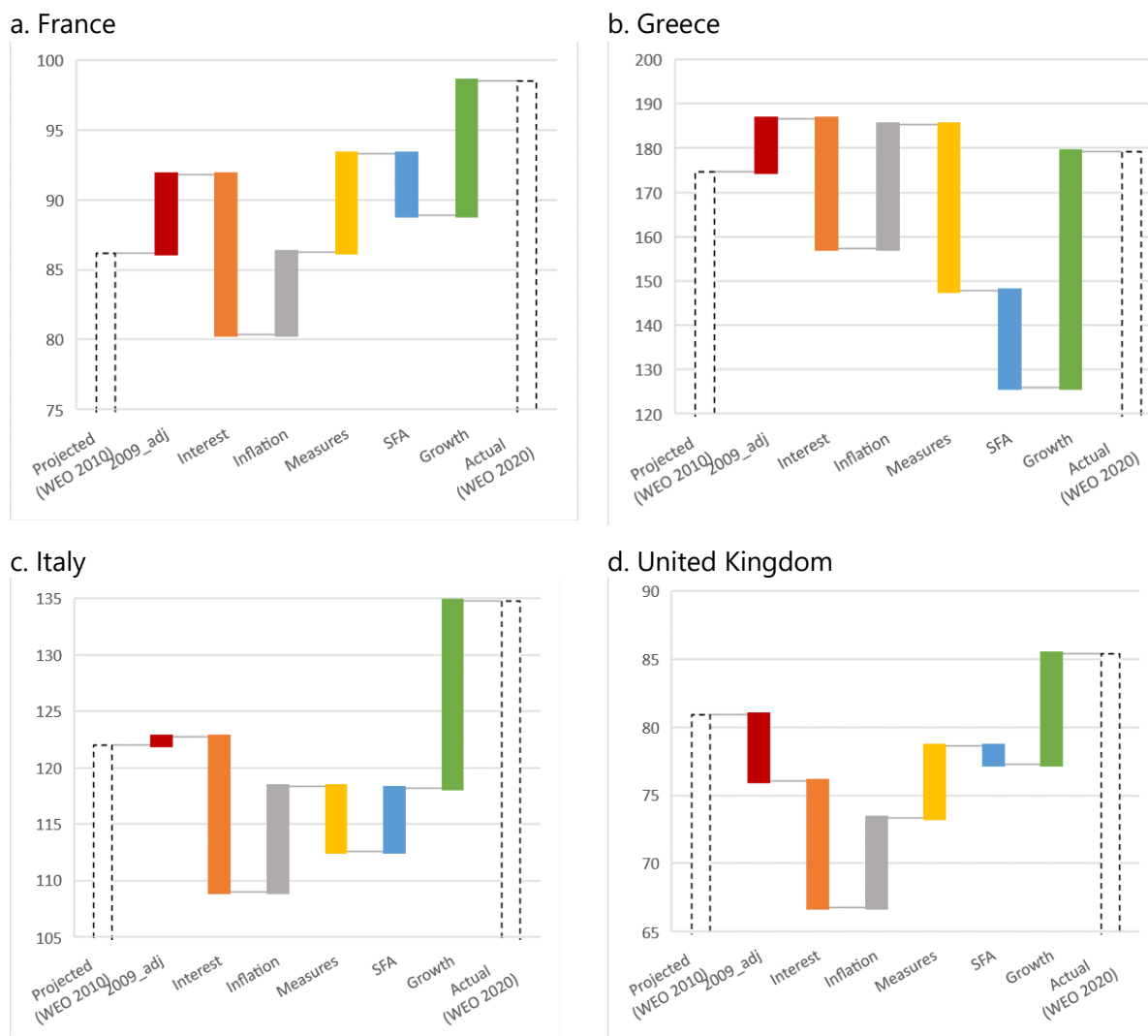*(Percent of GDP)*

a. Germany
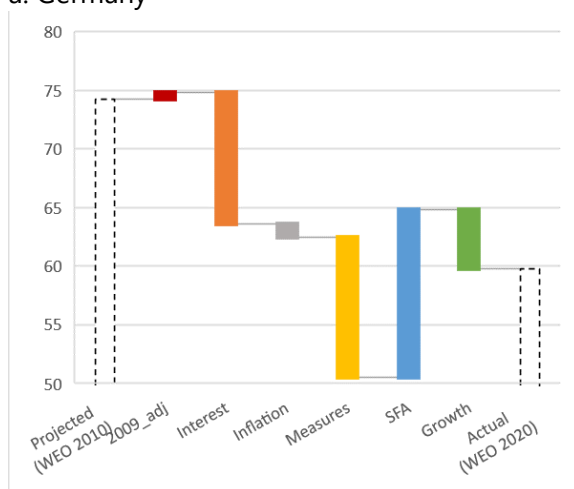
b. Japan
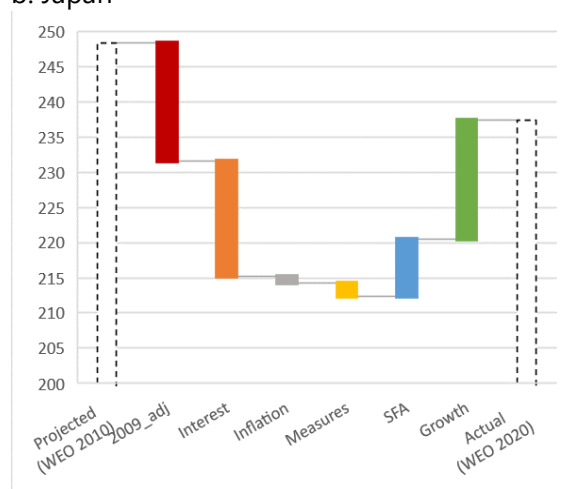
c. Spain

d. United States

Sources: Projections are from the April 2010 WEO and actual values are from the April 2020 WEO; IMF staff calculations.

Figure 11. Decomposition of Higher-than-expected Debt Ratios for 2019
(Percent of GDP)

a. France

b. Greece

c. Italy

d. United Kingdom

Sources: Projections are from the April 2010 WEO and actual values are from the April 2020 WEO; IMF staff calculations.

For Greece, negative growth surprises added about 55 percentage points to the debt-to-GDP ratio, more than offsetting sizable tightening measures. In France and the United Kingdom, a sizable contribution from adverse surprises to nominal growth added to the surprise increase in debt as well, though the effects were not as large as in Greece or Italy. Favorable effective interest rate outturns served to dampen the increase in actual debt relative to projections in all four countries.

Debt developments and Policy Measures Versus Normative Recommendations

Debts turned out even larger compared with a normative scenario prepared by IMF staff in 2010, which envisaged sizable fiscal tightening to reduce debts. Following the rapid increase in government debt in response to the GFC, IMF staff offered a strategy to return budgetary and debt positions to pre-GFC levels, as a share of GDP (Cottarelli and Viñals 2009). Specifically, a normative scenario envisaged returning debt ratios

