

A Mountain of Debt

Navigating the Legacy of the Pandemic

M. Ayhan Kose
Franziska Ohnsorge
Naotaka Sugawara



WORLD BANK GROUP

Prospects Group

October 2021

Abstract

The COVID-19 pandemic has triggered a massive increase in global debt levels and exacerbated the trade-offs between the benefits and costs of accumulating government debt. This paper examines these trade-offs by putting the recent debt boom into a historical context. It reports three major findings. First, during the 2020 global recession, both global government and private debt levels rose to record highs, and at their fastest single-year pace, in five decades. Second, the debt-financed, massive fiscal support programs implemented during the pandemic supported activity and

illustrated the benefits of accumulating debt. However, as the recovery gains traction, the balance of benefits and costs of debt accumulation could increasingly tilt toward costs. Third, more than two-thirds of emerging market and developing economies are currently in government debt booms. On average, the current booms have already lasted three years longer, and are accompanied by a considerably larger fiscal deterioration, than earlier booms. About half of the earlier debt booms were associated with financial crises in emerging market and developing economies.

This paper is a product of the Prospects Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at <http://www.worldbank.org/prwp>. The authors may be contacted at nsugawara@worldbank.org.

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

A Mountain of Debt: Navigating the Legacy of the Pandemic

M. Ayhan Kose, Franziska Ohnsorge, and Naotaka Sugawara*

Keywords: COVID-19; fiscal policy; sovereign debt; private debt; deficits.

JEL Classification: E32, E62, G01, H63.

* Kose: World Bank, Prospects Group; Brookings Institution; CEPR; and CAMA; akose@worldbank.org. Ohnsorge: World Bank, Prospects Group; CEPR; and CAMA; fohnsorge@worldbank.org. Sugawara: World Bank, Prospects Group; nsugawara@worldbank.org. We thank our discussant, Antonio Fatás, for helpful comments at the Workshop on “Sovereign Debt and Development.” We also thank Carlos Arteta, Kevin Gallagher, Indermit Gill, Sergiy Kasyanenko, Ugo Panizza, Brian Pinto, Andrea Presbitero, Justin Sandefur, Mark Weidemaier, and Charles Wyplosz and workshop participants for feedback. Shijie Shi provided excellent research assistance. The findings, interpretations, and conclusions expressed in this paper are those of the authors. They do not necessarily represent the views of the institutions they are affiliated with.

1. Introduction

The COVID-19 pandemic has triggered a massive increase in global debt levels as governments needed to finance the necessary spending to keep economies afloat. In 2020, global government debt increased by 13 percentage points of GDP to a new record of 97 percent of GDP. In advanced economies, it was up by 16 percentage points to 120 percent of GDP and, in emerging market and developing economies (EMDEs), by 9 percentage points to 63 percent of GDP.

Even before the pandemic, however, the global economy had been experiencing an unprecedented wave of debt accumulation that started in 2010. Recent increases in government and private debt stocks render the ongoing global debt wave the largest, fastest, and most broad-based of the four global debt waves since 1970.¹ The rapid increase in debt is a major cause of concern because of potential risks associated with elevated levels of debt, including widespread financial crises that followed previous waves of debt, such as the Latin American debt crises in the 1980s, and the East Asian financial crisis in the late 1990s.

The pandemic has exacerbated the trade-offs between benefits and costs of government debt accumulation, which were widely discussed well before the pandemic (Fatas et al. 2019; Yared 2019). The benefits of accumulating debt were vividly illustrated during the pandemic by the supportive role of large fiscal support programs financed by new debt issuance. As many central banks intervened to provide stimulus and liquidity, global borrowing costs have remained low. Low financing cost, still-large output gaps, and sizable investment needs in many countries make additional, debt-financed government spending an attractive option. However, as the initial recovery from the pandemic gives way to a new normal, the balance of benefits and costs of debt accumulation could increasingly tilt toward costs.

This paper examines the benefits and costs of debt accumulation by putting the recent debt boom into a historical context. Specifically, it addresses the following questions. First, what has been the impact of the COVID-19 pandemic on debt accumulation? Second, what are the potential benefits and costs of debt and how have they evolved since the beginning of the pandemic? Third, how does the current debt boom compare with previous such episodes?

The paper reports three main findings. First, the recent fiscal deterioration in advanced economies and EMDEs stands apart in the experience of the past half-century. Both global government and private debt levels have risen to their highest levels, and at their fastest single-year pace, in five decades. In EMDEs, the accompanying widening of fiscal deficits and

¹ The current wave was preceded by three previous debt waves since the 1970s, all of which ended with widespread financial crises (Kose et al. 2020). The first global wave of debt spanned the 1970s and 1980s, with borrowing by governments in Latin America and in low-income countries, particularly in Sub-Saharan Africa. This wave saw a series of financial crises in the early 1980s. The second wave ran from 1990 until the early 2000s as banks and corporations in East Asia and the Pacific and governments in Europe and Central Asia borrowed heavily, and ended with a series of crises in these regions in 1997-2001. The third wave was a runup in private sector borrowing in Europe and Central Asia (as well as in advanced economies), which ended when the global financial crisis disrupted bank financing in 2007-09 and tipped many economies into sharp recessions.

the speed at which both government and private debt are rising far exceed changes in previous waves of debt.

Second, debt accumulation has both benefits and costs. Benefits include the ability to support economic activity, invest in long-term development needs, and provide safe assets. While the role of debt-financed stimulus was critical in 2020, its importance will likely recede as the recovery gathers momentum. The costs of debt include interest payments, the possibility of debt distress, constraints that debt may impose on policy space and effectiveness, and the possible crowding out of private sector investment. As the recovery strengthens, the prospect of tightening financial conditions increases the possibility of financial stress. Depreciations or rising borrowing cost may further erode fiscal sustainability.

Third, more than two-thirds of EMDEs are currently in a rapid government debt accumulation episode (“debt boom”). In EMDEs, the median government debt boom currently underway is similar in magnitude to, but has already lasted three years longer than, the median past debt boom. Current booms have been accompanied by a considerably larger fiscal deterioration than past booms. Booms currently underway have also been associated with slower output, investment, and consumption growth than in previous episodes. Historically, about half of such booms in EMDEs were associated with financial crises either during the boom itself or in the two years after the end of the boom. Government debt booms associated with financial crises featured significantly weaker macroeconomic outcomes than booms without crises.

The contribution of this paper to the literature is threefold. First, it discusses benefits and costs of debt in the current context and from the perspective of EMDEs. The earlier literature mainly presents this cost-benefit discussion in the context of advanced economies, particularly the United States (Blanchard 2019; Furman and Summers 2019). Some have argued that low interest rates allow advanced economies to accumulate debt and undertake fiscal expansion.² Many EMDEs have borrowed heavily, taking advantage of historically low global interest rates over the past decade. However, the trade-offs EMDEs face are starker than those faced by advanced economies, in light of EMDEs’ history of severe debt crises and their more pressing spending needs to deliver stronger growth and achieve development goals (Vorisek and Yu 2020).

The second contribution is that, in examining debt sustainability, this paper goes beyond the simple discussion of interest rate-growth differentials. It uses a metric of sustainability gaps that depend on fiscal balances, long-term interest rates as well as output growth (Kose et al. 2017). Debt is not sustainable—despite interest rates being below output growth—if new debt accumulation is rapid, that is, primary deficits are large. The trade-off between primary deficits and the interest rate-growth differential is captured in the sustainability gap, which measures the difference between the actual primary balance and the debt-stabilizing one. Historically, the interest rate-growth differential was debt-reducing (i.e., negative) in more

² Some emphasize the merits of additional borrowing, mostly in the context of the United States: Blanchard (2019); Blanchard and Summers (2019); Eichengreen (2019); Furman and Summers (2019); and Krugman (2019). Other authors, however, argue that there are risks involved when governments undertake debt financed spending programs even with low interest rates (Kose et al. 2020; Lian, Presbitero, and Wiriadinata 2020; Mauro and Zhu 2021).

than one-half of country-year pairs among 83 EMDEs during 1990-2020, but in about one-quarter of these cases government debt was nevertheless on a rising path due to large primary deficits.

The third contribution of this paper is to illustrate the unique features of the ongoing debt booms in comparison with earlier episodes and the sheer scale of the fiscal deterioration since the pandemic, which dwarfs the experience during previous debt accumulation episodes. As a result of output collapses and fiscal stimulus measures, fiscal deficits have soared in advanced economies and EMDEs alike. Notwithstanding low interest rates, debt sustainability has deteriorated far more than in previous debt booms over the past half-century.

Section 2, as backdrop, reviews the evolution of debt and fiscal positions in EMDEs over the past decade. Section 3 reviews the literature related to the costs and benefits of debt, documents the evolutions of sustainability gaps, and analyzes their implications for the current juncture. Section 4 examines lessons from past debt booms for those debt booms that are currently underway. Finally, Section 5 concludes.

2. Impact of COVID-19 on debt

The global economy has been experiencing a new wave of debt accumulation since 2010. Recent increases in government and private debt stocks render the current global debt wave the largest, fastest, and most broad-based of all the four global debt waves since 1970 (Table 1; Kose et al. 2020). In the current debt wave, stocks of total, government, and private debt globally, in advanced economies, and in EMDEs reached their highest level on record (except EMDE government debt, which in 2020 reached its highest level in any year other than 1987). We briefly explain the magnitude, drivers, and composition of debt accumulation in the current wave with special attention to developments since the pandemic-induced global recession of 2020.

Prior to the pandemic-induced global recession of 2020. Following almost a decade of government debt reduction, debt rose sharply after the 2007-09 global financial crisis. In the largest, fastest, and most broad-based of the four waves of global debt since 1970, global government debt rose to a 50-year high of 84 percent of GDP before the COVID-19 pandemic, in 2019 (Figure 1, Table 2; Kose et al. 2020). By 2019, advanced-economy government debt was still higher than in all but three years since 1970. EMDE government debt had reached its highest level since 1993 and was up by a large amount (more than 20 percentage points of GDP) in more than one-third of EMDEs.

2020. The pandemic-induced recession of 2020 has led to a further sharp increase in government debt as governments needed to finance the necessary spending to keep economies afloat. In 2020, global government debt increased to a new record of 97 percent of GDP. In advanced economies, it rose by 16 percentage points of GDP to 120 percent of GDP and, in EMDEs, by 9 percentage points of GDP to 63 percent of GDP. These were the largest single-year increases since 1970 and since 1987, respectively, in advanced economies and EMDEs. The debt surge was broad-based: 2020 featured the largest single-year government debt increases on record for almost one-quarter of countries and one of the three largest single-year increases on record in almost one-half of countries.

As a result of these developments, by 2020, global government debt was, on average, 20 percentage points of GDP higher than in 2010. The deterioration was broad-based: government debt had risen in 85 percent of countries (76 percent of advanced economies and 87 percent of EMDEs), and risen by a large amount, more than 20 percentage points of GDP, in more than half of countries (more than one-third of advanced economies and more than one-half of EMDEs; Table S1 in the Supplementary Appendix).

Drivers of debt accumulation. The increase in government debt in 2020 reflected both output collapses and sharp deteriorations in primary fiscal balances. On average, global primary fiscal deficits widened by 7 percentage points of GDP, to 9 percent of GDP—the steepest single-year deterioration in the past four decades (Table 3). The deterioration was broad-based, affecting more than 80 percent of advanced economies and EMDEs, but particularly pronounced in advanced economies where primary deficits widened to 10 percent of GDP—considerably more than in EMDEs. They reflected severe revenue losses amid a deep recession as well as large-scale fiscal stimulus packages. By comparison, the contribution of the output collapse to the government debt buildup in 2020 was less than half of that of large primary fiscal deficits, in advanced economies and EMDEs alike.

