

During the pandemic, and in particular its most acute phase, government policies helped maintain private access to credit, staving off a deeper recession in 2020. This chapter examines whether the resulting increase in leverage may affect the pace of the recovery. On average, the drag on future GDP growth is estimated at 0.9 percent over three years for advanced economies and at 1.3 percent for emerging markets. However, analyses based on micro-level data show that the recovery is likely to be slower in countries where (1) leverage is concentrated among vulnerable firms and low-income households, (2) insolvency procedures are inefficient, (3) public and private deleveraging coincide, and (4) monetary policy must be tightened rapidly. As countries prepare to normalize monetary policy, assessing how leverage is distributed is key to forecasting the pace of the recovery and calibrating the unwinding of pandemic-time support. In some advanced economies where the recovery is well underway and private balance sheets are in good shape, fiscal support can be reduced faster, facilitating the work of central banks. Elsewhere, targeted fiscal support—within the limit of a credible medium-term fiscal framework—could be relied on to minimize the risk of disruptions and scarring.

Introduction

Accommodative policies during the acute phase of the COVID-19 crisis mitigated its overall economic cost by providing ample and cheap liquidity to affected households and firms. But these policies also led to rapid debt buildup, extending a steady rise in overall leverage encouraged by supportive financial conditions since the global financial crisis of 2008. The surge in global *private* debt in 2020—13 percent of GDP—was widespread, faster than during the global financial crisis and almost as large as the rise in public debt (Figure 2.1, panel 1). Nonfinancial corporations, which entered the pandemic with already-elevated debt

(*Global Financial Stability Report* [GFSR], April and October 2021), saw larger increase in debt ratios than households. This was especially the case in advanced economies thanks to extensive credit guarantees, concessional lending programs, and moratoriums (Figure 2.1, panel 2).

Will these developments have a bearing on the nature of the recovery that lies ahead? After all, one person's debt is another person's asset, so why should it matter?

Answers to these questions require delving deep into why private debt matters. *First*, it matters because debtors and creditors are not alike.¹ Borrowers are typically constrained financially, with the severity of the constraint depending on the financial resources at their command. High-net-worth, liquid households and firms can sustain large variations in indebtedness with minor consequences for spending; higher debt often finances the accumulation of assets that can later be drawn down to finance consumption or investment. Low-net-worth, illiquid households and firms, on the other hand, are more constrained. They are also more sensitive to leverage cycles and more reactive to changes in fiscal and monetary policies. Such distinction is particularly relevant if rising interest rates lead to conditions and financial instability (April 2022 GFSR and Chapter 1).

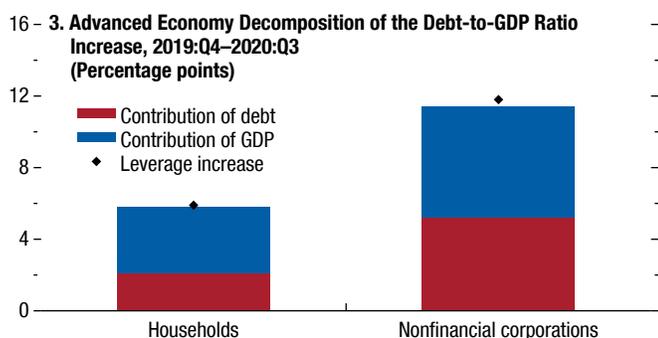
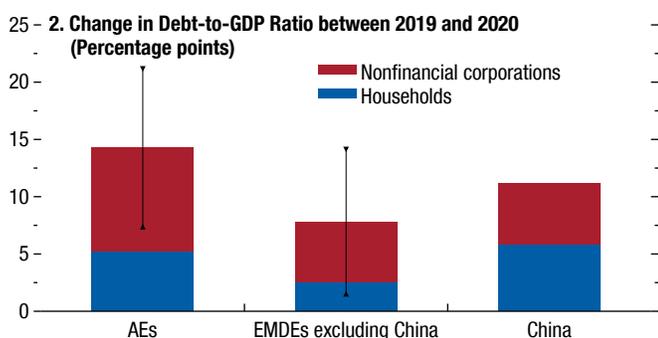
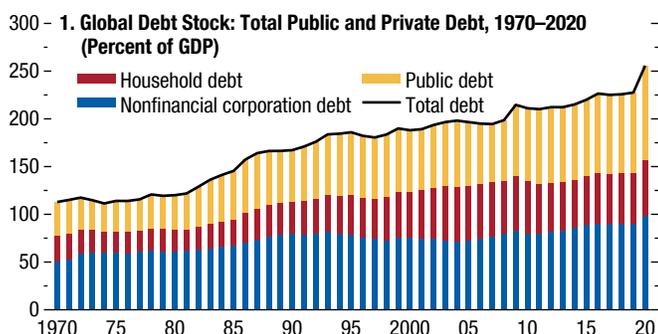
Second, periods of rapidly increasing debt may become unsustainable and lead to periods of deleveraging accompanied by subpar growth. In a nutshell, loose financial conditions encourage debt buildup, which boosts spending, growth, and asset prices and further incentivizes credit as collateral values increase. This eventually unwinds when returns disappoint or are too poor to justify further debt-financed investment, lenders become wary of rolling over credit and extending new loans, or financial conditions tighten and rising debt-service costs crowd out other spending.

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¹Tobin (1980) argues that “the population is not distributed between debtors and creditors randomly. Debtors have borrowed for good reasons, most of which indicate a high marginal propensity to spend from wealth or from current income or from any other liquid resources they can command.”

Figure 2.1. Rapidly Mounting Private Debt

Private debt increased as much as public debt in 2020. The largest increases took place in advanced economies, with large variations across countries.



Sources: Gaspar, Medas, and Perrelli (2021); IMF, Global Debt Database; and IMF staff calculations.

Note: In panel 1, public debt refers to the largest category of debt available (nonfinancial public sector, general government, and central government, in decreasing order). Private debt (households and nonfinancial corporations) includes only loans and securities. Total debt (as a percent of GDP) is close but not exactly equal to the sum of the components of public and private debt. This is because of the difference in country coverage for the corresponding variables, which causes the corresponding country weights to differ. In panel 2, whiskers show one standard deviation for private debt. AEs = advanced economies; EMDEs = emerging market and developing economies.

Third, national circumstances are also important. Countries with limited fiscal space may find it difficult to support domestic demand; public and private sector deleveraging may occur simultaneously, compounding the drag on growth. In countries where debt restructuring or business liquidation is required, the efficiency of the insolvency framework may play an important role in reallocating capital to productive uses. The strength of the recovery will also critically hinge on the strength of financial intermediaries. Following monetary tightening, deleveraging pressures may be stronger where macroprudential instruments are ineffective² and especially in countries where the health of the sovereign and banking sectors is closely intertwined (April 2022 GFSR, Chapter 2).

As governments are exiting pandemic-time emergency policies, the burden of debt is among the key challenges on the horizon. This chapter aims to answer two sets of questions:

- *Will the pandemic's private debt legacy affect the pace of the recovery?* How large a drag could there be on future private consumption and investment? Does it depend on the distribution of debt across households and firms? On available fiscal space? On the solvency framework?
- *What are the main implications for economic policy?* Does a high level of private debt, or its distribution across households and firms, affect the transmission and effectiveness of countercyclical policies? What does this imply for the pace of normalization and consolidation during the recovery, and what should the policy mix look like?

The main findings are summarized as follows:

Pandemic debt buildup: Nonfinancial corporate debt surged among vulnerable firms (high leverage, low liquidity, low profitability) in the worst-hit sectors (for example, those that are contact intensive). Household debt accumulation, although more modest than that of nonfinancial corporations overall, was in some cases heavily concentrated among low-income households. Differences across countries are large, with important implications for future growth.

²For an analysis of the implications of private sector leverage buildup for macro-financial stability risks and the role of macroprudential policy, see Barajas and others (2021).

Leverage cycles, heterogeneity, and future growth: Current levels of private leverage are expected to exert some drag on future GDP growth. Estimates based on cross-country aggregate data point to a cumulative 0.9 percent slowdown over three years for advanced economies and a cumulative 1.3 percent slowdown for emerging markets. However, the post-pandemic drag on growth could be much larger in countries where (1) indebtedness is more concentrated among financially constrained households and vulnerable firms, (2) the insolvency regime is inefficient, (3) fiscal space is limited, and (4) monetary policy needs to be tightened rapidly. For example, a surprise tightening of 100 basis points is estimated to slow investment among highly leveraged firms by a cumulative 6½ percentage points over two years, 4 percentage points more than among those with little leverage. The effect could be larger if higher interest rates lead to financial instability (April 2021 GFSR).

Implications for policy: Stronger emphasis on distributional considerations for macroeconomic forecasting and policymaking is needed. For example, where the recovery is well underway and private balance sheets are in good shape—mainly in advanced economies that benefited from generous government support during the pandemic—fiscal support can be reduced faster, facilitating the work of central banks. Elsewhere, the recovery may be weaker, and targeted fiscal support could help lessen the risks of disruptions and scarring within credible medium-term fiscal frameworks (April 2022 *Fiscal Monitor*). Where targeting is difficult and fiscal space limited, countries may need to consider revenue-enhancing measures to fund various priorities. Increasing tax compliance and other reforms to modernize business taxation are possible avenues; the latter could include temporary increases in corporate income tax designed to capture pandemic-related excess profits (IMF 2021a).