to 60 percent (the median across advanced economies in 2007) within the next two decades (by 2030). This would require steadily improving the cyclically adjusted primary balance from a deficit of 3½ percent of GDP in 2010 to a surplus of 4½ percent points in 2020—an 8-percentage point adjustment—and keeping it at that level for the subsequent 10 years. However, fiscal policy in advanced economies, as a group, fell well short of this recommended policy advice to consolidate the fiscal stance gradually. Relative to recommendations, the weighted average of fiscal adjustment was about 5 percent of GDP less contractionary (Figure 12). Whereas some advanced economies such as Germany, Greece, Italy, and Spain undertook sizable fiscal adjustment, most countries fell short of the recommended effort (See Figures 10 and 11).

Figure 12. Advanced Economies: Recommend and Actual Fiscal Adjustment, 2010-19
(Cumulative change, percent of GDP, weighted averages)
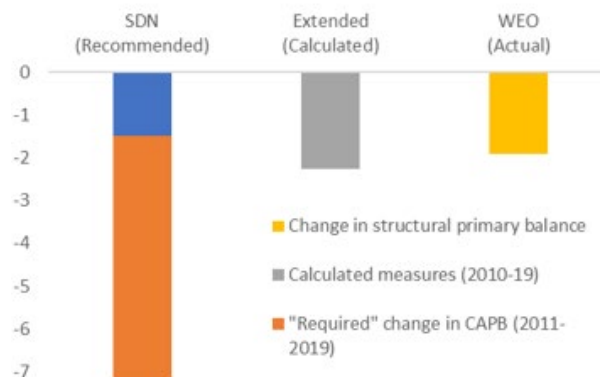
Sources: Cottarelli and Vinals. 2009. "A Strategy for Renormalizing Fiscal and Monetary Policies in Advanced Economies." IMF Staff Discussion Note SDN/09/22; WEO July 2022; WEO January 2020; WEO April 2016.