EMDE commodity exporters. Some of the sharpest increases in debt and deteriorations in fiscal balances occurred among EMDE commodity exporters. Government debt was up by 20 percentage of GDP or more since 2010 in almost two-thirds of commodity-exporting EMDEs, compared with less than one-half of other EMDEs (Table S1 in the Supplementary Appendix).³ In 2020, primary deficits widened by one-third more in commodity-exporting EMDEs than in other EMDEs. Energy-exporting EMDEs rely heavily on fiscal revenues from the resource sector, and the 2014-16 plunge in oil prices forced some of them into severe fiscal adjustment. For oil and gas exporters, the deep global recession of 2020 coincided with a record, although short-lived, plunge in oil prices (Kabundi and Ohnsorge 2020). Among the 10 EMDEs with the largest government debt buildups over 2010-20, all but one were commodity exporters.

Composition of government debt. In many EMDEs, the composition of government debt has tilted toward higher-risk characteristics, including debt held by nonresidents, issued on non-concessional terms, or at shorter maturity (Table 4). EMDE debt held by nonresidents and denominated in foreign currency accounted for more than 40 percent of EMDE government debt in 2020, making them vulnerable to a deterioration in global investor sentiment and exchange rate risk. Sovereign ratings have been downgraded for about 60 percent of EMDEs since 2010 and, since end-April 2021, about one-half of low-income countries (LICs) have been classified as being at high risk of debt distress or already in debt distress. The composition of LIC debt has become increasingly non-concessional over the past decade as they have accessed capital markets and borrowed from non-Paris Club creditors (World Bank 2018a).

Private debt accumulation. Record-high government debt in EMDEs is being accompanied by record-high private debt, even in EMDEs other than China. Private debt in EMDEs rose by 16 percentage points of GDP to 142 percent of GDP in 2020—with both the level in 2020

³ In a median EMDE commodity exporter, government debt increased 7 percentage points of GDP more than in a median EMDE commodity importer over 2010-20.

and its single-year increase being unprecedented in the past four decades—as monetary stimulus supported credit extension while revenues fell sharply in the pandemic-induced output collapse. As a result, total debt—consisting of government and private debt—in EMDEs rose to 206 percent of GDP, on average, in 2020, from 118 percent of GDP in 2010 and its highest level in five decades (Figure 2, Table 2; Aldosoro, Hardy, and Tarashev 2021; Avdjiev, McGuire, and von Peter 2020; Borensztein and Ye 2018).⁴ Much of that increase reflected soaring corporate debt in China. However, even in EMDEs excluding China, total debt rose to 137 percent of GDP in 2020, from 96 percent of GDP in 2010. In 2020, private debt accounted for more than half of total debt in EMDEs excluding China and around 17 percent of total debt in LICs.

3. Potential benefits and costs of debt

Fiscal support programs during the 2020 global recession were a critical policy response to avoid worse economic outcomes. They supported household incomes, kept businesses afloat, and helped stabilize financial markets. Until the recovery from the recession is firmly entrenched, fiscal support needed to be maintained, to varying degrees, in many countries, implying that debt accumulation may continue to finance support programs. However, the rapid increase in government debt, its shift toward a more fragile composition, and the rise of potential contingent liabilities from private debt over the past decade raise concerns that are now magnified by record increases in debt levels to finance such fiscal support.

Beyond its role during the recent global recession, debt accumulation has benefits as well as costs. Potential benefits of debt accumulation include funding growth-enhancing projects (e.g., infrastructure, health, and education) and programs to protect vulnerable groups; stabilizing short-term macroeconomic fluctuations by supporting activity; and serving as a safe asset. Potential costs of debt accumulation are servicing the cost of debt (the interest to be paid to creditors); rollover costs (the costs of refinancing when debt matures); limiting the magnitude and effectiveness of fiscal policy; and crowding out private investment.

As the recovery from the pandemic-induced recession gives way to a new normal, the balance of benefits and costs is likely to increasingly tilt toward costs. As the global economy strengthens, financial conditions are likely to tighten, whether because central banks begin to normalize monetary policy or because investors expect higher inflation. In EMDEs, this may be accompanied by depreciations that put pressure on debt sustainability in those countries with a large share of foreign currency-denominated debt. Even where foreign currency-denominated debt is limited, rising borrowing cost may erode debt sustainability, especially if growth fails to rebound strongly. Record-high EMDE debt makes countries vulnerable to financial market stress. Meanwhile, a recovery in domestic demand and closing output gaps may make additional fiscal stimulus unhelpful.

We now provide a brief discussion of these potential benefits and costs of debt and put them into the current context.

⁴ Total EMDE debt is defined as the sum of EMDE government debt (the GDP-weighted average for 152 EMDEs in 2020) and EMDE private debt (the GDP-weighted average for 128 EMDEs in 2020—private debt data are available on a quarterly basis, and in some countries, data as of Q3 are used).

3.1. Benefits of debt

3.1.1 Promoting long-term growth

Government investment in physical and human capital can provide an important foundation for stronger growth over the long term and for achieving development goals. Sustained robust growth is the foundation of long-term poverty reduction. Since potential growth—the rate of growth an economy can sustain at full employment and capacity—is expected to slow further over the next decade, there is now greater urgency to deploy additional investment (World Bank 2018b). Investment can raise potential growth directly and indirectly. The direct channel is capital accumulation, which lifts labor productivity and potential output. Indirectly, investment can raise total factor productivity because of technological improvements embedded in investment.⁵

EMDEs have large investment needs to meet development goals and improve living standards. Several studies estimate the cost of investment needed to achieve the Sustainable Development Goals (SDGs). Rozenberg and Fay (2019) find that low- and middle-income countries face aggregate investment needs of \$1.5 trillion to \$2.7 trillion per year—equivalent to 4.5 to 8.2 percent of GDP—between 2015 and 2030 to meet infrastructure-related SDGs. Their cost estimates depend on policy choices, highlighting the importance of spending efficiency (i.e., the quality of spending) in achieving such goals.⁶

At the current juncture, debt accumulation may well be necessary to limit the long-term damage caused by the pandemic. The pandemic has disrupted the education of about 90 percent of the world’s children; it caused a plunge in investment that exceeded that during the global financial crisis; and it exposed severe underinvestment in health care systems in many countries (World Bank 2021). Years of sustained investment in education and health care systems as well as physical infrastructure will likely be needed to undo this damage.

3.1.2. Stabilizing short-term macroeconomic fluctuations

Temporary debt accumulation also plays an important role in stabilizing short-term macroeconomic fluctuations. During recessions, borrowing for government spending or tax cuts can provide the necessary fiscal stimulus to support activity (Yared 2019). However, the effectiveness of such stimulus policies depends on fiscal multipliers—the output effects of additional government spending or tax cuts (Huidrom et al. 2020; Ramey 2019).

A large literature estimates fiscal multipliers and documents that multipliers vary widely, depending on circumstances. They range from a 1.1-dollar output decline to a 3.8-dollar output increase for every dollar of additional government spending or reduced revenues. The

⁵ For example, using a panel of OECD countries, Fournier (2016) shows that a 1-percentage-point increase in the share of public investment in expenditure is associated with an increase in long-term output by 5 percent. The study also documents that public investment is more growth-enhancing in areas with large externalities, such as health and research and development. To the extent that debt-financed investment spending stems the slowdown in potential growth, it helps preserve the revenues required to service this debt (Fatas et al. 2019).

⁶ Infrastructure investment can have particularly large growth benefits if it connects isolated communities with input and output markets, allows companies to realize economies of scale by increasing market size, and increases competitive pressures (Calderón and Servén 2010; Égert, Kozluk, and Sutherland 2009).

results depend on the cyclical position of the economy; country characteristics, including the coherence of fiscal frameworks; and the fiscal instrument employed. Specifically, fiscal multipliers are larger in recessions than in expansions, in advanced economies than in EMDEs, and during crises than during non-crisis periods.

In EMDEs, lack of fiscal space has often constrained fiscal support during recessions, but there is some evidence that fiscal policy has become less procyclical during the 2000s (Frankel, Vegh, and Vuletin 2013; Vegh, Lederman, and Bennett 2017). The correlation between cyclical swings in output and government consumption, for example, has turned from positive (procyclical) before the global financial crisis to negative (countercyclical) after the crisis. In advanced economies, proactive fiscal policy has gained in importance in the past decade, at least potentially, as monetary policy interest rates have approached or breached the zero lower bound (Battistini, Callegari, and Zavalloni 2019).

During the COVID-19 pandemic, advanced economies implemented fiscal support on the order of 20 percent of GDP, while EMDEs implemented support on the order of 6 percent of GDP—10 and four times, respectively, the stimulus implemented during the 2007-09 global financial crisis. Large-scale monetary policy accommodation by major central banks lowered international borrowing cost to record lows and facilitated market access for most borrowers. As a result, both EMDEs with above-median and below-median government debt were able to implement similar fiscal support packages. These fiscal and monetary policy support measures were critical in dampening the impact of the pandemic.

3.1.3. Providing safe assets

Sovereign debt constitutes a safe asset for investors, as an alternative to private debt whose issuers may default (Azzimonti and Yared 2019). When risk aversion rises, demand for safe assets increases while borrowing constraints on private borrowers tighten. In these circumstances, an accumulation of government debt, if redistributed to private households or corporates, can ease financing constraints (Yared 2019). As the safe asset that benchmarks private borrowing cost and can be used for collateral, government debt can also play an important role in financial deepening (Hauner 2009). Finally, the availability of government debt instruments is the prerequisite for monetary policy operations that rely on repurchase agreements of safe assets.

The large fiscal deficits opened by the COVID-19 pandemic generated a surge in bond issuance in both advanced economies and EMDEs. The stock of government securities rose significantly between end-2019 and end-2020. These relatively safe assets, however, were partly absorbed by central banks, which injected liquidity through asset purchases. In EMDEs, these purchases were limited in scale (World Bank 2021); in advanced economies, however, the share of central bank holdings of government debt rose by 6 percentage points in 2020.

3.2 Costs associated with debt

3.2.1. Deteriorating debt sustainability

Over the past decade, the cost of government borrowing has remained historically low, for both advanced economies and EMDEs (Supplementary Appendix Figure S1). Looking ahead, demographic shifts and slowing productivity growth are expected to contribute to a further

secular decline in real interest rates in advanced economies, continuing a multi-year trend (Ferrero, Gross, and Neri 2019; Holston, Laubach, and Williams 2017).

However, an increase in borrowing cost, for example because of a decline in global savings rates, could test the sustainability of elevated debt levels in some countries (Henderson 2019; Rogoff 2019a, 2019b). One-standard-deviation jumps in borrowing cost from the previous year are rare in government bond markets, but such hikes tend to be associated with economic downturns, especially in advanced economies. High-debt countries were particularly vulnerable to such jumps in borrowing cost: the majority of these jumps happened in advanced economies or EMDEs with debt above the group median.

Much of the discussion on debt in recent years has focused on the differential between interest rates and GDP growth. If interest rates (the cost of capital) are below output growth (the presumed rate of return on capital), then the real burden of the debt declines over time because the rate of return on debt-financed investment is more than sufficient to service the debt. Mostly in the context of advanced economies, some have argued that low interest rates allowed room for fiscal expansion, even before the pandemic hit (Blanchard 2019; Eichengreen 2019; Furman and Summers 2019; Krugman 2019; Rachel and Summers 2019).

Other authors, however, called for caution (Kose et al. 2020; Lian, Presbitero, and Wiriadinata 2020; Mauro and Zhu 2021). In particular, the interest rate-growth differential has to be weighed against the pace of new debt accumulation—the primary fiscal deficit. If, every year, primary deficits add more to the debt than is repaid on past debt (even if high rates of return are more than sufficient to service past debt), then the debt stock remains on a rising trajectory. In addition, elevated debt levels tend to be associated with a higher likelihood of the interest rate-growth differential deteriorating.