This chapter builds on earlier IMF work (April 2021 GFSR; April 2012 and April 2020 *World Economic Outlook* [WEO]; October 2020 *Regional Economic Outlook: Europe*; October 2020 *Regional Economic Outlook: Western Hemisphere*) and draws on two strands of literature that emphasize the importance of *heterogeneity* (Jappelli and Pistaferri 2014; Cloyne and others 2018; Kaplan, Moll, and Violante 2018; Ottonello and Winberry 2020) and *leverage* (Bernanke, Gertler, and Gilchrist 1999; Iacoviello 2005;

Eggertsson and Krugman 2012; Jordà, Schularick, and Taylor 2011; Dell’Ariccia and others 2016; Mian, Sufi, and Verner 2017; Drehman, Juselius, and Korinek 2017) in the transmission and amplification of economic shocks and policy.

The chapter starts by highlighting recent developments in households’ and nonfinancial corporations’ balance sheets, focusing on the distribution of debt. Cross-country panel regressions estimate the macroeconomic impact of leverage buildup on future growth. Micro-level data on households and firms then help unpack the role of heterogeneity and the importance of countercyclical and structural policy.

Private Sector Leverage during the Pandemic

This section sheds light on the historical development of household and corporate balance sheets, focusing on the COVID-19 recession and buildup of leverage among heterogeneous households and firms.

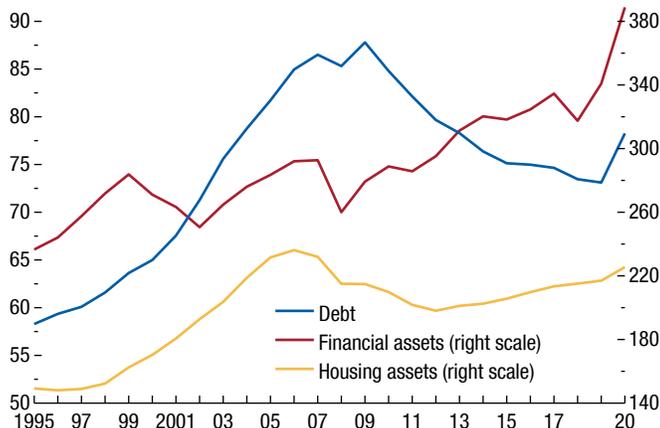
Household Balance Sheets

A Global Cycle in Assets and Liabilities

Household balance sheets have expanded almost continuously in recent decades, with net wealth increasing globally from an average 225 percent of GDP in 1995 to more than 360 percent of GDP in 2020, in purchasing-power-parity-weighted terms. Nevertheless, household debt has passed through two distinct phases over the past two decades. Among advanced economies, household leverage increased steadily in the years before the global financial crisis. Since debt was used primarily to finance housing investment, this resulted in assets growing in tandem with liabilities (Figure 2.2). In the decade after the global financial crisis, households gradually reduced debt relative to income, and housing assets also fell relative to income, with the reductions driven by lower valuations and slower investment. Household debt jumped in 2020 because of increased borrowing and lower income as a result of the pandemic-induced recession. This rise in debt was accompanied by a large increase in financial assets. Looking ahead, net wealth could contract again as governments’ cash transfers to households stop, and tighter financial conditions may increase debt-service costs and lead to declines in asset prices (see the April 2022 GFSR).

Figure 2.2. Advanced Economies: Aggregate Household Balance Sheets (Percent of GDP)

Household indebtedness jumped in 2020, after a decade of consolidation following the global financial crisis.



Sources: IMF, Global Debt Database; World Inequality Database; and IMF staff calculations.
 Note: See Online Annex 2.1 for the list of countries included.

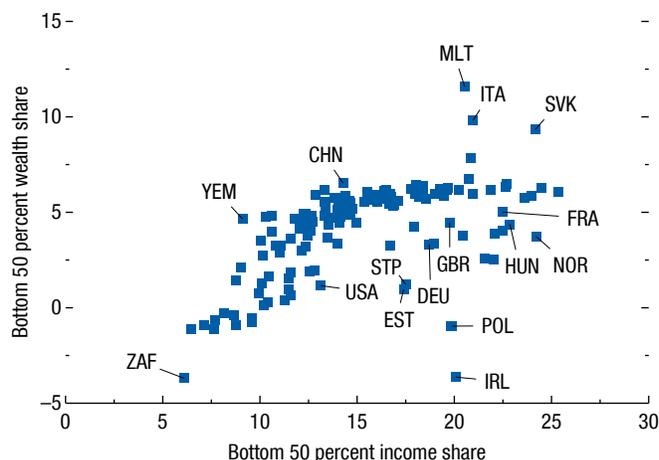
Household Debt across the Income Distribution

It is important to look beyond aggregate figures, as these can mask important heterogeneity, especially given the high degree of inequality in household income and wealth. How debt is distributed and changes over time has implications for liquidity constraints as well as for future saving rates. For instance, a debt buildup at the lower end of the income distribution, where net wealth is typically lower, is more likely to slow future consumption when financial conditions are tightened, borrowing costs increase, and asset prices decline (Figure 2.3).

Measuring how debt varies across income groups is challenging, as it requires household wealth surveys, which are available only for a handful of countries and are conducted relatively infrequently. To estimate the impact of the COVID-19 recession on household indebtedness, a “nowcasting” approach is used that relies on macroeconomic and financial variables to extrapolate microdata on income and debt. Regional and sectoral data for value added, wages, employment, unemployment, house prices and sales, and bank lending are used to estimate changes in income and debt for households. The algorithm employed also constrains the nowcast distributions

Figure 2.3. Correlation between Wealth and Income Inequality (Percent)

Countries where household incomes are more unequal also tend to have more wealth inequality.



Sources: World Inequality Database; and IMF staff calculations.
 Note: See Online Annex 2.1 for the list of countries included. Shares by country represent averages over the period from 2010 to 2020. Data labels in the figure use International Organization for Standardization (ISO) country codes.

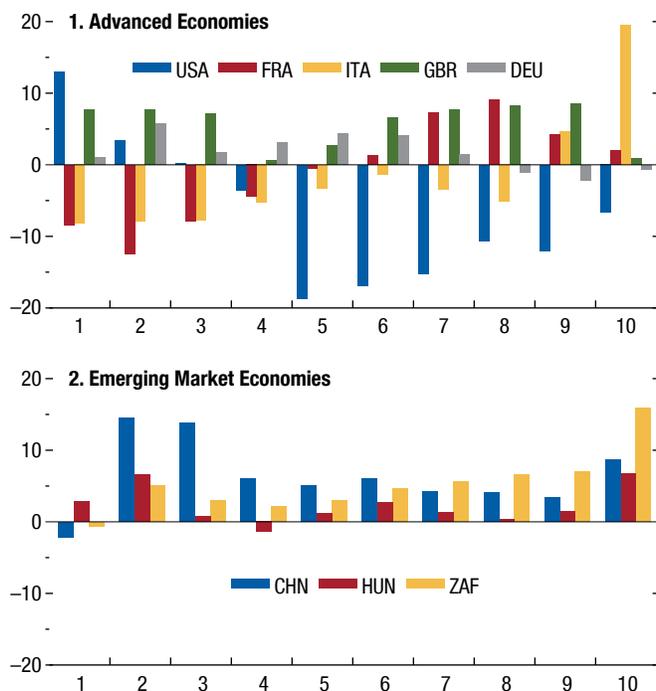
to match published aggregate household income and debt for 2020.³

Changes in household indebtedness varied across countries and income levels during the first year of the pandemic. The bar charts in Figure 2.4 show that aggregate statistics conceal important dimensions of debt accumulation. Among selected countries, the nowcasting estimates show that China and South Africa had the largest and broadest increases in debt ratios. The increases amounted to 5.7 percent of annual income on average across income deciles for China and 4.5 percent for South Africa. Lower-income households saw larger increases in China (except those in the bottom decile). In South Africa, the richest households saw the largest relative surge in debt, amounting to 15 percent of their annual incomes.

³The approach by DiNardo, Fortin, and Lemieux (1996) is used to nowcast joint distributions. This involves reweighting kernel densities and using regression adjustment to match changes in distributions over time. Income and debt distributions are nowcast for China, France, Germany, Hungary, Italy, South Africa, and the United Kingdom. For the United States, income and debt distributions are estimated using microdata from the 2019 and 2020 waves of the Consumer Expenditure Survey. See Online Annexes 2.1 and 2.2.

Figure 2.4. Change in Debt-to-Income Ratio by Income Decile in 2020
(Percent of income)

Household indebtedness varied across countries and household income groups.



Source: IMF staff calculations.

Note: Income deciles on x-axes, except for the United States where households are grouped by fixed income bands. See Online Annex 2.1. CHN = China; DEU = Germany; FRA = France; GBR = United Kingdom; HUN = Hungary; ITA = Italy; USA = United States; ZAF = South Africa.