Policy Discussions

In the aftermath of the pandemic, governments are once again considering whether and how they should stabilize or reduce debt ratios that are well above pre-pandemic levels, and even further above pre-GFC levels. There is merit in doing so. Reducing debt and unnecessary fiscal risks when conditions allow gives governments greater scope to act when needed (Battersby et al., 2022). The larger fiscal policy response of advanced economies relative to low-income countries in response to the two crises, particularly COVID-19, lends further support to this observation. Simply put, deploying fiscal and financial measures to help citizens cope with economic shocks is easier, cheaper, and more effective when countries have room to borrow. The case for fiscal restraint is even stronger when inflation is above target (Adrian and Gaspar 2023).

Containing, much less reducing, debt following the spike in debt during the COVID-19 pandemic from already high levels could prove hard given the tightening of global financial conditions as central banks unwind quantitative easing and raise interest rates in response to a surge in inflation. Moreover, governments relied heavily on below the line and contingent measures (guarantees) to support firms during COVID-19 lockdowns, which could add to government debt burdens in the future.

The question is how best to go about reducing debt during non-crisis times. The analysis documents that—in addition to fiscal measures—economic growth, interest rates, inflation, and stock-flow adjustments all have played substantial and varying roles in influencing debt dynamics during the GFC, the COVID-19 lockdown, and the decade-long intervening period. These various factors and their interplay suggest that reducing debt is not as simple as putting fiscal consolidation on autopilot. Fiscal policy decisions, growth and inflation outcomes, and interest rate developments are uncertain and often shaped by developments beyond the control of the fiscal authorities.

Many countries have succeeded in lowering debt from high levels in an orderly way. As Cottarelli and Viñals (2009) noted, the good news is that the debt ratio always converges to a level that depends just on the nominal growth rate of the economy and the level of the deficit, not the initial debt level. For example, with a nominal GDP growth rate equal to the average real growth over the past two decades in advanced economies plus 2 percent of inflation, balanced budgets would be sufficient to cut debt ratios from 100 to 65 percent in 10 years. The bad news is that the higher the initial debt level, the higher would be the primary surplus needed to run a certain overall balance. And the effort would need to be larger, the higher interest rates are. Although politically difficult, gradual and steady fiscal tightening, with an eye to its impact on growth, is less disruptive than an abrupt fiscal pullback brought on by loss of market confidence. A consistent medium-term, post pandemic policy framework (potentially involving a fiscal rule—see Caselli and others 2022) is crucial to add credibility.

Annex I. Analytical Framework and Sensitivity to Elasticity Assumptions

Baseline model: The model applied to disentangle the contributions of real growth, the GDP deflator (inflation), the effective interest rate, discretionary fiscal policy, and stock-flow adjustments to unexpected changes in debt (debt surprises) is based on the debt decomposition framework developed by (Mauro and Zilinsky 2016). The baseline model is:

(1)
$$d_{t+1} - d_{t+1}^* = \left(\frac{i_{t+1}}{1+g_{t+1}}\right)d_t - \left(\frac{i_{t+1}^*}{1+g_{t+1}^*}\right)d_t^* - \left(\frac{\pi_{t+1}}{1+g_{t+1}}\right)d_t + \left(\frac{\pi_{t+1}^*}{1+g_{t+1}^*}\right)d_t^*$$
$$- \left(\frac{g_{t+1}}{1+g_{t+1}}\right)d_t + \left(\frac{g_{t+1}^*}{1+g_{t+1}^*}\right)d_t^* - (p_{t+1} - p_{t+1}^*) + f - f^*.$$

where $f - f^* = f_{t+1} - f_{t+1}^* + (d_t - d_t^*)$. Furthermore, $p_{t+1} - p_{t+1}^* = e_{t+1}^* \left(\frac{g_{t+1} - g_{t+1}^*}{1+g_{t+1}}\right) + m_{t+1}$, m_{t+1} is the constituent of primary balance shocks corresponding to policy measures.

In equation (1), d_{t+1} is the actual debt-to-GDP ratio at end of year t+1 reported in the ex-post WEO vintage and d_{t+1}^* is the projected debt-to-GDP ratio reported in the ex-ante WEO vintage.
The other variables include real economic growth (g), the effective nominal interest rate (i), GDP deflator inflation (π), the primary balance (p), and the stock-flow residual (f). Their projected counterparts are indicated by *.