The sustainability of government debt, considering both interest rate-growth differentials and fiscal balances, can be captured by sustainability gaps. Sustainability gaps compare a country’s fiscal balance with the balance that stabilizes government debt at a target level under different assumptions of output growth and long-term interest rates (Buckle and Cruickshank 2013; Escolano 2010; Ley 2009). For example, the debt burden generated by sustained fiscal deficits would be easier to service if interest rates are lower and growth is stronger. The sustainability gap provides a simple snapshot of the adjustments that may be needed to reach debt targets under different macroeconomic conditions. The primary balance sustainability gap (*pbsusgap*) can be calculated with the following equation:

$$pbsusgap_{c,t} = p_{c,t} - \left(\frac{i_{c,t} - \gamma_{c,t}}{1 + \gamma_{c,t}} \right) d^*,$$

where $p_{c,t}$ is the primary balance (in percent of GDP) in country c in year t , i is the nominal long-term bond yield (with a 10-year or close maturity) in local currency, γ is nominal GDP growth in local currency, and d^* refers to the target debt ratio (in percent of GDP)—this is what is defined as the sustainability gap under *current conditions* (Kose et al. 2017).

The target debt ratio, d^* , is defined as the historical median in an economy’s peer group (advanced economies or EMDEs). Implicitly, compared with benchmarking against each

economy’s own historical median, this approach implies a more favorable debt target in economies with debt below the peer-group median and less favorable debt target in economies with debt above the peer-group median. The target (and median) debt ratios for advanced economies and EMDEs are, respectively, 55 percent of GDP and 45 percent of GDP.

Sustainability gaps illustrate the relative role of interest rate-growth differentials and the pace of new debt accumulation (Table 5). During 1990-2020, the interest rate-growth differential was negative in more than one-half (55 percent) of country-year pairs (52 percent of country-year pairs among 34 advanced economies and 57 percent of country-year pairs among 83 EMDEs). However, even in about one-quarter of these instances, the differential was not large enough to offset the increase in debt from new debt accumulation. As a result, during 1990-2020, primary balances, long-term interest rates and nominal GDP growth have been such that debt has been on a steadily rising trajectory in about half of the cases—in 46 percent of country-year pairs among advanced economies and 53 percent of country-year pairs among EMDEs. The findings echo the study by Wyplosz (2019) who finds that, when interest rates fall below output growth, debt falls in only one-half of his sample of OECD countries.

Despite low interest rates, and partly as a result of deep output contractions, debt sustainability in 2020 deteriorated sharply in advanced economies as well as EMDEs. In 2020, government debt was on a rising trajectory in almost all countries. In advanced economies, where fiscal positions had turned debt-reducing in 2017, they were now such that the positions would need to be improved by 13 percentage points of GDP to stabilize debt at current interest rates and growth rates (Figure 3). In the United States, the calculation suggests that an improvement of 16 percentage points of GDP would be required to stabilize government debt. In EMDEs, a fiscal consolidation of around 10 percent of GDP would now be required to stabilize debt. These sustainability calculations do not yet take into account the possibility that interest rates themselves may depend on the level of debt. Lian, Presbitero, and Wiradinata (2020) show that countries with elevated debt levels tend to have higher interest rate-growth differentials that deteriorate faster in response to shocks than in countries with low debt.

3.2.2. Increasing vulnerability to financial crises

A growing debt-to-GDP ratio could erode investor confidence, requiring the government to pay a rising risk premium on its debt. These pressures could culminate in a debt crisis if investors fear that the accumulation of government debt is no longer sustainable. Rapid debt accumulation can also lead to a currency crisis if investor concerns about the ability to repay foreign currency-denominated debt spark a speculative attack on a fixed or pegged currency (Krugman 1979; Obstfeld and Rogoff 1986), or a banking crisis if private sector balance sheet vulnerabilities trigger banking panics (Chang and Velasco 2000; Krugman 1999).

While the increase in private debt in EMDEs over the past decade partly reflects financial deepening that is associated with growth acceleration, elevated private debt represents a fiscal risk. Past experience illustrates that private sector debt may shift onto government balance sheets during financial crises, such as banking crises, as governments provide support to private institutions and guarantee their liabilities in difficulty. For example, government debt rose by more than 30 percentage points of GDP in Indonesia and Thailand during the East

Asian financial crisis in the late 1990s as governments absorbed private sector debt into public sector balance sheets. Some advanced economies also experienced a hike in government debt during banking crises in their economies, including Ireland and Latvia in 2008. Indeed, many episodes of sovereign debt distress were accompanied by currency or banking crises.⁷

Spikes in borrowing cost on debt concerns are a greater risk for EMDEs than for advanced economies. For reserve currency-issuing advanced economies, like the United States, a spike in risk premia is less likely, since these countries are often viewed as safe havens during periods of market turbulence (Furman and Summers 2019; Krugman 2014). Indeed, government debt in some advanced economies has reached record levels with interest rates remaining low. The extreme case is Japan, where the 10-year government bond yield has been below 0.1 percent for most of the time since mid-2015 even while gross government debt has exceeded 230 percent of GDP. For EMDEs, however, the risk of spikes in borrowing cost is more acute. During episodes of financial stress, EMDE borrowing costs can rise sharply, and higher debt servicing costs can cause debt ratios and debt dynamics to deteriorate and rollover risk to rise.⁸ Any number of shocks, ranging from credit downgrades in individual EMDEs to monetary policy decisions in major advanced economies, could trigger bouts of financial stress or rising borrowing cost (Claessens and Kose 2014; Arteta et al. 2015).

Financial crises tend to result in large economic costs with substantial effects on economic activity. Many recessions follow from financial crises, and financial crises often tend to make these recessions worse than a “normal” business cycle recession (Claessens, Kose, and Terrones 2012). The average duration of a recession associated with a financial crisis is six quarters, two more than a normal recession. There is also typically a larger output decline in recessions associated with crises than in other recessions.

In 2020, worse output losses have been pre-empted, and a financial crisis was averted, by unprecedented fiscal and monetary policy stimulus. In March-April 2020, the global economy was on the brink of a financial crisis as borrowing spreads rose, safe haven flows put pressures on EMDE financial markets, and equity prices plunged. However, the pro-active policy response was in part a reflection of one of the lessons from the global financial crisis, when it became clear that prompt and large policy stimulus can dampen output losses (Kose and Ohnsorge 2019). That said, record-high debt and a sizable share of foreign currency-denominated, short-term, or non-concessional debt now increase EMDEs’ vulnerability to financial stress.

3.2.3. Constraining government action during downturns

High debt constrains governments’ ability to respond to downturns with countercyclical fiscal policy (Reinhart and Rogoff 2009, 2010; Romer and Romer 2018). This was the case during the global financial crisis: fiscal stimulus during 2008-09 was considerably smaller in countries

⁷ Including consecutive cases, there were 151 banking crises, 248 currency crises, and 80 debt crises over 1970-2020. The various types of crises can also overlap. Currency crises frequently overlap with banking crises, the so-called twin crises (Kaminsky and Reinhart 1999). In addition, debt crises can overlap with currency and balance of payments crises (Claessens and Kose 2014).

⁸ For discussions of changes in the cost of borrowing, see Arellano and Ramanarayanan (2012); Broner, Lorenzoni, and Schmukler (2013); and Mauro and Zhu (2021).

with high government debt than in those with low debt (World Bank 2015). In 2020, in part because of massive monetary policy accommodation by advanced-economy central banks, such a divergence was not evident: fiscal support packages were similar in countries with higher and lower debt (see discussion above).

Not only the size but the effectiveness of fiscal policy could be constrained when governments face high debt levels. Empirical evidence suggests that fiscal multipliers are smaller when government debt is higher or fiscal positions are weaker, whether defined in terms of debt or deficits (Huidrom et al. 2020; Ilzetzki, Mendoza, and Vegh 2013).

3.2.4. Slowing growth of output and investment

Higher debt typically comes with higher debt service. Since 2014, long-term interest rates for EMDEs have declined but their interest payments have risen (Figure 4). In commodity-exporting EMDEs, interest payments, as well as interest rates, surged around 2015 as these economies rapidly accumulated debt to buffer the impact of a steep plunge in commodity prices (Supplementary Appendix Figure S2; Baffes et al. 2015). After the spike, a gradual decline in interest payments has been accompanied by an upward trend in long-term interest rates.

Spending on higher debt service needs to be financed through some combination of increased borrowing, increased taxes, and reduced government spending. Spending cuts may even include spending on critical government functions such as social safety nets or growth-enhancing public investment (Debrun and Kinda 2016; Obstfeld 2013; Reinhart and Rogoff 2010).

High debt could also weigh on growth because it is a source of uncertainty about macroeconomic and policy prospects (Lo and Rogoff 2015). This includes risks that the government may need to resort to distortionary taxation to rein in debt and deficits. Higher interest rates and uncertainty would tend to crowd out productivity-enhancing private investment and weigh on output growth. Crowding-out of private investment due to high public debt is documented in Huang, Pagano, and Panizza (2020), and with data for China, and Panizza, Huang, and Varghese (2018), with firm- and industry-level data across 69 countries.

4. Understanding debt booms

The costs associated with debt are often amplified by financial crises triggered by rapid debt accumulation as discussed in the previous section. This section presents an empirical analysis of the evolution of macroeconomic outcomes and fiscal positions during rapid government debt accumulation episodes—“debt booms”—over the past five decades. Many countries have been experiencing debt booms over the past decade, making the current global debt wave the largest, fastest, and most synchronized one of the past five decades. We also compare the features of the ongoing debt booms with those of the past episodes.

A debt boom is defined as a period during which the government debt-to-GDP ratio rises from trough to peak of the episode by more than the maximum of ten-year rolling standard deviations during the episode. This identification approach for debt booms follows Kose et al.

(2020) and is similar to methods used to date the turning points of business and financial cycles.⁹ The beginning of the episode is defined as the trough of the government debt-to-GDP ratio, based on the algorithm in Harding and Pagan (2002); the end of the episode is defined as the peak of the government debt-to-GDP ratio.

4.1 Features of debt booms

We identified 493 debt booms in 176 countries since 1970, including 390 episodes in 139 EMDEs. About one-quarter of these booms (118 episodes) were still underway in 2020. On average, a typical country—in the groups of advanced economies and EMDEs alike—had three government debt booms during 1970-2020, although some experienced up to five debt booms.

A typical debt boom lasted about 7 years and led to an increase of 30 percentage points in the ratio of government debt to GDP (Table 6). Debt buildups and their speed were statistically significantly larger in EMDEs than in advanced economies during these episodes, but varied more in EMDEs than in advanced economies. Ongoing debt booms tend to be longer than those that were completed prior to 2020, and among completed debt booms, the amplitude and duration in episodes ending after 2001 were smaller and shorter, respectively, than booms that ended before 2001.¹⁰

An increase in debt-to-GDP ratios during debt booms mostly reflected nominal debt buildups rather than changes in output. In all episodes, nominal government debt in local currency increased from the beginning to the end of debt booms and, in booms with financial crises, nominal debt in local currency grew by roughly 380 percentage points more than in booms without financial crises. Over the full course of the booms, nominal output declined only in 8 percent of the booms (41 episodes) and, of these, around one-third were associated with financial crises.

4.2. Fiscal positions during debt booms

Fiscal positions deteriorated markedly over the course of government debt booms (Table 7). The median government debt boom started with a primary balance surplus, debt on a declining path (with a positive sustainability gap), and a negative interest rate-growth differential. In EMDEs, short-term debt accounted for about 3 percent of GDP, about 41 percent of government debt was foreign currency-denominated, and nonresidents held about 35 percent of government debt.

⁹ For details of similar approaches, see Claessens, Kose, and Terrones (2012) and Mendoza and Terrones (2012). The headline results are robust to using a definition more closely aligned with the literature on credit booms. Episodes are required to have a minimum duration of five years from one peak to the next and two years from trough to peak and peak to trough. Episodes at the beginning and end of the data series are similarly classified, but the beginning and end of episodes are set at the points where the availability of government and private debt data begins and ends.

¹⁰ Features of debt booms based on private debt and total debt (defined as the sum of government and private debt) are included in Tables S2 and S3 in the Supplementary Appendix. In these types of debt booms, the amplitude is larger in advanced economies than in EMDEs, but other characteristics, such as larger changes in debt in booms associated with crises and longer durations of ongoing booms, especially in total debt, are similar to those of government debt booms.