Despite smaller aggregate increases in debt ratios in Germany, the United Kingdom, and Hungary and even outright decline in the United States, low-income households saw comparatively larger increases in debt. The buildup exceeded 10 percent of income in the United States for households with incomes below \$15,000. In the United Kingdom, debt increased by about 7.5 percent of income for households in the lowest tercile. In contrast, France and Italy were able to support low- and middle-income households' balance sheets, as seen from the decline in debt ratios in both countries for the bottom 50 percent of incomes.

This exercise is possible only for the small number of countries that conducted household wealth surveys in the past. As attention to inequality and distributional issues increases, the expansion of data collection on household balance sheets will allow a better understanding of the impact of shocks and policies.

Firms' Balance Sheets

Concentrated Vulnerabilities in the Nonfinancial Corporate Sector

Abundant liquidity support through loans, credit guarantees, and moratoriums on debt repayment contributed to debt buildup and was pivotal in preventing widespread corporate failures and related employment and output losses, especially among small and medium enterprises. The analysis here takes stock of balance sheet developments since the pandemic began, with a focus on the distribution of leverage and vulnerabilities across firms, sectors, and countries.

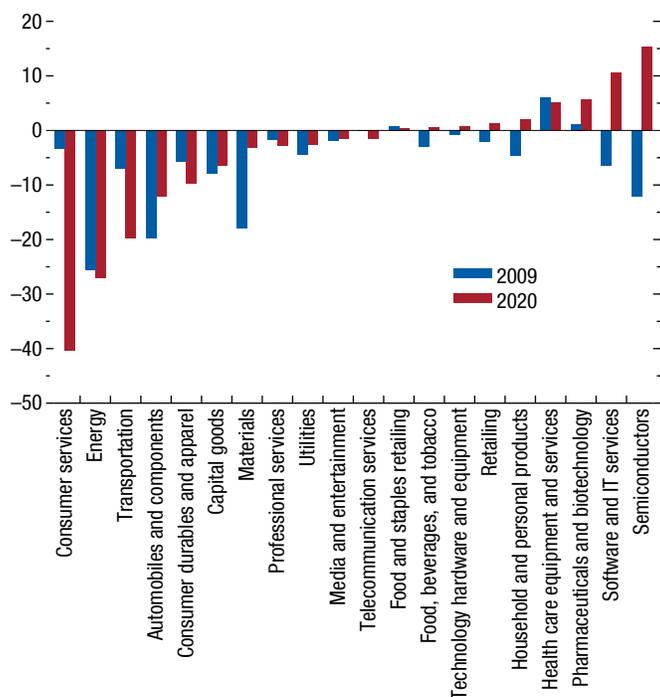
Figure 2.5 uses publicly listed firms' quarterly balance sheets⁴ to present revenue growth by sector across 71 advanced and emerging market economies in 2020 and compares this with 2009, at the height of the global financial crisis. A clear sectoral contrast emerges. Because of lockdowns or materials shortages, the largest losses are concentrated in a few sectors, such as consumer services, transportation, automobiles, and components. In contrast, at the other end of the distribution, some sectors gained from the structural pivot imposed by the pandemic (semiconductors, software and information technology [IT] services, pharmaceuticals and biotechnology, and health care equipment and services). This is different from what took place during the global financial crisis, when the shock hit almost all the sectors considered. Moreover, a substantial part of the increase in leverage during the pandemic was covered by government guarantees.⁵ Therefore, the risk of an adverse feedback loop in which corporate distress puts stress on the financial system—and eventually the public purse—appears smaller, at least in countries where the government can absorb the shock (Chapter 2 in the April 2022 GFSR analyzes risks associated with the sovereign-bank nexus in emerging markets). Figure 2.6 suggests that the biggest commitments were made in advanced economies, where fiscal space is the largest (see Box 2.1). However, it is worth noting that regulatory forbearance may have masked the real extent of losses.

⁴Standard & Poor's Capital IQ data are used in the whole subsection for their timeliness. But since they only comprise firms listed on stock exchanges, they cover only 7 percent of total employment. This suggests the reported share of firms in the worst-hit sectors should be considered a lower bound given that small and medium enterprises, which account for large labor and value-added shares in some of the economies, are not included in the sample. See Online Annex 2.1 for details.

⁵The share of those guarantees in total credit is highly variable, ranging from about 20 percent of all new credit in Germany to 100 percent (up to a certain limit) in Japan.

Figure 2.5. Uneven COVID-19 Impact on Nonfinancial Corporations' Revenue Growth (Percent)

For nonfinancial corporations, a clear sectoral divergence between winners and losers emerged, which was not so pronounced in the global financial crisis.



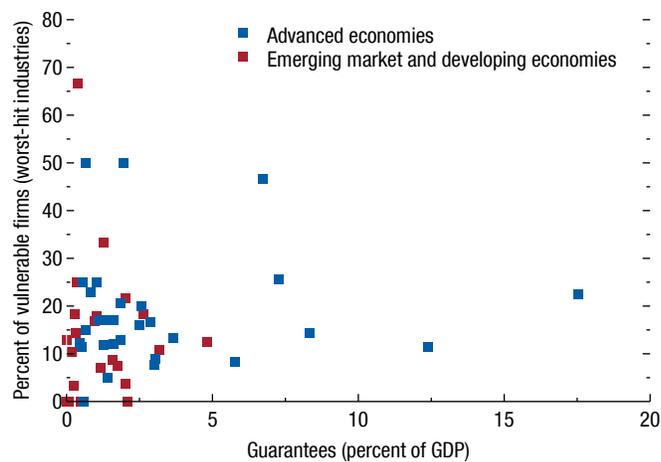
Sources: Standard & Poor's Capital IQ; and IMF staff calculations.
 Note: The sample consists of 71 countries; see Online Annex 2.1. The figure shows asset-weighted medians for annual revenue growth in 2009 (blue bars) and 2020 (red bars). IT = information technology.

Higher Leverage for Vulnerable Firms, Especially in Worst-Hit Sectors

Leverage by sector group: Based on Figure 2.5, sectors can be grouped into three clusters: the worst-hit industries (the five sectors experiencing the strongest drop in revenue growth in 2020), the least-hit industries (the five sectors experiencing the highest revenue growth), and the middle ones as a residual category. Leverage, defined as firms' debt-to-asset ratio, increased during the pandemic in the worst-hit industries. As of the second quarter of 2021 (the latest data point available), it remained well above precrisis levels (Figure 2.7, panel 1). Net debt (gross debt net of cash holdings) also increased substantially in vulnerable firms in the worst-hit sectors, especially in emerging markets (Figure 2.7, panel 2). This is in stark contrast to what took place in other sectors that deleveraged during the pandemic, reflecting both higher assets and lower liabilities.

Figure 2.6. Exposure to Contingent Liabilities Associated with Credit Guarantees (50 Percent Scenario)

A combination of high vulnerabilities and generous guarantees is concentrated in advanced economies.



Sources: IMF, COVID-19 Policy Tracker; Standard & Poor's Capital IQ; and IMF staff calculations.
 Note: Actual data on take-up rates of government guarantees are not available for most countries. The figure displays governments' exposures in a scenario in which it is assumed that 50 percent of the announced guarantees are contracted. The share of vulnerable firms refers to the mean share of firms in the worst-hit industries in 2021 that were in the top tercile of the debt-to-asset ratio and the bottom tercile of the returns on assets distribution and had an interest coverage ratio of less than 1.

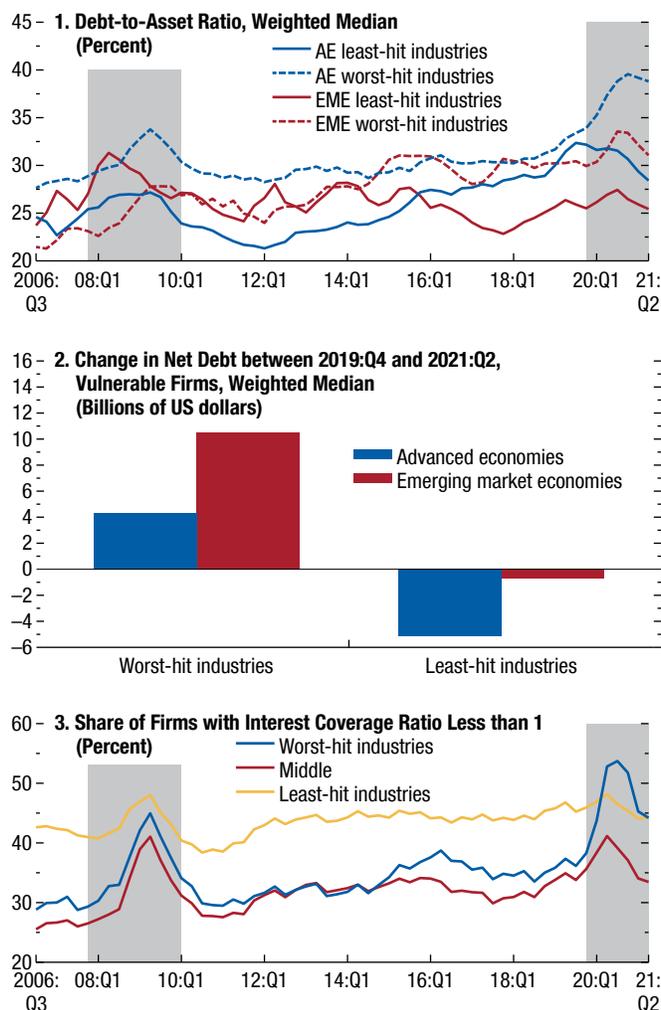
Assessing the debt burden: Debt accumulation may not be detrimental in itself: a highly indebted firm might still have a healthy balance sheet—as reflected in ample liquid asset holdings and high profits. In contrast, a firm's capacity to invest, innovate, and grow may be compromised if high leverage is coupled with profitability so low that the firm cannot make interest payments; in that case, the interest coverage ratio is less than 1. In the worst-hit industries, profitability dropped to levels comparable to those during the global financial crisis and has not yet recovered completely. This reflects both earning losses (before interest and taxes) and higher interest rate payments. The share of firms in worst-hit sectors with an interest coverage ratio of less than 1 has yet to revert to its pre-pandemic level (Figure 2.7, panel 3).