The provides a more comprehensive view of the affect real economic growth has on overall debt dynamics, by incorporating the impact of real growth on primary surplus (as a share of GDP). These can be easily seen when comparing the results of a debt decomposition based on the standard approach to the Mauro-Zilinsky model. Figure A.1.1 shows that a debt decomposition under the standard approach underestimates the contribution of negative growth surprises to debt accumulation. For advance economies, the cumulative growth impact calculated through the extended approach is almost double that of the traditional approach.

Figure A1.1. Growth Surprise: Standard vs. Extended 1/
(*Median of growth contributions, in percent of GDP*)
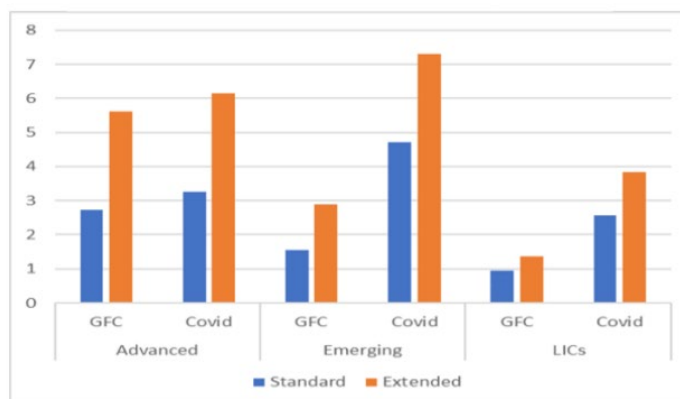
Sources: IMF WEO April 2008, WEO April 2010, WEO January 2020, WEO April 2022, and IMF staff estimates.
1/ Contribution of growth shocks to the surprise change in debt between actual and projected levels. GFC projections based on WEO April 2008 and actual values from WEO April 2010. COVID-19 projections based on WEO January 2020 and actual values from WEO April 2022. Country count for COVID-19: AE=35; EM=84; LIC=54. Country count for GFC: AE=33; EM=56; LIC=24.

Model extension and sensitivity to elasticity assumptions: With elasticity of revenue defined as δ^τ and the elasticity of primary spending defined as δ^e, we can decompose the primary balance surprises as:

$$(1)\quad (p_{t+1} - p_{t+1}^*) = \left(\frac{(1+g_{t+1}^*)(1+g_{t+1}\delta^\tau)}{(1+g_{t+1})(1+g_{t+1}^*\delta^\tau)}\tau_{t+1}^* - \tau_{t+1}^*\right) + \left(\tau_{t+1} - \frac{(1+g_{t+1}^*)(1+g_{t+1}\delta^\tau)}{(1+g_{t+1})(1+g_{t+1}^*\delta^\tau)}\tau_{t+1}^*\right)$$
$$-\left(\frac{(1+g_{t+1}^*)(1+g_{t+1}\delta^e)}{(1+g_{t+1})(1+g_{t+1}^*\delta^e)}e_{t+1}^* - e_{t+1}^*\right) - \left(e_{t+1} - \frac{(1+g_{t+1}^*)(1+g_{t+1}\delta^e)}{(1+g_{t+1})(1+g_{t+1}^*\delta^e)}e_{t+1}^*\right)$$

Red indicates automatic stabilizer and blue indicates the policy measures.

In the baseline, we define as $\delta^\tau = 1$ and $\delta^e = 0$. However, as illustrated in the literature, the revenue elasticity could be greater than one and the elasticity of expenditures less than one during downturns. To incorporate the business cycle, we can define $\delta^\tau = 1.05$ and $\delta^e = -0.14$, which are estimated based on OECD countries data (OECD, 2015). Alternatively, we could define $\delta^\tau = 1.12$, the elasticity of VAT revenue to the output gap for advanced economies estimated by Cemile Sancak, Ricardo Velloso, and Jing Xing (2010). To test the sensitivity of the model, we choose the elasticities with the largest absolute magnitudes: $\delta^\tau = 1.12$ and $\delta^e = -0.14$. These larger elasticity assumptions amplify the impact of automatic stabilizers on the primary balance relative to the baseline (the positive change shown in blue and orange bars in Figure A1.2.), which reduces the estimated size of calculated discretionary measures (negative change as shown by red bars). Overall, these differences accentuate the impact of growth on debt surprises though the absolute magnitude of the amplification is generally less than one percentage point.