However, over the course of the median government debt boom, these indicators of fiscal sustainability and balance sheet resilience deteriorated. Primary balances worsened by 0.5 percentage point per year. Primary surpluses turned into deficits over the median government debt boom. Similarly, debt-reducing sustainability gaps turned into debt-increasing ones, and interest rate-growth differentials turned from negative at the start of debt booms into positive ones. In EMDEs, the share of foreign currency-denominated and nonresident-held government debt rose and short-term debt increased (Supplementary Appendix Table S4).

4.3. Debt booms relative to non-boom years

A panel regression using dummy variables allows us to gauge the statistical significance of any difference between periods around debt booms and years that are not related to debt booms. The panel regression runs indicators of fiscal positions or macroeconomic outcomes on a dummy variable for each year of the debt boom.

The estimated model is:

$$y_{c,t} = \alpha_c + \sum_{j=-p}^p \beta_j boom_{c,t+j} + C + \varepsilon_{c,t},$$

where $y_{c,t}$ is each of indicators of fiscal positions or macroeconomic outcomes in country c , year t , and α_c is the country-fixed effects. The variable, $boom$, refers to government debt booms and is a dummy variable taking the value of one if a boom starts in country c , year $t+j$. C is a vector of control variables, including population (in logs), the level of development (i.e., real per capita GDP in U.S. dollars in logs), and a dummy variable for the occurrence of financial crises. ε is an error term. A series of coefficients, β , show the effects of debt booms over $(2p + 1)$ years, relative to other “non-boom-related” years, where p is the number of pre-boom and post-boom years included.¹¹ Here, we use $p = 5$, implying that the estimation covers 11-year windows.

The results suggest that primary balances and sustainability gaps are significantly weaker during debt booms than in “non-boom” years, and the difference widens over the first few years of a typical debt boom (Table 8). For example, in the first three years after the start of a debt boom, primary balances are 4 percentage points of GDP lower than in non-boom years. Meanwhile, debt booms are preceded by five years of significantly lower interest rate-growth differentials than otherwise but these differentials turn significantly higher by the second year of the debt boom. Meanwhile, the balance sheet composition mostly did not differ materially between boom years and non-boom years, with the exception of initially lower foreign currency-denominated and nonresident-held shares of debt (Supplementary Appendix Table S5). During the first three years of the boom, output growth is statistically significantly weaker than outside boom years, in a reversal from the above-normal growth in the runup to the boom.

¹¹ As dummy variables for years before the beginning of debt booms are included, the term “non-boom-related” is used to refer to years when all dummy variables have the value of zero. The term “non-boom” is also used interchangeably.

4.4. Debt booms and financial crises

About 50 percent of the EMDE government debt booms that were completed before 2020 were accompanied by a financial crisis either during the boom itself or within the two years after the end of the boom.¹² A smaller fraction (34 percent) of advanced-economy debt booms were accompanied by crises. Debt booms that were associated with financial crises were accompanied by more than twice the government debt buildup, at twice the speed (defined as the ratio of the amplitude to the duration), of that during debt booms without financial crises.

The fiscal positions at the beginning of debt booms with crises were stronger, especially in advanced economies, but their deterioration over the course of the boom was more pronounced, than in debt booms without crises (Table 9). In EMDEs, despite significantly wider primary deficits, debt booms with crises started with somewhat more strongly debt-reducing sustainability gaps because interest rate-growth differentials were considerably more negative. The composition of debt was somewhat more resilient with a smaller share of nonresident-held debt in debt booms without crises (Supplementary Appendix Table S6).

Over the course of EMDE debt booms, sustainability gaps worsened in debt booms with and without crises, but for somewhat different reasons: in debt booms without crises, primary balances deteriorated sharply, whereas in debt booms with crises, when financing conditions typically deteriorate sharply, interest rate-growth differentials rose steeply. Meanwhile, in both advanced economies and EMDEs, the share of foreign currency-denominated or nonresident-held debt rose more over the course of debt booms without crises than those with crises, although the differences are not statistically significant.

Growth fell especially short in those debt booms that were associated with financial crises, and their differences from growth in debt booms without crises are highly significant.¹³ Output growth in EMDEs was 2.3 percent in debt booms with crises, but, in those without crises, it was 2.9 percent. In advanced economies, output growth was near-zero over the course of the booms with crises, 2.1 percentage points lower than in booms without crises. Government debt booms with crises were also accompanied by statistically significantly weaker investment growth than booms without crises.

4.5. Ongoing debt booms in historical context

Government debt booms that are currently underway have already lasted longer than those that were completed before the pandemic brought the global economy to a standstill in 2020 (Table 6). In the case of EMDEs, the difference in the duration is statistically significant between completed debt booms and ongoing ones.

¹² Financial crises are defined as in Laeven and Valencia (2020) as currency crises (updated to 2020), debt crises, or banking crises.

¹³ Kose et al. (2020) also find that macroeconomic outcomes are statistically significantly weaker in government debt booms with financial crises than those without crises. Their study focused on showing cumulative changes in levels of macroeconomic variables eight years following the beginning of boom episodes.

While there are no statistically significant differences in the initial positions in debt sustainability between the debt booms currently underway and the completed booms, the ongoing booms have featured a much steeper deterioration in primary balances and sustainability gaps (Table 10). This has reflected larger increases in interest rate-growth differentials, specifically larger declines in growth rates, than in past booms. The ongoing booms have tended to start with more fragile balance sheets in EMDEs (despite insignificant differences), but the deterioration in balance sheet composition has thus far been no worse than in past booms (Supplementary Appendix Table S6).

The macroeconomic performance of economies that are currently undergoing debt booms has tended to be significantly weaker than that in the completed booms. Output growth in ongoing booms has averaged 1.3 percent–1.1 percentage point lower than in past debt booms. For investment growth, this difference has been even more pronounced.¹⁴

5. Conclusion

Even before the pandemic, the global economy had been experiencing the largest, fastest, and most synchronized wave of debt accumulation since 1970. In light of potential costs associated with rapid debt accumulation, the debt buildup over the past decade had raised concerns about its sustainability and the possibility of a financial crisis. The trade-off between benefits and costs of accumulating debt may increasingly be tilting towards costs now. The deterioration in fiscal balances and increase in debt during the pandemic-induced global recession in 2020 far exceeded those in previous recessions or debt booms over the past five decades, in line with an unprecedented output collapse and associated fiscal response.

While this deterioration was necessary and once again showed an important beneficial role of debt accumulation during the global recession, it exacerbates the risks associated with elevated government debt levels. High debt constrains policy makers' ability to support their economies through future shocks and makes countries vulnerable to financial market disruptions. Indeed, during past sovereign debt crises, fiscal deficits tightened sharply and, yet, this tightening was not accompanied by significantly improved fiscal sustainability.

More than two-thirds of EMDEs are currently experiencing a government debt boom. Ongoing government debt booms have been longer than booms that ended before the pandemic. Macroeconomic outcomes have been weaker in booms currently underway and fiscal balances and sustainability gaps have deteriorated more in comparison with earlier such episodes. Half of such debt booms in EMDEs ended in financial crises in the past. Historical booms suggest that macroeconomic outcomes, including output, investment, and consumption growth, are significantly weaker when debt booms are associated with financial crises.

Debt is likely to rise further as governments and central banks continue supporting the recovery. Policy makers need to act to prevent liquidity constraints from derailing the recovery in activity and to provide space to assess debt sustainability, as well as to consider

¹⁴ When data for 2020 are excluded from the calculation for ongoing booms, macroeconomic outcomes for EMDEs tend to be significantly stronger than in previous booms. In addition, changes in debt sustainability are no longer statistically significant, unlike those based on ongoing booms including 2020. These results highlight the large negative impact of the COVID-19 pandemic on debt dynamics.

the best approaches to resolving debt if it becomes unsustainable. EMDE governments need to put in place mechanisms and institutions that help them strike a careful balance between taking advantage of the present low interest rate environment and avoiding the risks posed by excessive debt accumulation. As the post-pandemic recovery gives way to a new normal, the balance of benefits and costs of debt accumulation may likely tilt towards cost. In particular, record-high debt makes EMDEs vulnerable to financial market stress.

For many EMDEs, containing the potential risks associated with accumulating debt may mean resorting to alternatives for borrowing, including better spending and revenue policies, in an improved institutional environment. Spending can be shifted toward areas that lay the foundation for future growth, including education and health spending as well as climate-smart investment to strengthen economic resilience. Government revenue bases can be broadened by removing special exemptions and strengthening tax administration (Gaspar, Ralyea, and Ture 2019). Business climates and institutions can be strengthened to support vibrant private sector growth that can yield productivity gains and expand the revenue base.

Several directions of future research would be useful. First, rapid growth would likely be the most benign option to resolve debt—provided it can be engineered. However, the risk remains that debt needs to be resolved in other ways, such as through default and widespread bankruptcies (Kose et al., 2021). Future research could empirically examine the circumstances under which the cost of such debt resolution can be limited. Second, research could also look in greater detail at the nature of debt booms in commodity exporters. Because of their heavy dependence on an often narrow set of commodities, debt dynamics in these economies are typically closely linked to global commodity cycles. Future research could document the real and financial implications of these linkages for the magnitude of debt booms in commodity exporters. Third, this study’s comparison between ongoing and past debt booms has been confined to government debt booms. A similarly close look at private debt booms may be warranted. After all, the lethal combination of private and government debt booms has been shown to be particularly likely to be associated with financial crises (Koh et al. 2020).

References

- Aldasoro, I., B. Hardy, and N. Tarashev. 2021. "Corporate Debt: Post-GFC through the Pandemic." *BIS Quarterly Review*, June, 1-14, Bank for International Settlements, Basel.
- Arellano, C., and A. Ramanarayanan. 2012. "Default and the Maturity Structure in Sovereign Bonds." *Journal of Political Economy* 120 (2): 187-232.
- Arteta, C., M. A. Kose, F. Ohnsorge, and M. Stocker. 2015. "The Coming U.S. Interest Rate Tightening Cycle: Smooth Sailing or Stormy Waters?" Policy Research Note. World Bank, Washington, DC.
- Avdjiev, S., P. McGuire, and von Peter, G. 2020. "International Dimensions of EME Corporate Debt." *BIS Quarterly Review*, June, 1-13, Bank for International Settlements, Basel.
- Azzimonti, M., and P. Yared. 2019. "The Optimal Public and Private Provision of Safe Assets." *Journal of Monetary Economics* 102: 126-144.
- Baffes, J., M. A. Kose, F. Ohnsorge, and M. Stocker. 2015. "The Great Plunge in Oil Prices: Causes, Consequences, and Policy Responses." World Bank Policy Research Note 15/01, World Bank, Washington, DC.
- Battistini, N., G. Callegari, and L. Zavalloni. 2019. "Dynamic Fiscal Limits and Monetary-Fiscal Policy Interactions." ECB Working Paper 2268, European Central Bank, Frankfurt.
- Blanchard, O. 2019. "Public Debt and Low Interest Rates." *American Economic Review* 109 (4): 1197-1229.
- Blanchard, O., and L. H. Summers, eds. 2019. *Evolution or Revolution? Rethinking Macroeconomic Policy after the Great Recession*. Cambridge: MIT Press.
- Borensztein, E., and L. S. Ye. 2018. "Corporate Debt Overhang and Investment: Firm-Level Evidence." World Bank Policy Research Working Paper 8553, World Bank, Washington, DC.
- Broner, F. A., G. Lorenzoni, and S. L. Schmukler. 2013. "Why do Emerging Economies Borrow Short Term?" *Journal of the European Economic Association* 11 (S1): 67-100.
- Buckle, R. A., and A. A. Cruickshank. 2013. "The Requirements for Long-Run Fiscal Sustainability." New Zealand Treasury Working Paper 13/20, New Zealand Treasury, Wellington.
- Calderón, C., and L. Servén. 2010. "Infrastructure and Economic Development in Sub-Saharan Africa." *Journal of African Economies* 19 (suppl_1): i13-i87.
- Chang, R., and A. Velasco. 2000. "Financial Fragility and the Exchange Rate Regime." *Journal of Economic Theory* 92 (1): 1-34.
- Claessens, S., and M. A. Kose. 2014. "Financial Crises Explanations, Types, and Implications." In *Financial Crises: Causes, Consequences, and Policy Responses*, edited by S. Claessens, M. A. Kose, L. Laeven, and F. Valencia, 3-59. Washington, DC: International Monetary Fund.