Vulnerable firms are defined as nonfinancial corporations with high leverage, low profitability, and an interest coverage ratio less than 1.⁶ Not only are

⁶Since this analysis considers the distribution of leverage and return on assets by sector, high leverage is defined as that above the average threshold of the top tercile across industries (35 percent) and low profitability as that below the average of the bottom tercile of return on assets (0.2 percent).

Figure 2.7. Heterogeneous Effect on Nonfinancial Corporation Balance Sheets

The pandemic exacerbated weak balance sheet positions only in the worst-hit industries.



Sources: Standard & Poor's Capital IQ; and IMF staff calculations.
 Note: Sample consists of 71 economies; see Online Annex 2.1. Panels 1 and 3 show a three-quarter moving average; shaded areas indicate the global financial crisis and COVID-19. Vulnerable firms have an interest coverage ratio of less than 1 and are in the top tercile of the debt-to-asset ratio distribution and the bottom tercile of the return on assets distribution. Net debt = total liabilities net of cash and equivalents. AE = advanced economy; EME = emerging market economy.

unprofitable indebted firms with low liquidity more exposed to potential asset repricing (Ding and others 2021) and the withdrawal of policy support, but they are also more likely to underinvest (Albuquerque 2021). Eighteen months into the pandemic, the share of vulnerable firms remained higher than in the global financial crisis and concentrated in

the worst-hit sectors, where indebtedness was also relatively higher (Figure 2.8, panels 1 and 2). This share has declined since its peak at the end of 2020, however, reflecting higher returns, better cash flows, and lower debt.

How macroeconomically relevant is all this? Figure 2.8, panel 3, shows the 2020 share of vulnerable firms by sector with regard to their contribution to countries' value added. One of the worst-hit sectors, consumer services (including tourism, recreation, entertainment, and education), accounted for almost 10 percent of value added and comprised about 30 percent of vulnerable firms. Both are sizable shares.⁷ Overall, worst-hit industries represented 18 percent of value added and a quarter of the labor force.⁸

Extraordinary measures to cushion the impact of the pandemic on firms' cash flow have helped prevent corporate failures. Government credit guarantees have helped ensure broad access to credit and have protected bank balance sheets. Whether this extra leverage will affect investment remains uncertain. It will depend on (1) the strength of the recovery, especially in worst-hit sectors, and (2) the tightness of future financial conditions as monetary policy is normalized (Gourinchas and others 2020, 2021; Cros, Epaulard, and Martin 2021).

Private Debt and the Business Cycle

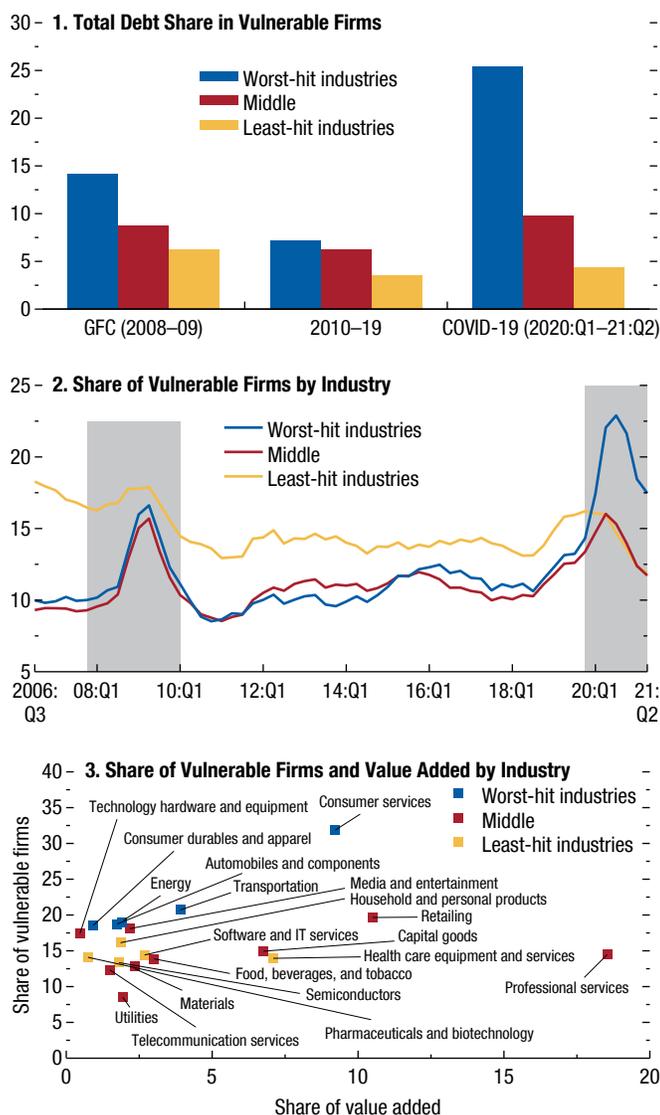
The leverage buildup during the 2020 recession can be seen as an efficient reaction to the pandemic, perceived as a temporary shock. However, it led to large increases in the private-debt-to GDP ratio that are liable to affect future consumption and investment. This section quantifies the implications of leverage buildup for growth. In line with recent literature, it shows the quantitative importance of leverage cycles

⁷Note that these vulnerabilities may be underestimated, since the stylized facts presented are based on data for listed firms, which are on average larger and less represented in worst-hit sectors than small and medium enterprises, as well as less likely to experience distress (Carletti and others 2020; Díez and others 2021).

⁸Value-added and employment figures are based on the Organisation for Economic Co-operation and Development (OECD) STAN Statistical Analysis Database and are available with a detailed sector breakdown only for Austria, Colombia, the Czech Republic, Finland, Greece, Iceland, Mexico, the Netherlands, New Zealand, the Republic of Korea, the Slovak Republic, Sweden, Turkey, and the United States.

Figure 2.8. Concentration of Nonfinancial Corporation Vulnerabilities
(Percent)

Vulnerable firms hold a higher share of debt, are concentrated in the hard-hit industries, and are macroeconomically relevant.



Sources: Organisation for Economic Co-operation and Development; Structural ANalysis database; Standard & Poor's Capital IQ; and IMF staff calculations. Note: Sample consists of 71 economies in panels 1 and 2 and 14 economies for which an adequate sectoral breakdown of the value-added data is available in panel 3; see Online Annex 2.1. Vulnerable firms have an interest coverage ratio of less than 1 and are in the top tercile of the debt-to-asset ratio distribution and the bottom tercile of the return on assets distribution. Panel 2 shows a three-quarter moving average; shaded areas indicate the global financial crisis and COVID-19. Panel 3 shows the share of vulnerable firms in each sector in 2020 and value added corresponding to these sectors as a percent of total value added in these economies in 2019. GFC = global financial crisis.

for growth forecasting.⁹ It first documents empirical regularities based on cross-country aggregate data and then digs deeper into the mechanism, highlighting the importance of heterogeneity in the financial situations of households and firms.

Output Responses to Deleveraging Pressures

Cross-Country Evidence

Following a buildup of private-debt-to-GDP ratios over and beyond what a smooth trend would predict—defined as *excess credit*—output growth typically slows as firms and households reduce debt. Local projections, as in Jordà (2005), depict the dynamic responses of output, with all else kept constant.¹⁰ The empirical approach relies on a panel of macroeconomic data for 43 countries (27 advanced economies and 16 emerging market and developing economies) over 52 years from 1969 to 2020 (see Online Annex 2.4).¹¹ For households, a 1 percentage point change in the excess-credit-to-GDP ratio results in a persistent decline in private consumption of 0.5 percent in advanced economies and 2 percent in emerging market and developing economies five years later. Nonfinancial corporate credit swings induce a similar investment response.¹² Both consumption (following excess household credit) and investment (following excess nonfinancial corporate credit) decline substantially more in emerging market and developing economies (Figure 2.9).

⁹Mian, Sufi, and Verner (2017) show that professional economic forecasters systematically overpredict GDP growth at the end of household debt buildup cycles. A rise in household debt over the three years preceding a forecast helps predict growth-forecasting errors.