Figure A1.2. Impact of Elasticity Variation Relative to Baseline 1/
(Percent of GDP)

GFC: G20 - 2009
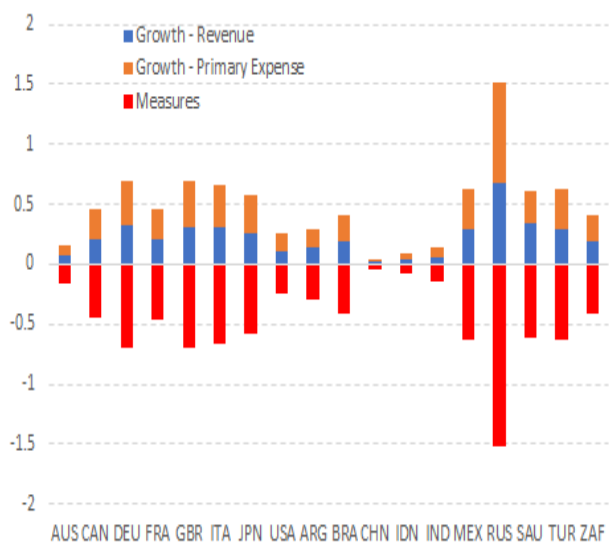
COVID-19: G20 - 2020
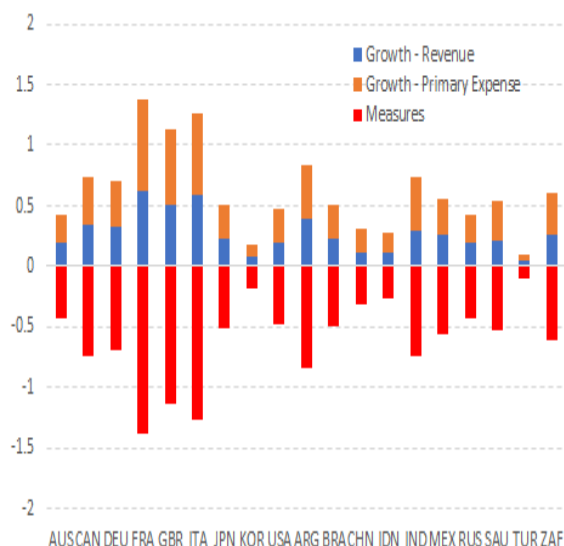
Sources: IMF WEO April 2008, WEO April 2010, WEO January 2020, WEO April 2022, and IMF staff estimates.
1/ Revenue elasticity = 1.12; expenditure elasticity = -0.14. Under the baseline, revenue elasticity = 1; expenditure elasticity = 0

Annex II. Robustness Check of the Magnitude of the Crisis Fiscal Policy Measures

Based on the analytical framework applied in this paper, the magnitude of fiscal measures undertaken in response to the GFC was broadly similar to the magnitude of measures undertaken in response to the COVID-19 pandemic. Some may consider this surprising.

To assess the reasonableness of the fiscal policy response derived from the framework, we calculated fiscal policy responses to the crises based on the difference between the projected and actual WEO Structural Primary Balances. As shown in Figure A2.1, the unexpected change in the structural primary balance displays a similar pattern across the two crises to the calculated policy responses shown in Figure 8 in the main text. The comparison also broadly holds if the framework-derived policy measures are compared to the magnitude of the fiscal policy response to the crises based on the difference between projected and actual WEO Primary Balances (Figure A2.2).

What could be behind perceptions of a larger fiscal response to the COVID-19 lockdown than to the GFC? One possible factor may be the substantial contingent support offered in the form of guarantees to business following the onset of COVID-19 lockdowns, particularly by some G7 countries, which are not reflected in their budget balance unless the borrower fails to repay the loans (Figure A2.3).