- Claessens, S., M. A. Kose, and M. E. Terrones. 2012. “How do Business and Financial Cycles Interact?” *Journal of International Economics* 87 (1): 178-190.
- Debrun, X., and T. Kinda. 2016. “That Squeezing Feeling: The Interest Burden and Public Debt Stabilization.” *International Finance* 19 (2): 147-178.
- Égert, B., T. J. Kozluk, and D. Sutherland. 2009. “Infrastructure and Growth: Empirical Evidence.” CESifo Working Paper 2700, CESifo, Munich.
- Eichengreen, B. 2019. “The Return of Fiscal Policy.” Project Syndicate, May 13.
- Escolano, J. 2010. “A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates.” IMF Technical Notes and Manuals 10/02, International Monetary Fund, Washington, DC.
- Fatas, A., A. R. Ghosh, U. Panizza, and A. F. Presbitero. 2019. “The Motives to Borrow.” IMF Working Paper 19/101, International Monetary Fund, Washington, DC.
- Ferrero, G., M. Gross, and S. Neri. 2019. “On Secular Stagnation and Low Interest Rates: Demography Matters.” *International Finance* 22 (3): 262-278.
- Fournier, J.-M. 2006. “The Positive Effect of Public Investment on Potential Growth.” OECD Economics Department Working Paper 1347, Organisation for Economic Co-operation and Development, Paris.
- Frankel, J. A., C. A. Vegh, and G. Vuletin. 2013. “On Graduation from Fiscal Procyclicality.” *Journal of Development Economics* 100 (1): 32-47.
- Furman, J., and L. H. Summers. 2019. “Who’s Afraid of Budget Deficits? How Washington should End Its Debt Obsession.” *Foreign Affairs* 98 (2): 82-94.
- Gaspar, V., J. Ralyea, and E. Ture. 2019. “High Debt Hampers Countries’ Response to a Fast-Changing Global Economy.” IMFBlog; Insights & Analysis on Economics & Finance, April 10.
- Harding, D., and A. Pagan. 2002. “Dissecting the Cycle: A Methodological Investigation.” *Journal of Monetary Economics* 49 (2): 365-381.
- Hauner, D. 2009. “Public Debt and Financial Development.” *Journal of Development Economics* 88 (1): 171-183.
- Henderson, D. R. 2019. “Who’s Afraid of Budget Deficits? I am.” Defining Ideas, February 20.
- Holston, K., T. Laubach, and J. C. Williams. 2017. “Measuring the Natural Rate of Interest: International Trends and Determinants.” *Journal of International Economics* 108 (Supplement 1): S59-S75.
- Huang, Y., M. Pagano, and U. Panizza. 2020. “Local Crowding-Out in China.” *Journal of Finance* 75 (6): 2855-2898.
- Huidrom, R., M. A. Kose, J. J. Lim, and F. L. Ohnsorge. 2020. “Why do Fiscal Multipliers Depend on Fiscal Positions?” *Journal of Monetary Economics* 114: 109-125.

- Ilzetzki, E., E. G. Mendoza, and C. A. Vegh. 2013. “How Big (Small?) are Fiscal Multipliers?” *Journal of Monetary Economics* 60 (2): 239-254.
- Kabundi, A., and F. Ohnsorge. 2020. “Implications of Cheap Oil for Emerging Markets.” World Bank Policy Research Working Paper 9403, World Bank, Washington, DC.
- Kaminsky, G. L., and C. M. Reinhart. 1999. “The Twin Crises: The Causes of Banking and Balance-of-Payments Problems.” *American Economic Review* 89 (3): 473-500.
- Koh, W. C., M. A. Kose, P. S. Nagle, F. L. Ohnsorge, and N. Sugawara. 2020. “Debt and Financial Crises.” World Bank Policy Research Working Paper 9116, World Bank, Washington, DC.
- Kose, M. A., S. Kurlat, F. Ohnsorge, and N. Sugawara. 2017. “A Cross-Country Database of Fiscal Space.” World Bank Policy Research Working Paper 8157, World Bank, Washington, DC.
- Kose, M. A., P. Nagle, F. Ohnsorge, and N. Sugawara. 2020. *Global Waves of Debt: Causes and Consequences*. Washington, DC: World Bank.
- Kose, M. A., F. Ohnsorge, C. Reinhart, and K. Rogoff. 2021. “The Aftermath of Debt Surges.” World Bank Policy Research Working Paper 9771, World Bank, Washington, DC.
- Kose, M. A., and F. Ohnsorge, eds. 2019. *A Decade after the Global Recession: Lessons and Challenges for Emerging and Developing Economies*. Washington, DC: World Bank.
- Krugman, P. 1979. “A Model of Balance-of-Payments Crises.” *Journal of Money, Credit, and Banking* 11 (3): 311-325.
- Krugman, P. 1999. “Balance Sheets, the Transfer Problem, and Financial Crises.” *International Tax and Public Finance* 6 (4): 459-472.
- Krugman, P. 2014. “Currency Regimes, Capital Flows, and Crises.” *IMF Economic Review* 62 (4): 470-493.
- Krugman, P. 2019. “Perspectives on Debt and Deficits.” *Business Economics* 54 (3): 157-159.
- Laeven, L., and F. Valencia. 2020. “Systemic Banking Crises Database II.” *IMF Economic Review* 68 (2): 307-361.
- Ley, E. 2009. “Fiscal Policy for Growth.” PREM Note 131, World Bank, Washington, DC.
- Lian, W., A. F. Presbitero, and U. Wiriadinata. 2020. “Public Debt and $r - g$ at Risk.” IMF Working Paper 20/137, International Monetary Fund, Washington, DC.
- Lo, S., and K. Rogoff. 2015. “Secular Stagnation, Debt Overhang and Other Rationales for Sluggish Growth, Six Years On.” BIS Working Paper 482, Bank for International Settlements, Basel.
- Mauro, P., and J. Zhou. 2021. “ $r - g < 0$: Can We Sleep More Soundly?” *IMF Economic Review* 69 (1): 197-229.
- Mendoza, E. G., and M. E. Terrones. 2012. “An Anatomy of Credit Booms and Their Demise.” NBER Working Paper 18379, National Bureau of Economic Research, Cambridge.

- Obstfeld, M. 2013. "On Keeping Your Powder Dry: Fiscal Foundations of Financial and Price Stability." *Monetary and Economic Studies* 31: 25-37.
- Obstfeld, M., and K. Rogoff. 1986. "Ruling Out Divergent Speculative Bubbles." *Journal of Monetary Economics* 17 (3): 349-362.
- Panizza, U., Y. Huang, and R. Varghese. 2018. "Does Public Debt Crowd Out Corporate Investment? International Evidence." CEPR Discussion Paper 12931, Centre for Economic Policy Research, London.
- Rachel, L., and L. H. Summers. 2019. "On Secular Stagnation in the Industrialized World." *Brookings Paper on Economic Activity* (Spring): 1-76.
- Ramey, V. A. 2019. "Ten Years after the Financial Crisis: What Have We Learned from the Renaissance in Fiscal Research?" *Journal of Economic Perspectives* 33 (2): 89-114.
- Reinhart, C. M., and K. S. Rogoff. 2009. *This Time is Different: Eight Centuries of Financial Folly*. Princeton: Princeton University Press.
- Reinhart, C. M., and K. S. Rogoff. 2010. "Growth in a Time of Debt." *American Economic Review* 100 (2): 573-578.
- Rogoff, K. 2019a. "Government Debt is Not a Free Lunch." Project Syndicate, December 6.
- Rogoff, K. 2019b. "Risks to the Global Economy in 2019." Project Syndicate, January 11.
- Romer, C. D., and D. H. Romer. 2018. "Phillips Lecture – Why Some Times are Different: Macroeconomic Policy and the Aftermath of Financial Crises." *Economica* 85 (337): 1-40.
- Rozenberg, J., and M. Fay, eds. 2019. *Beyond the Gap: How Countries Can Afford the Infrastructure They Need while Protecting the Planet*. Washington, DC: World Bank.
- Vegh, C., D. Lederman, and F. R. Bennett. 2017. *Leaning against the Wind: Fiscal Policy in Latin America and the Caribbean in a Historical Perspectives*. Washington, DC: World Bank.
- Vorisek, D., and S. Yu. 2020. "Understanding the Cost of Achieving the Sustainable Development Goals." World Bank Policy Research Working Paper 9164, World Bank, Washington, DC.
- World Bank. 2015. *Global Economic Prospects Report: Having Fiscal Space and Using It*. January. Washington, DC: World Bank.
- World Bank. 2018a. "Debt Vulnerabilities in IDA Countries." Paper prepared as a response to the interest expressed at the IDA Technical Briefing during the 2018 Spring Meetings, October 4, World Bank, Washington, DC.
- World Bank. 2018b. *Global Economic Prospects: Broad-Based Upturn, but for How Long?* January. Washington, DC: World Bank.
- World Bank. 2021. *Global Economic Prospects*. June. Washington, DC: World Bank.
- Wyplosz, C. 2019. "Olivier in Wonderland." VoxEU.org, June 17.
- Yared, P. 2019. "Rising Government Debt: Causes and Solutions for a Decades-Old Trend." *Journal of Economic Perspectives* 33 (2): 115-140.

Table 1. Features of global debt waves

	World				Advanced economies				EMDEs			
	Wave: First	Second	Third	Fourth	First	Second	Third	Fourth	First	Second	Third	Fourth
Magnitude												
(Percent of GDP)												
Total	176	192	218	262	190	216	263	300	96	100	120	206
Government	56	65	75	97	56	70	91	120	55	48	39	63
Private	120	127	143	165	134	147	172	179	42	52	81	142
Speed												
(Percentage points of GDP)												
Total	3.0	1.7	3.0	4.8	3.2	2.3	6.3	3.5	2.1	0.8	1.5	8.7
Government	1.0	0.9	1.1	2.1	0.9	1.2	2.9	2.3	1.5	-0.3	-1.8	2.6
Private	2.1	0.8	1.9	2.8	2.3	1.1	3.4	1.3	0.6	1.1	3.4	6.2
Coverage												
(Percent of countries)												
Total	91	73	51	83	96	93	94	65	88	68	39	89
Government	90	62	32	85	80	69	72	76	93	60	22	87
Private	68	74	83	72	93	83	89	53	58	72	81	77

Note: There have been four waves of global debt since 1970: first wave over 1970-89, second wave over 1990-2001, third wave over 2002-09, and fourth wave since 2010. Magnitude, speed, and coverage refer to, respectively, the stock at the end of each wave, an average annual change in debt during each wave, and the share of countries with rising debt over each wave. In computing the magnitude and speed, aggregates are weighted averages using current GDP in U.S. dollars as weights.

Table 2. Debt
(Percent of GDP)

	2010	2019	2020
Total debt			
World	214	233	262
Advanced economies	264	269	300
EMDEs	118	180	206
Commodity-exporting EMDEs	78	109	125
Commodity-importing EMDEs	151	212	237
Government debt			
World	77	84	97
Advanced economies	98	104	120
EMDEs	37	54	63
Commodity-exporting EMDEs	30	47	55
Commodity-importing EMDEs	43	57	67
Private debt			
World	137	149	165
Advanced economies	167	165	179
EMDEs	81	126	142
Commodity-exporting EMDEs	48	62	70
Commodity-importing EMDEs	108	155	170

Note: Aggregates are weighted averages using current GDP in U.S. dollars as weights. The classification of countries follows World Bank (2021).