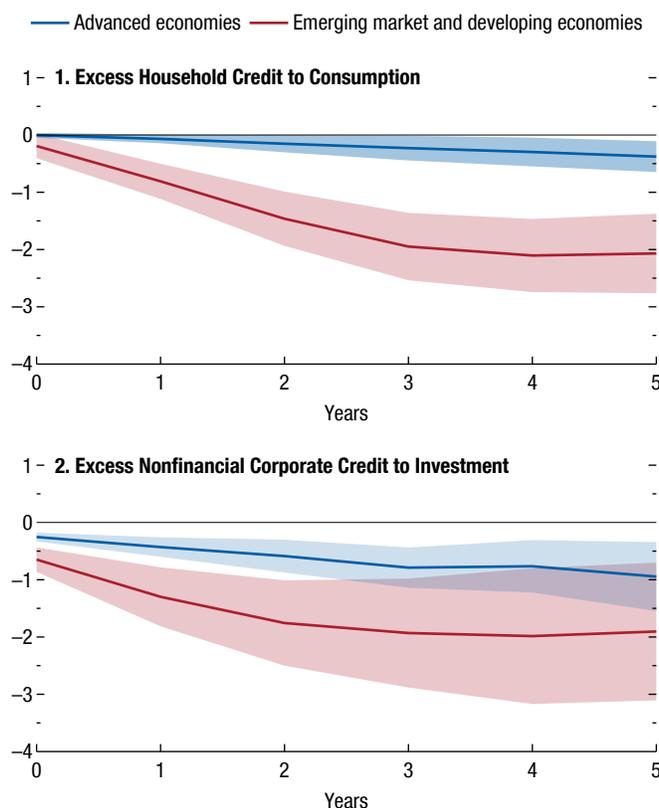
¹⁰To focus on large and persistent credit cycles, excess credit is defined as the three-year trailing average of the cyclical component of the Hamilton (2018) filter of private-debt-to-GDP ratios.

¹¹Because the impact of leverage buildup on future growth might be different in different parts of the cycle, the local projection introduces time fixed effects. These make it possible to control for business cycle and other time-varying influences common to all countries in the sample. Country fixed effects control for country-specific factors. Potential idiosyncratic effects specifically related to the presence of public guarantees are not taken into account. The implications for future growth are uncertain and depend in part on governments' propensity and capacity to forgive or restructure those debts before the guarantees need to be activated. In the worst-case scenario of limited fiscal and monetary space and a large bank-sovereign nexus, activating public guarantees could even lead to doom loops (April 2022 GFSR).

¹²The total effect on output will be smaller, because the share of investment is smaller than the share of consumption in output and because of the generally larger share of imported input in investment.

Figure 2.9. Consumption and Investment Responses to Household and Nonfinancial Corporate Excess Credit
(Cumulative percentage points)

Excess private credit buildup affects consumption and investment more strongly in emerging market and developing economies.



Sources: Bank for International Settlements; and IMF staff calculations.
Note: Panel 1 shows the impact of a 1 percentage point increase in the three-year trailing average excess-household-credit-to-GDP ratio on cumulative consumption growth. Panel 2 shows the impact of a 1 percentage point increase in the three-year trailing average excess-nonfinancial-corporate-credit-to-GDP ratio on cumulative investment. Jordà (2005) impulse response functions. Shaded areas represent 90 percent confidence intervals.

Wide heterogeneity is seen across different economies, but at face value these estimates would imply a slower recovery by a cumulative 0.9 percent of GDP over the next three years for advanced economies and 1.3 percent for emerging market economies (excluding China) as households and nonfinancial corporations reduce debt following the recent surge.¹³ These are estimates of averages based on cross-country

¹³China is excluded from this estimate because it is not in the same cyclical position. Deleveraging of nonfinancial corporations started a few years ago, likely already dampening growth.

aggregate data.¹⁴ The forces of deleveraging and the impact on growth could be stronger for countries with debt more concentrated among financially constrained households and vulnerable firms, where fiscal space is limited, the insolvency regime is inefficient, and inflation is high (requiring tighter financial conditions). The mechanisms in play are unpacked in the following subsections; they may explain some of the differences between emerging markets and advanced economies.¹⁵

Private and Public Debt Interactions

The rise in private debt during the COVID-19 pandemic was accompanied by a substantial increase in public debt. The latter rose by almost 15 percent of GDP in 2020, and uncertainties remain about contingent claims and the ultimate guarantor of much of the private debt buildup (see the April 2022 *Fiscal Monitor* for more details).

Excess credit and subsequent deleveraging are expected to have a larger negative effect on output where governments struggle to mitigate the drag through public spending—that is, those with limited fiscal space.¹⁶

Using the same framework as in the previous subsection, this subsection explores the question within advanced economies and emerging market and developing economies by using quartiles of a fiscal position indicator by year to compare the dynamic responses of GDP following excess household credit (see Online Annex 2.4). Figure 2.10 contrasts countries in the two groups with fiscal positions that are relatively strong versus those that are fairly weak. It shows that dynamic responses of future aggregate output to private debt buildup are substantially more negative in countries with weak fiscal positions; they are larger by orders

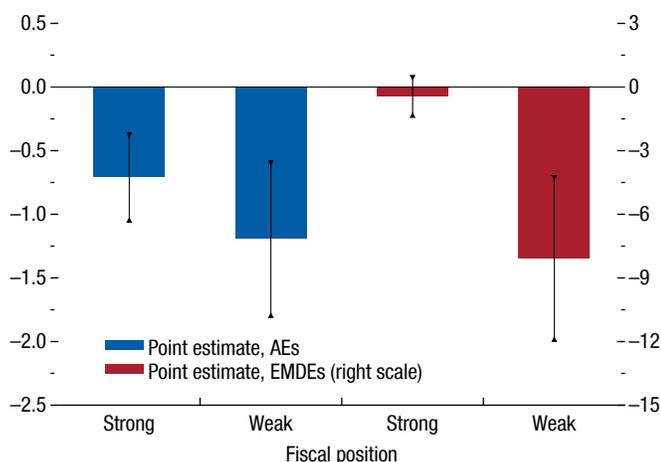
¹⁴Note that these estimates are not driven by boom-bust episodes. The dynamic responses are unaltered by the exclusion from the sample of the global financial crisis and its aftermath. The sample covers 43 countries over 51 years, and only a minority of excess credit episodes led to a recession. For the United States, for example, where recessions declared by the National Bureau of Economic Research are clearly classified, only about 15 percent of excess credit episodes were followed by a recession. Dell’Ariccia and others (2016) conduct similar analysis and find that about two-thirds of credit booms do not end up as busts but lead to subpar growth.

¹⁵Dissecting the role of debt maturity and currency denomination in emerging markets opens up avenues for future research, but data constraints are a limiting factor.

¹⁶A mere measure of the public-debt-to-GDP ratio is unlikely to be a sufficient statistic for fiscal space, a multidimensional assessment (IMF 2018). Different countries can support very different levels of public debt and fiscal deficits. See Box 2.1 and Ghosh and others (2013) for further discussion.

Figure 2.10. Fiscal Position and Deleveraging
(Cumulative output growth over three years; percentage points)

A strong fiscal position can mitigate the negative output response following excess credit buildup, especially in emerging market and developing economies.



Sources: Bank for International Settlements; Kose and others (2017); World Bank; and IMF staff calculations.

Note: The figure shows the impact of a 1 percentage point increase in the three-year trailing average excess-household-credit-to-GDP ratio on cumulative output growth over three years. Countries' fiscal position is proxied by within-year quartiles of the principal component of six fiscal indicators: (1) general government gross debt, (2) primary balance, and (3) fiscal balance—all three as a percent of GDP; (4) cyclically adjusted balance as a percent of potential GDP; and (5) general government gross debt and (6) fiscal balance—both as a percent of average tax revenues. The figure contrasts the response between the top (strong) and bottom (weak) quartiles of the fiscal position. AEs = advanced economies; EMDEs = emerging market and developing economies.

of magnitude in emerging market and developing economies.¹⁷ For emerging market economies with the weakest fiscal positions, these numbers imply a drag on growth of up to 9 percent cumulative over three years.

Borrower Heterogeneity and Debt-Output Dynamics

This section analyzes the implications of increasing leverage among financially constrained households and vulnerable firms. It unpacks the mechanism described in the introduction by exploiting micro-level data on firms and households.

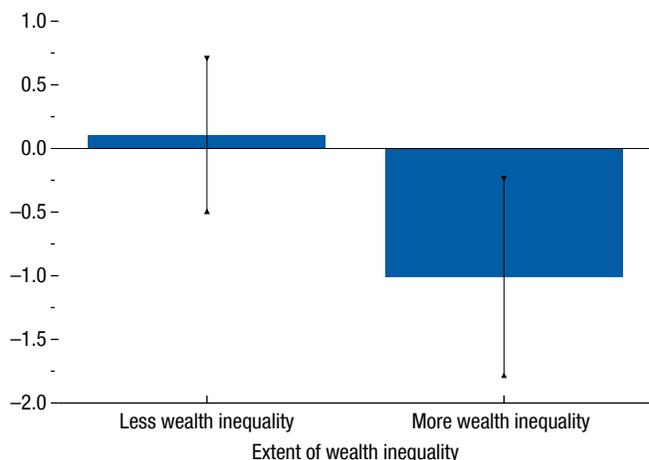
Households: Inequality and the Impact of Private Debt on Output

Here the focus is on the cyclical implications of debt buildup in countries differentiated according to wealth inequality. The analysis is based on the same

¹⁷This analysis should be interpreted as suggestive, since only four emerging market economies are included.