Figure A2.1. Estimates of the Size of Fiscal Policy Measures in G7 Countries in Response to the Crises: WEO Structural Primary Balance
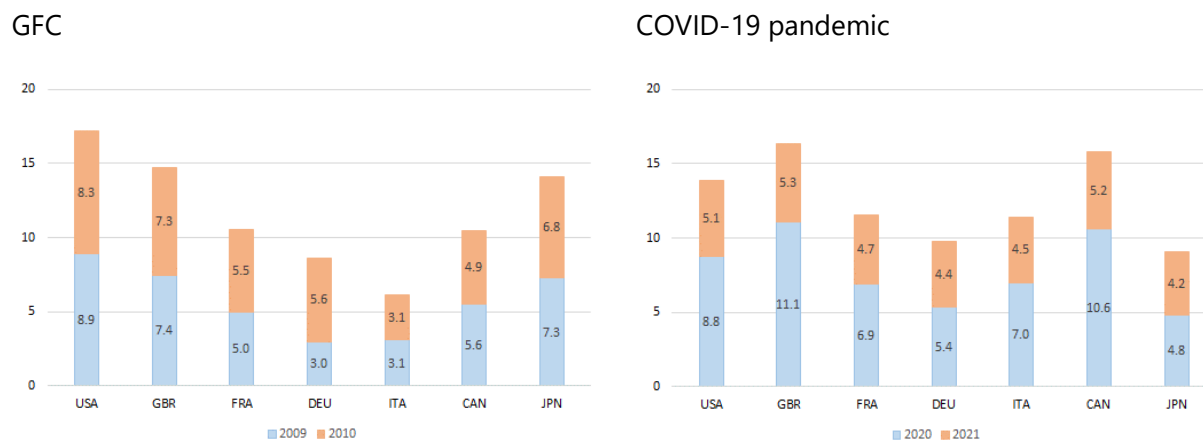*(Percent of GDP)*
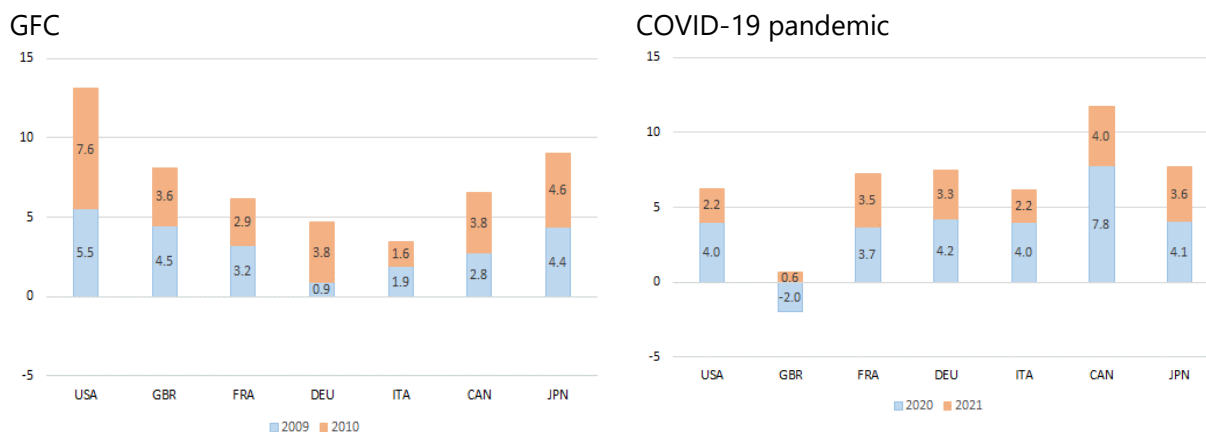
Sources: IMF WEO April 2008, WEO April 2010, and IMF staff estimates.
Note: The measures are calculated as the difference between the actual and projected structural primary balance. The structural primary balance is equal to the structural balance plus interest expenses for GFC as no structural primary balance were reported in the WEOs for 2008 and 2010.

Sources: IMF WEO Jan 2020, WEO April 2022 and IMF staff estimates.
Note: The measures are calculated as the difference between the actual and projected structural primary balance. For the United Kingdom, the actual structural primary balance for 2020 reported in the WEO April 2022 is a positive 1.48 percent of GDP while the projected one reported in WEO 2020 is -0.48 percent of GDP. That is, fiscal policy was tighter than projected.

Figure A2.2. Estimates of the Size of Fiscal Policy Measures in G7 Countries in Response to the Crises: WEO Primary Balance
(Percent of GDP)

GFC

COVID-19 pandemic

Sources: IMF WEO April 2008, WEO April 2010, and IMF staff estimates.
Note: The measures are calculated as the difference between actual and projected primary balance.