Table 3. Primary balance
(Percent of GDP)

	2010	2019	2020
World	-4.2	-2.1	-9.3
Advanced economies	-6.0	-1.5	-10.3
EMDEs	-0.7	-2.9	-7.7
Commodity-exporting EMDEs	-0.1	-1.0	-6.6
Commodity-importing EMDEs	-1.2	-3.8	-8.2

Note: Aggregates are weighted averages using current GDP in U.S. dollars as weights. The classification of countries follows World Bank (2021).

Table 4. Balance sheet composition of debt in EMDEs

	Median			Percent of EMDEs with deterioration	
	2010	2019	2020	2010-19	2010-20
Foreign currency government debt (Percent of government debt)	48	49	49	45	50
Nonresident-held government debt (Percent of government debt)	38	44	42	66	61
Short-term government debt (Percent of GDP)	3	4	4	68	74
Average maturity of government debt (Years)	8	9	9	54	49
Foreign currency external debt (Percent of external debt)	91	94	95	45	55
Short-term external debt (Percent of external debt)	11	10	13	43	41
Concessional external debt (Percent of government debt)	20	14	...	84	...

Note: Table shows medians of respective indicators across EMDEs, as well as the share of EMDEs by the sign of changes in those indicators. Deterioration refers to increases in all indicators except average maturity and concessional external debt.

Table 5. Countries with negative interest rate-growth differentials and sustainability gaps

		Percent of countries				Percent of country-year pairs (1990-2020)	
		1990s	2000	2010	2020	All	With negative gaps
Interest rate below growth	World	28	53	68	11	55	14
	Advanced economies	23	71	57	11	52	11
	EMDEs	43	38	74	12	57	16
Negative sustainability gap	World	60	36	56	99	50	...
	Advanced economies	57	14	76	100	46	...
	EMDEs	46	53	45	99	53	...

Note: Table shows the share of countries with negative interest rate-growth differentials and sustainability gaps in respective years. Sustainability gaps are measured with current growth and interest rates.

Table 6. Features of government debt booms

	World	Advanced economies	EMDEs	World	Advanced economies	EMDEs
All debt booms						
Amplitude	30	25	32***			
(Percentage points of GDP)	[17, 52]	[13, 42]	[18, 56]			
Duration	7	7	7			
(Years)	[4, 11]	[4, 13]	[4, 11]			
Speed	4.3	3.7	4.6***			
(Percentage points of GDP per year)	[2.5, 7.3]	[2.4, 5.0]	[2.6, 8.4]			
All debt booms: Completed versus Ongoing						
	Completed			Ongoing		
Amplitude	29	25	32	31	29	31
(Percentage points of GDP)	[17, 57]	[13, 41]	[18, 60]	[22, 49]	[12, 58]	[23, 48]
Duration	6	7	6	9**	11	9***
(Years)	[4, 10]	[4, 11]	[4, 10]	[5, 12]	[3, 13]	[6, 12]
Speed	4.5	3.2	5.0	4.1	4.5**	3.9**
(Percentage points of GDP per year)	[2.5, 8.3]	[2.3, 4.6]	[2.7, 9.4]	[2.6, 6.4]	[3.3, 6.4]	[2.6, 6.4]
Completed debt booms: With crises versus Without crises						
	With crises			Without crises		
Amplitude	44	30	45	20***	19***	21***
(Percentage points of GDP)	[25, 75]	[21, 65]	[27, 77]	[12, 36]	[9, 32]	[13, 37]
Duration	7	7	6	6	7	6
(Years)	[4, 12]	[4, 11]	[4, 12]	[4, 9]	[4, 10]	[4, 9]
Speed	6.7	4.9	7.0	3.5***	2.7***	3.6***
(Percentage points of GDP per year)	[4.0, 11.2]	[2.8, 8.2]	[4.1, 12.0]	[2.0, 5.4]	[2.1, 3.9]	[2.0, 6.2]
Completed debt booms: Before 2000 versus After 2001						
	Before 2000			After 2001		
Amplitude	34	29	37	24***	19	27***
(Percentage points of GDP)	[18, 64]	[15, 42]	[18, 66]	[17, 38]	[13, 31]	[17, 40]
Duration	7	8	7	6**	6*	6
(Years)	[4, 12]	[4, 15]	[4, 11]	[4, 8]	[4, 8]	[4, 8]
Speed	4.6	3.0	5.2	4.3	3.7	4.6
(Percentage points of GDP per year)	[2.5, 9.1]	[2.3, 4.4]	[2.7, 10.6]	[2.6, 6.8]	[2.2, 5.9]	[2.8, 7.6]

Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), based on 493 government debt booms, of which 103 booms are in advanced economies and 390 are in EMDEs. Amplitude is the trough-to-peak change in the government debt-to-GDP ratio during a government debt boom. Speed is the ratio of the amplitude to the duration. ** and *** denote that medians between advanced economies and EMDEs in all debt booms, and between completed and ongoing booms or between completed booms with and without crises in respective country groups, are statistically significantly different at the 5 percent and 1 percent levels, respectively.

Table 7. Macroeconomic and fiscal indicators during government debt booms

	World	Advanced economies	EMDEs
Macroeconomic outcomes			
Output growth (Percent)	2.2 [0.3, 3.9]	1.6 [0.2, 2.8]	2.4** [0.4, 4.1]
Investment growth (Percent)	1.4 [-1.7, 4.4]	0.9 [-1.5, 2.1]	2.0** [-1.8, 6.3]
Consumption growth (Percent)	2.2 [0.4, 3.9]	1.4 [0.3, 2.7]	2.8*** [0.4, 4.6]
Debt sustainability			
Primary balance, initial (Percent of GDP)	0.4 [-1.1, 2.3]	1.2 [-0.5, 2.7]	0.0** [-1.5, 2.1]
Primary balance, changes (Percentage points of GDP)	-0.5 [-1.1, -0.1]	-0.6 [-1.1, -0.1]	-0.4 [-1.1, 0.0]
Sustainability gap, initial (Percent of GDP)	1.7 [0.2, 4.4]	1.7 [0.4, 3.6]	1.7 [0.1, 4.8]
Sustainability gap, changes (Percentage points of GDP)	-1.1 [-2.1, -0.4]	-0.9 [-1.6, -0.4]	-1.2 [-2.5, -0.4]
Interest rate-growth differential, initial (Percentage points)	-2.5 [-6.6, 0.1]	-1.3 [-3.5, 0.9]	-4.2*** [-8.9, -0.3]
Interest rate-growth differential, changes (Percentage points)	0.9 [0.2, 2.2]	0.4 [0.0, 1.0]	1.4*** [0.3, 3.6]

Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), of macroeconomic and debt sustainability indicators across all government debt booms in respective country groups. Indicators on macroeconomic outcomes are annual averages during debt booms. In indicators on debt sustainability, initial and changes refer to, respectively, the level at the beginning, or trough, of debt booms and average annual changes during debt booms. ** and *** denote that medians are statistically significantly different between advanced economies and EMDEs at the 5 percent and 1 percent levels, respectively.

Table 8. Macroeconomic and fiscal indicators during government debt booms (relative to non-boom years)

	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
Macroeconomic outcomes									
Output growth (Percent)	1.3	1.2	1.7	1.3	-1.2	-1.4	-0.8	0.1	0.3
Investment growth (Percent)	3.1	1.2	3.4	2.1	-1.8	-4.6	-1.0	-2.4	-1.1
Consumption growth (Percent)	1.5	1.0	2.2	1.3	-0.1	-0.9	-0.2	-0.5	-0.3
Debt sustainability									
Primary balance (Percent of GDP)	-0.9	-0.3	-0.2	-2.2	-3.7	-4.0	-3.0	-3.0	-3.1
Sustainability gaps (Percent of GDP)	2.7	2.3	3.2	2.5	-2.0	-3.3	-1.9	-2.0	-1.9
Interest rate-growth differentials (Percentage points)	-3.8	-3.5	-5.7	-4.4	1.6	2.0	-0.2	0.0	-0.5

Note: Coefficients of estimations in which each indicator of fiscal positions or macroeconomic outcomes is regressed on a series of dummy variables for government debt booms started in year t , based on data for all countries. The numbers in bold indicate that the coefficients are statistically significant at least at the 10 percent level.

Table 9. Macroeconomic and fiscal indicators during government debt booms (crises vs. non-crises)

	Completed booms with crises			Completed booms without crises		
	World	Advanced economies	EMDEs	World	Advanced economies	EMDEs
Macroeconomic outcomes						
Output growth (Percent)	2.2 [-0.1, 3.8]	0.3 [-0.6, 2.5]	2.3 [0.3, 3.9]	2.8*** [1.0, 4.5]	2.4*** [1.2, 3.6]	2.9** [0.9, 4.7]
Investment growth (Percent)	-0.4 [-4.4, 3.9]	-2.6 [-4.7, 1.1]	0.7 [-3.8, 4.1]	2.7*** [0.7, 6.8]	1.8*** [0.3, 2.8]	5.8*** [1.3, 8.8]
Consumption growth (Percent)	1.1 [-0.2, 3.9]	0.3 [-0.5, 2.2]	1.7 [-0.1, 4.2]	2.9*** [1.8, 4.6]	2.2*** [1.7, 3.2]	3.5*** [2.1, 6.0]
Debt sustainability						
Primary balance, initial (Percent of GDP)	0.1 [-2.0, 2.7]	1.1 [-0.7, 3.2]	-0.5 [-2.4, 0.9]	0.7 [-1.1, 2.8]	0.6 [-0.7, 2.0]	0.7** [-1.5, 3.5]
Primary balance, changes (Percentage points of GDP)	-0.1 [-0.8, 0.4]	-0.3 [-1.0, -0.1]	0.0 [-0.6, 0.6]	-0.3* [-0.9, 0.1]	-0.2* [-0.6, 0.0]	-0.3*** [-1.5, 0.1]
Sustainability gap, initial (Percent of GDP)	2.9 [1.1, 5.1]	2.8 [1.4, 5.1]	4.6 [0.8, 5.1]	0.9** [-1.0, 3.4]	0.7*** [-1.0, 1.2]	1.9 [-0.8, 5.2]
Sustainability gap, changes (Percentage points of GDP)	-0.8 [-1.8, -0.2]	-1.1 [-1.4, -0.4]	-0.4 [-2.0, 0.1]	-0.4 [-0.9, 0.0]	-0.4** [-0.5, 0.1]	-0.5 [-1.6, -0.2]
Interest rate-growth differential, initial (Percentage points)	-1.8 [-12.4, 0.7]	-1.3 [-2.4, 0.9]	-12.4 [-27.7, -4.6]	-1.9 [-6.7, 1.8]	0.0 [-2.7, 2.7]	-2.9 [-13.8, 1.0]
Interest rate-growth differential, changes (Percentage points)	0.3 [-0.2, 2.3]	0.2 [-0.1, 0.7]	1.8 [-0.5, 5.4]	0.3 [-0.6, 0.9]	0.3 [-0.3, 0.9]	0.4 [-0.6, 2.2]

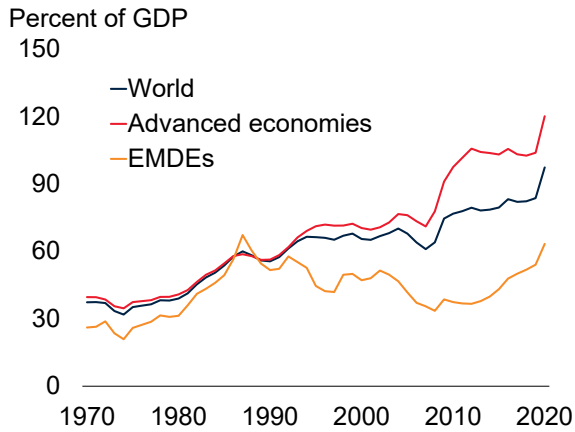
Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), of macroeconomic and debt sustainability indicators across completed government debt booms with and without crises in respective country groups. Indicators on macroeconomic outcomes are annual averages during debt booms. In indicators on debt sustainability, initial and changes refer to, respectively, the level at the beginning, or trough, of debt booms and average annual changes during debt booms. *, **, and *** denote that medians are statistically significantly different between booms with and without crises in respective country groups at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 10. Macroeconomic and fiscal indicators during government debt booms (completed vs. ongoing booms)