Figure 2.11. Advanced Economies: Wealth Inequality and Deleveraging
(Cumulative output growth over three years; percentage points)

Greater wealth inequality amplifies the output response following excess credit buildup.



Sources: Allen, Kolerus, and Xu (2022); Bank for International Settlements; World Inequality Database; and IMF staff calculations.

Note: The figure displays the impact of a 1 percentage point increase in the excess-household-credit-to-GDP ratio on cumulative output growth over three years. Countries are ranked by the extent of dissaving among the bottom 50 percent, where more dissaving proxies for greater wealth inequality. High wealth inequality denotes countries in the top quartile of dissaving among the bottom 50 percent over the preceding three years. Low wealth inequality denotes countries in the bottom quartile of dissaving among the bottom 50 percent over the preceding three years. Error bars represent 90 percent confidence intervals.

empirical framework as in the first section but relies on micro-level data on household saving and income distribution to sort countries: dissaving among low-income households is used as a proxy for (bottom) wealth inequality.¹⁸ Figure 2.11 contrasts the cumulative future output responses to the buildup of excess leverage in countries where households are thought to be financially constrained (more wealth inequality) and others (with less wealth inequality). Countries where households are relatively more financially constrained (more wealth inequality) tend to see a larger drag on future output following excess credit buildup (see Online Annex 2.4).

¹⁸To proxy for bottom wealth inequality across countries, a three-year trailing average of dissaving of households in the bottom 50 percent of income is computed using data for advanced economies from Allen, Kolerus, and Xu (forthcoming). The results are then sorted into four quartiles per year. Figure 2.11 compares the debt-output dynamics for high- (most dissaving by bottom 50 percent) and low-inequality groups.

Rising inequality (Chancel and others 2022) may also have stark implications for countercyclical policy (Mian, Straub, and Sufi 2021a, 2021b, 2021c, 2021d), an important consideration for governments as they contemplate unwinding exceptional support. Higher inequality tends to push down the equilibrium (natural) interest rate, a key concept for calibrating the pace of policy normalization as it affects both *fiscal* (Box 2.1) and *monetary* (Box 2.2) space.

Corporate Leverage and Investment: The Importance of Vulnerable Firms

Drilling down one level deeper than the macroeconomic analysis reported in Figure 2.9, panel 2, this subsection turns to the microeconomic drivers linking corporate leverage to investment. In so doing, it investigates the particular role played by vulnerable firms.

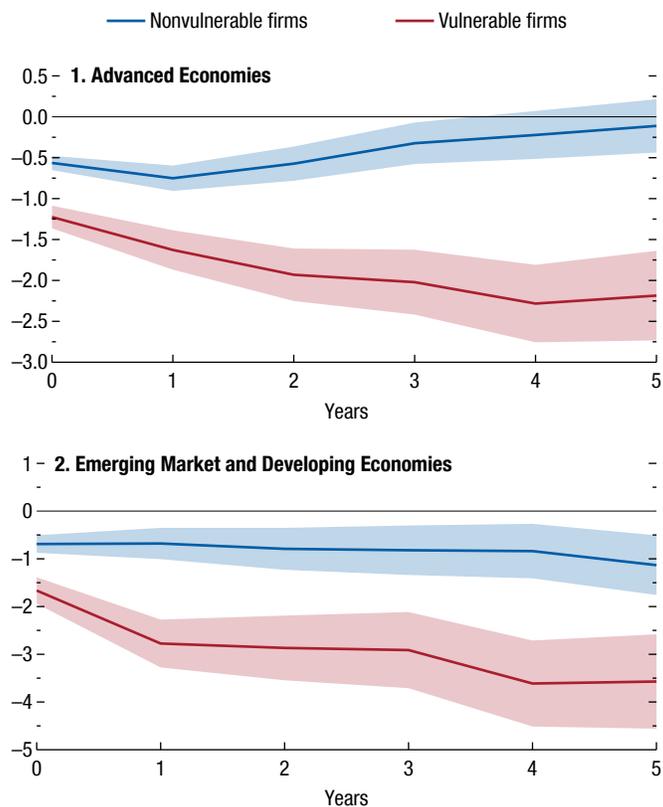
Firms' leverage buildup may hold back investment under three circumstances. First, high outstanding debt may increase the service cost of future debt, preventing further borrowing to finance new investment (Krugman 1988; Drehman, Juselius, and Korinek 2017). Second, credit booms lead to more-leveraged balance sheets and tighter borrowing constraints when firms' net worth declines (Bernanke and Gertler 1989; Bernanke, Gertler, and Gilchrist 1999). Finally, for firms with excess leverage, the return on future investment is likely to go toward repaying existing debt, decreasing equity holders' incentive to finance new investment projects (Myers 1977). Vulnerable firms—defined as highly leveraged firms with low profitability and low liquidity (interest coverage ratio less than 1)—are particularly exposed to all these channels.

To quantify the role of vulnerable firms in driving investment dynamics following leverage buildup, the analysis relies on a local projection estimation based on a comprehensive firm-level panel data set (see Online Annex 2.3).¹⁹ Following Albuquerque (2021), leverage buildup is defined as the lagged three-year cumulative change in the debt-to-asset ratio. By including firms fixed effects, our estimates capture how firms' investment responds when the firm has higher (or lower) leverage increase than usual; sector-country-year fixed effects help pin down the partial equilibrium effect of leverage buildup by controlling for other time-varying confounding factors, such as the macroeconomic cycle and general equilibrium forces at play.

¹⁹The analysis is based on Bureau van Dijk Orbis and comprises 2.5 million listed and unlisted firms from 1998 to 2018.

Figure 2.12. The Role of Vulnerable Firms
(Cumulative investment loss; percentage points)

Cumulative investment losses associated with leverage buildup are larger for vulnerable firms.



Sources: Bureau van Dijk Orbis; and IMF staff calculations.

Note: The figure illustrates the responses of firms' investment ratio following a one-standard-deviation increase in the debt-to-asset-accumulation ratio, conditional on firms' being vulnerable. Vulnerable firms have an interest coverage ratio of less than 1 and are in the top tercile of the debt-to-asset ratio distribution and the bottom tercile of the return on assets distribution. Shaded areas represent 90 percent confidence intervals.

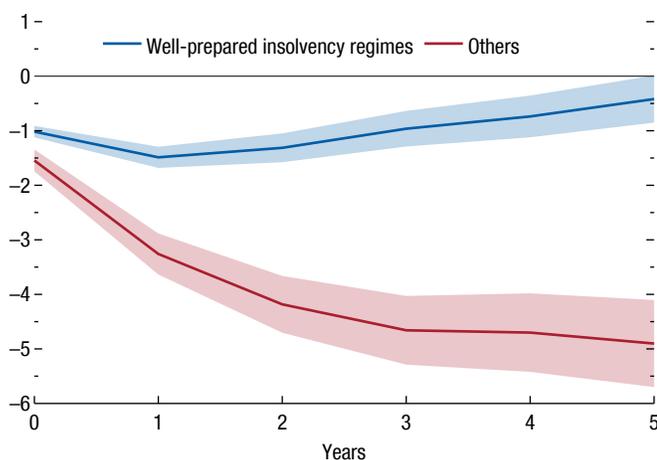
As reported in Figure 2.12, following leverage buildup, vulnerable firms reduce investments the most, generating permanent losses to the stock of tangible assets. This is true in advanced economies and emerging markets alike. The maximum effect is reached after four years.

The Role of Effective Insolvency Frameworks

To mitigate these negative effects and support recovery, vulnerable nonviable firms need to be restructured or liquidated to free up resources that can be directed to new growth areas. However, coordination frictions among creditors, weak contract enforcement, costly liquidation procedures, and asymmetric information may delay the restructuring process.

Figure 2.13. The Role of Effective Insolvency Frameworks
(Cumulative percentage points)

Effective insolvency and restructuring proceedings prevent a long-term decline in the future stock of tangible capital following firms' leverage buildup.



Sources: Bureau van Dijk Orbis; IMF, Crisis Preparedness Index; and IMF staff calculations.

Note: The figure illustrates the cumulated response of firms' investment ratio following a one-standard-deviation increase in leverage buildup, conditional on a country's insolvency regime. Well-prepared insolvency regimes are defined as those of countries in the top quartile of the IMF Strategy, Policy, and Review and Legal Departments' indicator of crisis preparedness in 2020. Shaded areas represent 90 percent confidence intervals.

The effectiveness of insolvency frameworks plays a key role that can be analyzed using a novel IMF indicator that sorts countries according to the preparedness of their insolvency frameworks to face systemic crises.²⁰ Figure 2.13 compares the cumulated response of investment ratios to firms' leverage buildup in countries with well-prepared insolvency systems in place versus others. The findings suggest that inadequate insolvency proceedings account for most of the long-term decline in the stock of tangible capital.