Sources: IMF WEO Jan 2020, WEO April 2022 and IMF staff estimates.
Note: The measures are calculated as the difference between actual and projected primary balance.
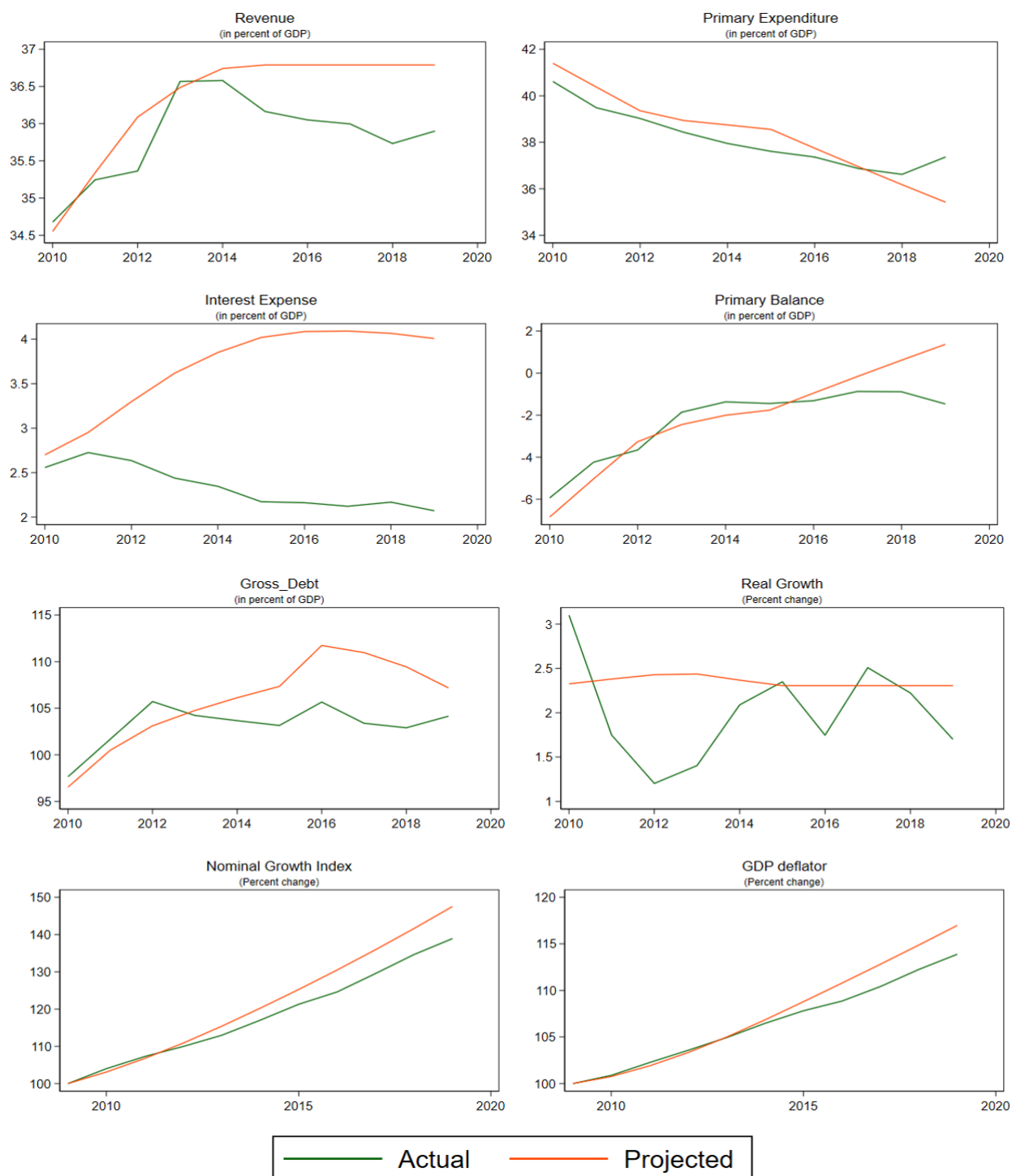
Figure A2.3. Announced Fiscal Measures in Response to the COVID-19 Pandemic
(Percent of 2020 GDP)
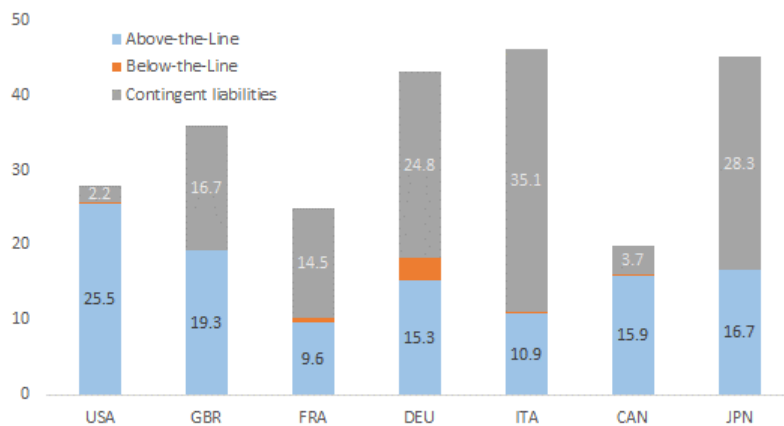
Source: COVID-19 Fiscal Response Database, IMF
Note: The measures are for multiple years. Below-the-line items include equity injections, loans, asset purchase or debt assumptions. Contingent liabilities include guarantees and quasi-fiscal operations.