	Completed booms			Ongoing booms		
	World	Advanced economies	EMDEs	World	Advanced economies	EMDEs
Macroeconomic outcomes						
Output growth (Percent)	2.4 [0.5, 4.0]	2.2 [0.4, 3.2]	2.6 [0.6, 4.1]	1.3** [0.1, 3.3]	0.9*** [0.1, 1.4]	2.1 [0.0, 3.6]
Investment growth (Percent)	1.8 [-1.7, 5.3]	1.0 [-1.8, 2.6]	2.7 [-1.7, 6.9]	0.8 [-1.6, 3.2]	0.1 [-1.5, 1.4]	1.0* [-2.3, 4.1]
Consumption growth (Percent)	2.3 [0.4, 4.2]	1.9 [0.5, 3.1]	2.8 [0.4, 4.8]	1.8* [0.3, 3.4]	0.6*** [-0.9, 1.2]	2.9 [0.4, 3.9]
Debt sustainability						
Primary balance, initial (Percent of GDP)	0.4 [-1.4, 2.8]	1.0 [-0.7, 2.7]	0.2 [-1.9, 2.8]	0.4 [-0.9, 1.8]	1.5 [-0.1, 2.4]	-0.2 [-1.0, 1.7]
Primary balance, changes (Percentage points of GDP)	-0.2 [-0.8, 0.1]	-0.3 [-0.9, 0.0]	-0.2 [-0.8, 0.2]	-0.8*** [-1.4, -0.4]	-1.0*** [-2.4, -0.7]	-0.7*** [-1.3, -0.3]
Sustainability gap, initial (Percent of GDP)	1.5 [0.1, 4.7]	1.2 [0.1, 3.4]	2.3 [0.1, 5.1]	1.8 [0.4, 3.7]	3.1 [0.8, 4.4]	1.7 [0.1, 3.0]
Sustainability gap, changes (Percentage points of GDP)	-0.4 [-1.4, -0.2]	-0.4 [-1.4, -0.2]	-0.4 [-1.7, 0.0]	-1.6*** [-3.3, -0.9]	-1.4*** [-3.9, -1.0]	-1.7*** [-3.1, -0.9]
Interest rate-growth differential, initial (Percentage points)	-1.8 [-6.8, 1.6]	-0.7 [-2.5, 1.8]	-5.1 [-17.2, 0.2]	-3.1 [-6.4, -0.7]	-2.3* [-3.8, -0.7]	-4.1 [-8.5, -0.4]
Interest rate-growth differential, changes (Percentage points)	0.3 [-0.4, 1.5]	0.2 [-0.3, 0.9]	0.6 [-0.6, 2.6]	1.4*** [0.6, 3.4]	1.0*** [0.5, 1.8]	1.8** [1.0, 4.3]

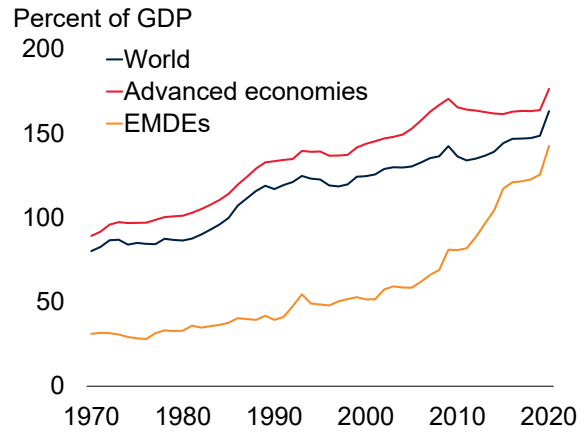
Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), of macroeconomic and debt sustainability indicators across completed government debt booms and ongoing booms in respective country groups. Indicators on macroeconomic outcomes are annual averages during debt booms. In indicators on debt sustainability, initial and changes refer to, respectively, the level at the beginning, or trough, of debt booms and average annual changes during debt booms. *, **, and *** denote that medians are statistically significantly different between completed and ongoing booms in respective country groups at the 10 percent, 5 percent, and 1 percent levels, respectively.

Figure 1. Government debt



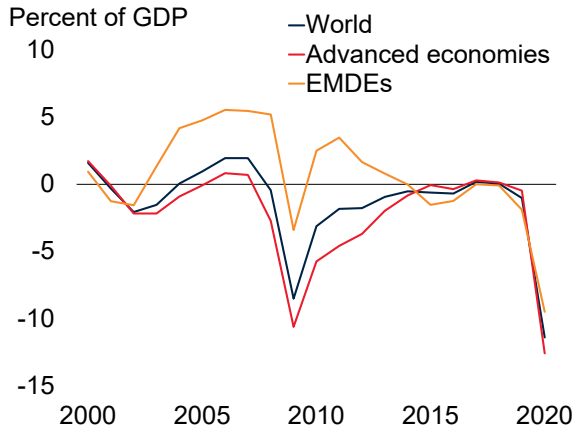
Sources: Kose et al. (2017, 2020).
 Note: Aggregates are weighted averages using current GDP in U.S. dollars as weights.

Figure 2. Private debt



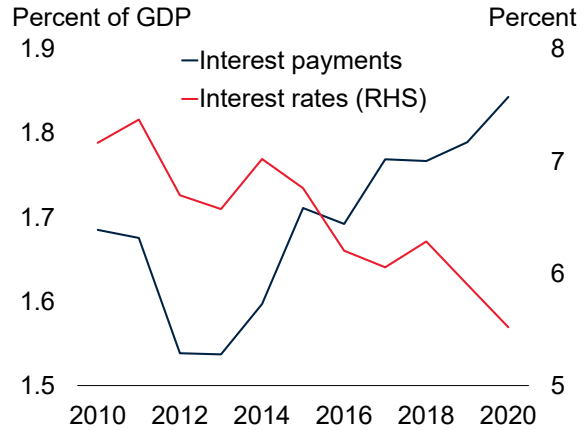
Sources: Kose et al. (2017, 2020).
 Note: Aggregates are weighted averages using current GDP in U.S. dollars as weights.

Figure 3. Sustainability gaps



Source: Kose et al. (2017).
 Note: Sustainability gaps are computed with current output growth rates and long-term interest rates. Aggregates are weighted averages using current GDP in U.S. dollars as weights.

Figure 4. Interest payments and interest rates in EMDEs



Sources: International Monetary Fund, Kose et al. (2017).
 Note: Interest payments refer to net interest payments, which are computed as differences between primary balances and overall fiscal balances. Interest rates refer to long-term nominal interest rates (i.e., government bond yields with maturity of 10 years or close). Aggregates are weighted averages using current GDP in U.S. dollars as weights.

Supplementary Appendix

A Mountain of Debt: Navigating the Legacy of the Pandemic

M. Ayhan Kose, Franziska Ohnsorge, and Naotaka Sugawara*

Not for Publication

This appendix contains:

- Table S1. Countries with deterioration in fiscal indicators
- Table S2. Features of private debt booms
- Table S3. Features of total debt booms
- Table S4. Balance sheet composition during government debt booms
- Table S5. Balance sheet composition during government debt booms (relative to non-boom years)
- Table S6. Balance sheet composition during government debt booms (crises vs. non-crises)
- Table S7. Balance sheet composition during government debt booms (completed vs. ongoing booms)

- Figure S1. Long-term interest rates
- Figure S2. Interest payments and interest rates in commodity-exporting EMDEs

* Kose: World Bank, Prospects Group; Brookings Institution; CEPR; and CAMA; akose@worldbank.org. Ohnsorge: World Bank, Prospects Group; and CAMA; fohnsorge@worldbank.org. Sugawara: World Bank, Prospects Group; nsugawara@worldbank.org. We thank our discussant, Antonio Fatás, for helpful comments at the Workshop on “Sovereign Debt and Development.” We also thank Carlos Arteta, Kevin Gallagher, Sergiy Kasyanenko, Ugo Panizza, Andrea Presbitero, Justin Sandefur, Mark Weidemaier, and Charles Wyplosz and workshop participants for feedback. Shijie Shi provided excellent research assistance. The findings, interpretations, and conclusions expressed in this paper are those of the authors. They do not necessarily represent the views of the institutions they are affiliated with.

Table S1. Countries with deterioration in fiscal indicators
(Percent of countries)

Change (percentage points):	2010-20		2010-19		2019-20	
	>0	>20	>0	>20	>0	>20
Government debt increase						
World	85	52	75	31	89	14
Advanced economies	76	39	55	21	97	16
EMDEs	87	55	80	34	88	13
Commodity-exporting EMDEs	92	64	85	43	89	13
Commodity-importing EMDEs	78	42	73	20	85	14
Deterioration in primary balance						
World	81	...	38	...	88	...
Advanced economies	86	...	14	...	97	...
EMDEs	80	...	44	...	85	...
Commodity-exporting EMDEs	85	...	54	...	85	...
Commodity-importing EMDEs	74	...	28	...	86	...

Note: Table shows the share of countries in respective country groups with an increase in government debt or the deterioration in primary balance over the denoted period. The classification of countries follows World Bank (2021).

Table S2. Features of private debt booms

	World	Advanced economies	EMDEs	World	Advanced economies	EMDEs
All debt booms						
Amplitude	18	54	15***			
(Percentage points of GDP)	[8, 38]	[30, 82]	[7, 29]			
Duration	8	10	7***			
(Years)	[4, 12]	[5, 17]	[4, 11]			
Speed	2.5	5.1	2.0***			
(Percentage points of GDP per year)	[1.3, 4.3]	[3.3, 7.4]	[1.1, 3.5]			
All debt booms: Completed versus Ongoing						
	Completed			Ongoing		
Amplitude	18	54	14	21	59	17*
(Percentage points of GDP)	[8, 37]	[31, 78]	[7, 29]	[13, 41]	[29, 112]	[10, 29]
Duration	8	11	7	9	9	8
(Years)	[5, 12]	[6, 16]	[4, 11]	[3, 14]	[5, 18]	[3, 12]
Speed	2.3	5.0	1.9	3.1**	5.4	2.3*
(Percentage points of GDP per year)	[1.2, 4.2]	[3.2, 7.2]	[1.1, 3.4]	[1.7, 4.6]	[3.8, 8.3]	[1.5, 4.2]
Completed debt booms: With crises versus Without crises						
	With crises			Without crises		
Amplitude	17	65	13	19	42**	14
(Percentage points of GDP)	[6, 45]	[50, 131]	[5, 29]	[8, 35]	[30, 74]	[7, 29]
Duration	9	13	8	7**	9*	6*
(Years)	[5, 13]	[9, 22]	[4, 12]	[5, 11]	[5, 15]	[4, 10]
Speed	2.1	6.4	1.6	2.5*	4.2	2.0**
(Percentage points of GDP per year)	[1.0, 4.3]	[3.4, 8.0]	[0.9, 3.0]	[1.3, 4.1]	[2.8, 6.4]	[1.2, 3.5]
Completed debt booms: Before 2000 versus After 2001						
	Before 2000			After 2001		
Amplitude	16	42	11	23***	76***	17***
(Percentage points of GDP)	[6, 32]	[26, 64]	[5, 22]	[10, 44]	[36, 133]	[8, 34]
Duration	7	10	6	9**	14	8**
(Years)	[4, 11]	[5, 14]	[4, 10]	[5, 13]	[7, 19]	[5, 11]
Speed	2.1	4.0	1.6	2.6***	6.0***	2.3***
(Percentage points of GDP per year)	[1.1, 3.7]	[2.6, 6.4]	[1.0, 2.9]	[1.3, 5.3]	[4.4, 8.4]	[1.2, 3.9]

Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), based on 515 private debt booms, of which 100 debt booms are in advanced economies and 415 are in EMDEs. Amplitude is the trough-to-peak change in the private debt-to-GDP ratio during a private debt boom. Speed is the ratio of the amplitude to the duration. *, **, and *** denote that medians between advanced economies and EMDEs in all debt booms, and between completed and ongoing booms or between completed debt booms with and without crises in respective country groups, are statistically significantly different at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table S3. Features of total debt booms

	World	Advanced economies	EMDEs	World	Advanced economies	EMDEs
All debt booms						
Amplitude	43	63	40***			
(Percentage points of GDP)	[25, 78]	[33, 103]	[24, 71]			
Duration	8	9	7***			
(Years)	[4, 12]	[5, 15]	[4, 11]			
Speed	6.0	6.1	5.8			
(Percentage points of GDP per year)	[3.8, 10.1]	[4.6, 8.9]	[3.6, 10.1]			
All debt booms: Completed versus Ongoing						
	Completed			Ongoing		
Amplitude	42	62	39	54*	76	49**
(Percentage points of GDP)	[24, 76]	[34, 103]	[23, 68]	[32, 81]	[32, 102]	[32, 76]
Duration	7	9	6	10***	9	10***
(Years)	[4, 11]	[5, 15]	[4, 10]	[6, 13]	[5, 14]	[7, 13]
Speed	6.0	5.8	6.1	5.9	6.5	5.5
(Percentage points of GDP per year)	[3.8, 10.5]	[4.2, 10.3]	[3.8, 10.5]	[3.8, 9.0]	[5.4, 8.1]	[3.4, 9.8]
Completed debt booms: With crises versus Without crises						
	With crises			Without crises		
Amplitude	61	100	52	36***	53***	33***
(Percentage points of GDP)	[33, 101]	[62, 183]	[32, 92]	[20, 61]	[24, 90]	[19, 49]
Duration	8	12	7	6**	8*	6*
(Years)	[4, 14]	[7, 17]	[4, 13]	[4, 10]	[4, 15]	[4, 9]
Speed	7.8	7.4	8.2	5.3***	5.5**	5.1***
(Percentage points of GDP per year)	[4.9, 12.1]	[5.4, 11.7]	[4.6, 12.1]	[3.5, 8.3]	[3.7, 8.7]	[3.3, 8.3]
Completed debt booms: Before 2000 versus After 2001						
	Before 2000			After 2001		
Amplitude	43	55	41	40	74**	37
(Percentage points of GDP)	[23, 72]	[26, 92]	[23, 70]	[24, 82]	[41, 172]	[23, 64]
Duration	7	8	7	7	12	6
(Years)	[4, 11]	[5, 14]	[4, 11]	[4, 11]	[6, 21]	[4, 10]
Speed	5.8	5.5	6.2	6.2	7.1**	5.7
(Percentage points of GDP per year)	[3.8, 10.2]	[4.0, 7.8]	[3.8, 10.5]	[3.9, 11.0]	[4.7, 11.5]	[3.8, 10.4]

Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), based on 448 total debt booms, of which 92 debt booms are in advanced economies and 356 are in EMDEs. Amplitude is the trough-to-peak change in the total debt-to-GDP ratio during a total debt boom. Speed is the ratio of the amplitude to the duration. *, **, and *** denote that medians between advanced economies and EMDEs in all debt booms, and between completed and ongoing booms or between completed debt booms with and without crises in respective country groups, are statistically significantly different at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table S4. Balance sheet composition during government debt booms

	World	Advanced economies	EMDEs
Short-term government debt, initial (Percent of GDP)	3.5 [1.6, 6.2]	4.5 [1.9, 7.0]	2.7 [1.6, 6.2]
Short-term government debt, changes (Percentage points of GDP)	0.2 [0.0, 0.8]	1.0 [0.3, 1.6]	0.1** [-0.1, 0.6]
Foreign currency government debt, initial (Percent of government debt)	14.4 [0.6, 40.8]	0.6 [0.1, 3.9]	40.9*** [27.0, 61.5]
Foreign currency government debt, changes (Percentage points of government debt)	0.0 [-0.2, 0.5]	0.0 [-0.1, 0.0]	0.3 [-0.2, 0.7]
Nonresident-held government debt, initial (Percent of government debt)	39.0 [20.0, 53.8]	40.8 [16.4, 54.2]	35.1 [22.3, 53.8]
Nonresident-held government debt, changes (Percentage points of government debt)	0.3 [-0.6, 1.2]	0.4 [-0.5, 1.2]	0.3 [-0.9, 1.2]

Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), of indicators on balance sheet composition of debt across all government debt booms in respective country groups. Initial and changes refer to, respectively, the level at the beginning, or trough, of debt booms and average annual changes during debt booms. ** and *** denote that medians are statistically significantly different between advanced economies and EMDEs at the 5 percent and 1 percent levels, respectively.

Table S5. Balance sheet composition during government debt booms (relative to non-boom years)

	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
Short-term government debt (Percent of GDP)	-0.7	-1.5	0.0	-1.3	-1.2	-1.0	-1.1	-0.8	-0.3
Foreign currency government debt (Percent of government debt)	1.6	1.8	0.0	-0.5	-3.5	-2.4	-1.5	-2.2	-1.5
Nonresident-held government debt (Percent of government debt)	-2.7	-3.3	-4.3	-4.2	-5.8	-4.7	-3.2	-2.5	-1.0

Note: Coefficients of estimations in which each indicator of balance sheet composition is regressed on a series of dummy variables for government debt booms started in year t , based on data for all countries. The numbers in bold indicate that the coefficients are statistically significant at least at the 10 percent level.

Table S6. Balance sheet composition during government debt booms (crises vs. non-crises)

	Completed booms with crises			Completed booms without crises		
	World	Advanced economies	EMDEs	World	Advanced economies	EMDEs
Short-term government debt, initial (Percent of GDP)	...	...	...	5.0 [0.0, 6.2]	...	3.1 [0.0, 6.2]
Short-term government debt, changes (Percentage points of GDP)	...	...	...	0.0 [-0.7, 0.2]	...	-0.4 [-0.7, 0.0]
Foreign currency government debt, initial (Percent of government debt)	1.5 [0.2, 3.9]	1.5 [0.2, 3.9]	...	15.0* [14.4, 27.0]	7.3 [0.1, 14.4]	27.0 [15.0, 61.5]
Foreign currency government debt, changes (Percentage points of government debt)	0.0 [-0.2, 0.6]	0.0 [-0.2, 0.6]	...	1.2 [0.0, 1.3]	0.7 [0.0, 1.5]	1.2 [-0.2, 1.3]
Nonresident-held government debt, initial (Percent of government debt)	43.8 [39.6, 55.6]	43.8 [40.2, 55.5]	45.0 [22.3, 67.6]	25.6 [14.2, 53.4]	23.6 [9.3, 48.4]	30.5 [15.0, 59.6]
Nonresident-held government debt, changes (Percentage points of government debt)	0.1 [-0.7, 2.5]	0.1 [-0.6, 3.2]	-0.8 [-2.1, 0.5]	0.8 [0.1, 1.3]	0.8 [0.6, 1.6]	0.5 [-0.9, 1.3]

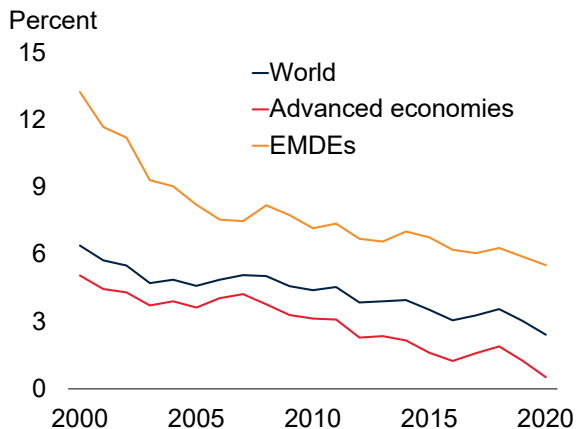
Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), of indicators on balance sheet composition of debt across completed government debt booms with and without crises in respective country groups. The statistics are not reported, if there is only one data point. Initial and changes refer to, respectively, the level at the beginning, or trough, of debt booms and average annual changes during debt booms. * denotes that medians are statistically significantly different between booms with and without crises in respective country groups at the 10 percent level.

Table S7. Balance sheet composition during government debt booms (completed vs. ongoing booms)

	Completed booms			Ongoing booms		
	World	Advanced economies	EMDEs	World	Advanced economies	EMDEs
Short-term government debt, initial (Percent of GDP)	5.0 [0.0, 6.2]	...	3.1 [0.0, 6.2]	3.2 [1.6, 6.4]	4.5 [1.7, 8.6]	2.7 [1.6, 6.1]
Short-term government debt, changes (Percentage points of GDP)	0.0 [-0.7, 0.2]	...	-0.4 [-0.7, 0.0]	0.3 [0.0, 1.1]	1.1 [0.4, 1.6]	0.1 [0.0, 0.7]
Foreign currency government debt, initial (Percent of government debt)	3.9 [0.2, 15.0]	1.5 [0.1, 4.3]	27.0 [15.0, 61.5]	18.5 [0.6, 44.4]	0.2 [0.0, 1.1]	41.0 [30.4, 73.1]
Foreign currency government debt, changes (Percentage points of government debt)	0.0 [-0.2, 1.3]	0.0 [-0.1, 1.0]	1.2 [-0.2, 1.3]	0.0 [-0.6, 0.3]	0.0 [-0.1, 0.0]	0.2 [-0.6, 0.5]
Nonresident-held government debt, initial (Percent of government debt)	40.9 [18.7, 55.5]	41.6 [23.6, 52.8]	30.5 [18.7, 59.6]	36.0 [20.0, 53.8]	36.0 [14.4, 57.2]	37.0 [24.6, 52.7]
Nonresident-held government debt, changes (Percentage points of government debt)	0.6 [-0.6, 1.6]	0.8 [-0.3, 1.7]	0.5 [-0.9, 1.2]	0.2 [-0.6, 1.0]	0.2 [-0.7, 1.0]	0.2 [-0.6, 1.2]

Note: Table shows medians, as well as interquartile ranges (i.e., two numbers in brackets), of indicators on balance sheet composition of debt across completed government debt booms and ongoing booms in respective country groups. The statistics are not reported, if there is only one data point. Initial and changes refer to, respectively, the level at the beginning, or trough, of debt booms and average annual changes during debt booms

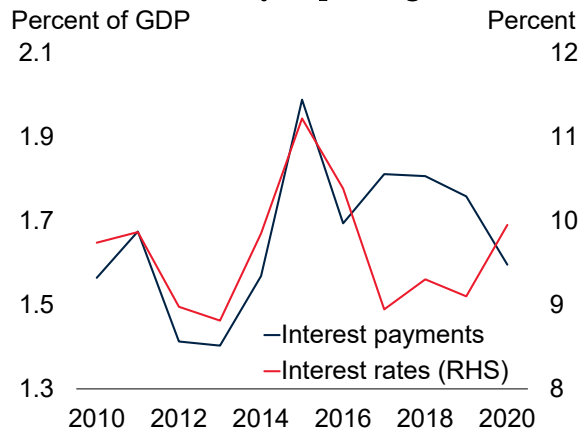
Figure S1. Long-term interest rates



Source: Kose et al. (2017).

Note: Average long-term nominal government bond yields (with maturity of 10 years or close) computed with current U.S. dollar GDP as weights.

Figure S2. Interest payments and interest rates in commodity-exporting EMDEs



Sources: International Monetary Fund, Kose et al. (2017).

Note: Interest payments refer to net interest payments, which are computed as differences between primary balances and overall fiscal balances. Interest rates refer to long-term nominal interest rates (i.e., government bond yields with maturity of 10 years or close). Aggregates are weighted averages using current GDP in U.S. dollars as weights. The classification of commodity-exporting EMDEs follows World Bank (2021).