Countercyclical Policy Effects amid High Private Debt

Understanding how private debt and its distribution affect the transmission of countercyclical macroeconomic policy is important to help countries calibrate

²⁰An effective and well-prepared insolvency regime is characterized by a comprehensive set of legal tools and institutions relevant for widespread restructuring and insolvency proceedings, such as out-of-court and hybrid restructuring, rapid reorganization and liquidation processes, and a proper institutional framework. For a detailed discussion on the construction of the indicator and its values, refer to Araujo and others (2022) and Online Annex 2.3.

the exit from the expansionary fiscal and monetary policy responses to the COVID-19 recession. This section analyzes (1) the importance of countries' aggregate debt levels for the impact of fiscal consolidation and monetary tightening and (2) how policy affects different groups of households and firms. In particular, it investigates whether tightening policies has a larger impact on more financially constrained households and firms.

The analysis uses local projections to estimate the effects of policies on real output, household consumption, and corporate investment over time for a sample of advanced economies and emerging markets (see Online Annex 2.5). Fiscal and monetary policy shocks (changes in policy that are exogenous to the near-term economic outlook) are borrowed from previous cross-country studies (IMF 2021b, Chapter 2, for fiscal consolidations; Furceri, Loungani, and Zdzienicka 2016 for monetary tightening). The aggregate response of output to these fiscal and monetary policy shocks is in line with the previous literature (Ramey 2016).²¹

Private Debt and the Transmission of Countercyclical Policy

The increase in private debt before and through the COVID-19 recession may have changed how economies respond to policy tightening, with more-leveraged households and firms having greater sensitivity. This is first investigated at the country level by interacting the policy shock with an indicator variable equal to 1 for each country in periods when the ratio of private debt to GDP is in the top quartile for each country (Ramey and Zubairy 2018 and April 2020 WEO for fiscal policy; Tenreyro and Thwaites 2016 for monetary policy). Figure 2.14 shows that fiscal consolidation is more contractionary when the private-debt-to-GDP ratio is high.

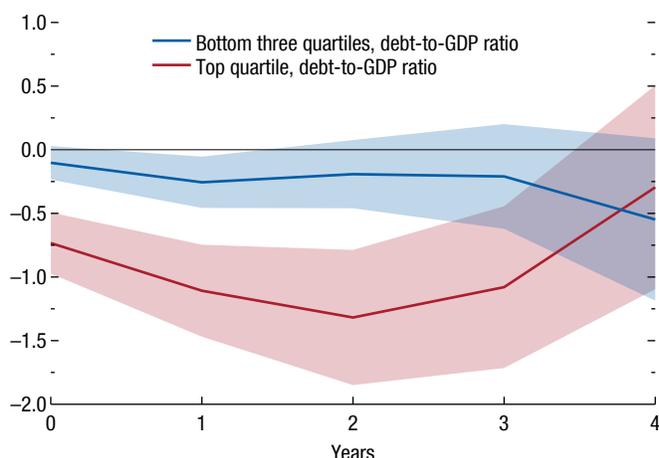
Heterogeneous Transmission of Monetary and Fiscal Policies

Recent studies recognize that the effects of macroeconomic policy depend on the characteristics of households and firms. For *households*, policy transmission is affected by their income, their debt, and the

²¹A fiscal consolidation of 1 percent of GDP leads to a $\frac{3}{4}$ percent decline in output, and a monetary policy tightening of 100 basis points leads to a $\frac{1}{2}$ percent decline in output after two years. See Online Annex 2.5 for details.

Figure 2.14. Output Sensitivity to Fiscal Consolidation as Function of Private Debt
(Percentage points)

Fiscal consolidation leads to a larger contraction in real output when private sector debt is high.



Sources: IMF, Global Debt Database; and IMF staff calculations.
Note: The solid lines represent the estimated response of real GDP to a fiscal consolidation shock. Shaded areas represent 90 percent confidence intervals. The x-axis indicates the number of years after the shock.

types of assets they hold (particularly whether illiquid or liquid). The intuition is straightforward: households without liquid assets, and in particular indebted households, have a higher propensity to consume out of disposable income than savers, who can maintain consumption by drawing down savings following negative shocks to income (Jappelli and Pistaferri 2010, 2014; Crawley and Kuchler 2018; Kaplan, Moll, and Violante 2018). Studies focused on the effects of monetary policy on consumption for the United Kingdom and the United States have found that the *indirect* effects of an unexpected change in interest rates, which operate through general equilibrium changes in labor demand and housing wealth, far outweigh the standard *direct* intertemporal substitution effect (Kaplan, Moll, and Violante 2018; Slacalek, Tristani, and Violante 2020). These indirect effects are particularly large for the lowest-income households, with the largest changes in income after a monetary policy shock (Lenza and Slacalek 2018). With lower-income households having the lowest net worth (see Kumhof, Rancière, and Winant 2015 for evidence for the United States), one would also expect these to be most affected by the direct effect of monetary policy tightening on disposable income, through higher debt-service costs.

For *firms*, the channels are similar, with the literature focusing on how firms' balance sheets affect their access to external financing. The financial accelerator model (Bernanke, Gertler, and Gilchrist 1999) shows how changes to the net worth of firms over the business cycle amplify the effects of monetary policy and other changes to credit conditions. In the United States, the leverage and liquidity of firms have been found to affect how responsive they are to monetary policy (Ottonello and Winberry 2020; Jeevas 2019).

Figure 2.15, panel 1, reports the results for the effect of fiscal consolidation on consumption by income quintiles.²² The figure shows the effects on each income quintile two years after the shock. It highlights that (1) the impact of consolidation is negative for all income groups and (2) the largest impact is on the consumption of the lowest-income-quintile households. After two years, the consumption drop among the lowest-income quintile is twice as large as the consumption decline among the highest-income quintile.²³ The results are similar for all horizons, and the effect of the fiscal consolidation persists in each case.

Figure 2.15, panel 2, reports the results for the effect of monetary tightening on corporate investment by leverage quintiles.²⁴ The figure shows that the impact of tightening is again largest for the most leveraged quintile of firms. After two years, investment by the most leveraged quintile is a cumulative 6½ percent lower in response to a surprise 100 basis point rise in the policy rate. This is 4 percentage points lower than the decline in investment by the least leveraged quintile. As with fiscal consolidation, the effects of monetary tightening on investment are persistent.

Overall, these results point to potential amplification of output costs in countries with private debt concentrated in vulnerable households and firms. This concern may be lessened in countries where stringent macroprudential measures were in place before the COVID-19 recession. Intuitively, measures that “lean against the wind,” such as loan-to-value restrictions and debt-to-income caps, may have limited the

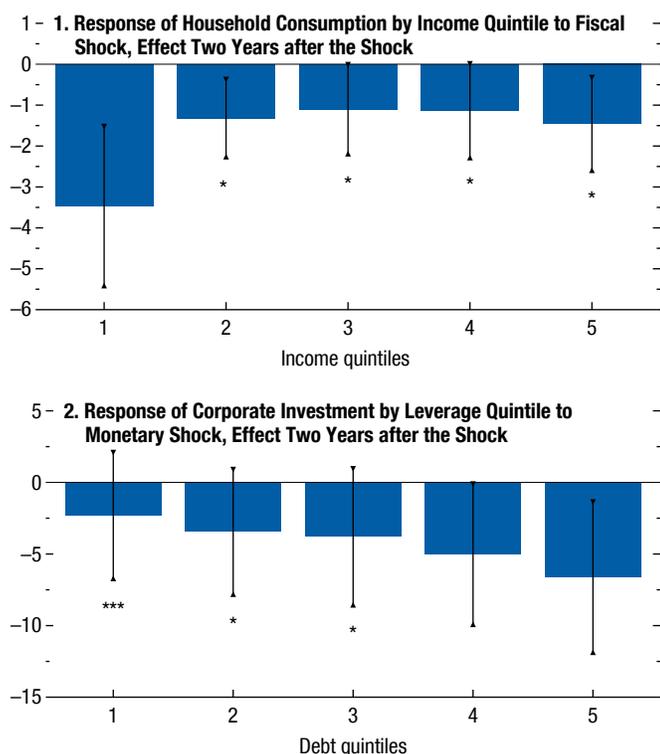
²²The analysis is based on a sample of 13 European countries from 1990.

²³Income and wealth inequality show close correspondence (see Figure 2.3). Low-income households will also have the lowest net assets as a share of income and therefore will be the most financially constrained. However, a lack of distributional balance sheet data for most countries limits the empirical exercise to income distribution.

²⁴This analysis is based on a reduced sample of 25 economies from 1998 to allow sufficient time coverage.

Figure 2.15. Effects of Macro Policy Tightening on Heterogeneous Households and Firms
(Percent change)

The effect of fiscal consolidation on consumption is largest in lower-income households. Monetary policy tightening negatively affects corporate investment for the most leveraged firms.



Sources: Allen, Kolerus, and Xu (2022); Bureau van Dijk Orbis; and IMF staff calculations.