Annex III. Evolution of Advanced Economies' Macroeconomic and Fiscal Aggregates

Revenue
(in percent of GDP)

Primary Expenditure
(in percent of GDP)

Interest Expense
(in percent of GDP)

Primary Balance
(in percent of GDP)

Gross_Debt
(in percent of GDP)

Real Growth
(Percent change)

Nominal Growth Index
(Percent change)

GDP deflator
(Percent change)

— Actual   — Projected

1/ Projections based on WEOApr2010Pub. Actual values from WEOApr2020Pub.

References

Adrian, Tobias, and Vitor Gaspar. 2022. "How Fiscal Restraint Can Help Fight Inflation," IMF Blog, November 21. International Monetary Fund. Washington DC.

Alonso, Christian, and Roberto Perrelli. 2021. "Assessing Unexpected Increases in Debt", Fiscal Monitor October 2021. International Monetary Fund. Washington DC.

Battersby, Bryn, Raphael A Espinoza, Jason Harris, Gee Hee Hong, Paolo Mauro, and Amanda Sayegh. 2022. "The State as Financier of Last Resort." Staff Discussion Note SDN2022/003. International Monetary Fund, Washington, DC.

Carlo Cottarelli and Jose Viñals. 2009. "A Strategy for Renormalizing Fiscal and Monetary Policies in Advanced Economies." IMF Staff Position Note SPN/09/22. International Monetary Fund. Washington DC.

Caselli, Francesca, Hamid Davoodi, Carlos Goncalves, Gee Hee Hong, Andresa Lagerborg, Paulo Medas, Anh Dinh Minh Nguyen, and Jiae Yoo. 2022. "The Return to Fiscal Rules." IMF Staff Discussion Note. SDN/2022/002. International Monetary Fund. Washington DC.

Chatterjee, Pratiti and Sylwia Nowak. 2016. "Forecast Errors and Uncertainty Shocks." IMF Working Paper WP/16/228. International Monetary Fund. Washington DC.

G-20 Toronto Summit, 2010, "G-20 Mutual Assessment Process – Alternative Policy Scenarios." Prepared by Staff of the International Monetary Fund.

Ho, Giang, and Paolo Mauro. 2016. "Growth: Now and Forever?" *IMF Economic Review*. 64, 526–547.

IMF. Various vintages. World Economic Outlook (WEO). International Monetary Fund. Washington DC.

IMF. 2010. Fiscal Monitor, November 2010: Fiscal Exit: From Strategy to Implementation. International Monetary Fund. Washington DC.

Mauro, Paolo, and Jing Zhou. 2021. "r−g<0: Can We Sleep More Soundly?" IMF Economic Review 69, 197–229. International Monetary Fund. Washington DC.

Mauro, Paolo, and Jan Zilinsky. 2016. "Reducing Government Debt Ratios in an Era of Low Growth." Policy Briefs PB16-10, Peterson Institute for International Economics. Washington, DC.

Price, R., Thai-Thanh Dang, and Jarmila Botev, 2015. "Adjusting Fiscal Balances for The Business Cycle: New Tax and Expenditure Elasticity Estimates for OECD Countries." OECD Economics Department Working Papers, No. 1275, OECD Publishing, Paris, https://doi.org/10.1787/5jrp1g3282d7-en.

Sancak, Cemile, Jing Xing, and Ricardo Velloso. 2010. "Tax Revenue Response to the Business Cycle." IMF Working Paper WP/10/71. International Monetary Fund. Washington DC.