Note: The bars in panel 1 represent the estimated effect of a fiscal consolidation shock of 1 percent of GDP on the consumption of five groups of households, according to their income levels, two years after the shock. In panel 2, the bars represent the estimated effect of a monetary policy tightening shock of 100 basis points on the real investment of five groups of firms, according to their leverage ratios, two years after the shock. The x-axis indicates the quintile of corporate leverage. Error bars denote 90 percent confidence intervals. Statistically significant differences between the lowest income quintile in panel 1 (and highest leverage quintile in panel 2) and other quintiles at the 1, 5, and 10 percent confidence levels are denoted, respectively, by ***, **, and *.

buildup of debt among vulnerable households and helped create buffers for banks, limiting the output cost of tightening monetary and financial conditions (see the discussion in the April 2021 GFSR and Online Annex 2.5).²⁵

²⁵Online Annex 2.5, Figure 2.5.4, estimates the marginal effect of macroprudential regime stringency (based on iMaPP, the IMF's integrated macroprudential policy database) in mitigating the output decline from monetary tightening. The medium-term (two years) effect of tightening is reduced by half in countries where the macroprudential regime is the most stringent.

Conclusions and Policy Implications

Soon after the pandemic began in early 2020, exceptional measures to save lives and livelihoods were deployed. On top of direct fiscal support to households and firms, governments helped sustain the flow of credit: central banks' accommodation and temporary financial regulatory changes, including repayment moratoriums and debt guarantees, offered a lifeline to many businesses and households.

Still, the impact of the pandemic on households' and firms' balance sheets has been unequal across and within countries, in large part reflecting differences in sectoral composition. Contact-intensive services have contracted during the pandemic, while production and exports of goods and services substitutes (for example, appliances, computer chips, software) have thrived. Relatedly, the situation of workers in tourism services, restaurants, hospitality, and entertainment has in many cases remained precarious two years after the start of the pandemic, while labor shortages and rapid wage increases have become the norm in construction and logistics, for example (IMF 2021c). The war in Ukraine has further disrupted global supply chains. Large increases in the prices of energy and food products are likely to affect low-income households—especially in emerging markets and developing economies—and could spill over to many industries via higher input prices if the conflict is prolonged (see Chapter 1).

This chapter estimates that recent leverage buildup could slow the recovery by a cumulative 0.9 percent of GDP in advanced economies and 1.3 percent in emerging markets over the next three years. But these are average effects based on cross-country aggregate data.²⁶ Financially constrained households and vulnerable firms, which have grown in number and proportion during the COVID-19 pandemic, are expected to cut spending by more, especially in countries where the insolvency framework is inefficient and fiscal space limited.

As monetary policies are being normalized amid rising inflationary pressures, governments should calibrate the pace of fiscal consolidation to country circumstances to avoid large disruptions and potential scarring. Where the recovery is well underway and balance sheets are in good shape, fiscal support can be reduced faster, facilitating the work of central banks.

²⁶The estimates also predate the war in Ukraine and its possible consequences for balance sheets.

Elsewhere, targeted support can be considered within credible medium-term fiscal frameworks (see Box 2.1).

In particular, government support to firms could be limited to circumstances in which there is clear market failure (April 2022 *Fiscal Monitor*). Where a wave of bankruptcies in sectors heavily hit by the pandemic could spill over to the rest of the economy, for example, governments could provide incentives for restructuring over liquidation, and where necessary, solvency support could be considered. Among possible frameworks for such support, debt relief in the form of quasi-equity injections into small and medium enterprises (for example, through profit participation loans) could be considered in countries with adequate fiscal space, transparency, and accountability (see Díez and others 2021). Of course, targeting the right viable businesses—those that are insolvent as a result of the pandemic but that have viable business models—is hard (see the April 2021 GFSR). To lessen the burden on public finances, temporary higher taxes on excess profits could be envisaged. This would help claw back some of the transfers to firms that did not need them (Gourinchas and others 2021).

The analysis presented in this chapter also points to the need to enhance restructuring and insolvency

mechanisms (through, for example, dedicated out-of-court restructuring) to promote a rapid reallocation of capital and labor toward the most productive firms (Araujo and others 2022; Díez and others 2021). To address the short-term impact of pandemic-related insolvency, countries could prioritize the weakest aspects of their regimes while working on more long-term comprehensive reforms. Similarly, if large household debt threatens the recovery, governments should consider cost-effective debt-restructuring programs aimed at transferring resources to relatively vulnerable individuals with a high propensity to consume. By design, these programs should seek to minimize moral hazard (April 2012 WEO). The debt bias in corporate and personal taxation should also be eliminated to avoid providing incentives for excessive debt buildup, resource misallocation, and recurrent boom-bust cycles.

Finally, the chapter stresses the importance of distributional considerations to improve macroeconomic forecasting and policymaking. While further research is needed to enrich the tools and models available to policymakers, the priority is the collection of more detailed and real-time data on firms' and household balance sheets.

Box 2.1. Inequality and Public Debt Sustainability

The pandemic has exacerbated income inequality, extending a secular trend started in the 1980s (April 2021 *Fiscal Monitor*; Azzimonti, de Francisco, and Quadri 2014; Chancel and Piketty 2021; Chancel and others 2022). At the same time, interest rates have remained low despite steady increases in public debt. This apparent contradiction can be rationalized: higher-income households tend to save a larger share of their revenues. As their proportion to national income increases, so do savings and the associated demand for both private and public debt securities. This increase in savings lowers equilibrium interest rates and eventually the cost of borrowing (Mian, Straub, and Sufi 2021a, 2021b, 2021d; Del Negro and others 2017; Box 2.2). Therefore, *all else equal*, higher top income inequality raises the sustainable levels of public debt and primary deficit (Mian, Straub, and Sufi 2021c; Reis 2021). Rising inequality may require larger social transfers (and public debt) after the pandemic, but at the same time enhances governments' ability to finance them. Of course, all else is not always equal. Higher inequality could lead to lower potential growth, and increases in government debt are eventually met with higher interest rates as liquidity, regulatory, and safety premiums on government debt erode (Krishnamurthy and Vissing-Jorgensen 2012; Lian, Presbitero, and Wiriadinata 2020). Sustainable public debt has its limits.¹

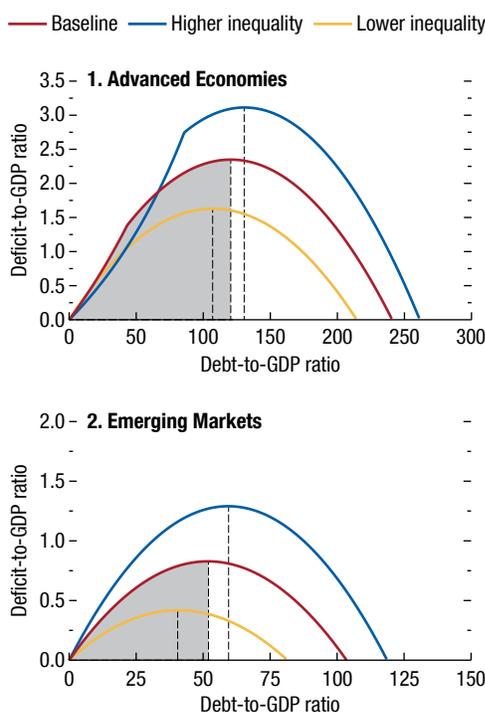
This box analyzes the implications of inequality for debt sustainability in a framework that allows those counteracting forces to play out. As governments contemplate exiting pandemic-related support policies, assessing the stringency of fiscal budget constraints is key to calibrating the pace of consolidation.

A simple calibrated model (based on Mian, Straub, and Sufi 2021c) can be used to draw a *deficit-debt-phase diagram* that depicts the set of sustainable combinations of primary deficit and debt (as a percent of GDP); meaning the combination of primary deficit and debt that can be maintained permanently given long-term growth and interest rates. The peak of the diagram shows the maximum sustainable debt-deficit level, taking into account economies' nominal potential growth (G) and forces driving the interest rate (R). The region to the left of the maximum represents a *free-lunch*

The author of this box is Anh Dinh Minh Nguyen.

¹Other institutional factors matter, including the effectiveness and credibility of policy, the interaction with monetary policy, and the quality of institutions (October 2021 *Fiscal Monitor*; IMF 2018).

Figure 2.1.1. Effect of Income Inequality on the Sustainable Level of Debt (Percent)



Sources: Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: The vertical line relates to the maximum sustainable primary deficit and its corresponding debt-to-GDP ratio. The shaded area indicates the free-lunch zone. The baseline calibration identifies savers, with the top 10 percent earning a 40 percent share of income in advanced economies and a 48 percent share of income in emerging markets. The advanced economies' (respectively, emerging markets') model is calibrated with an initial level of debt of 105 percent (55 percent) of GDP, an initial nominal interest rate of 1 percent (4.7 percent), and a nominal long-term trend growth of 3.2 percent (6.2 percent). The higher-/lower-inequality scenario adds/subtracts a 5 percentage point share of income to/from the baseline. In both cases, the debt-to-GDP ratio elasticity of interest rates is 0.017, implying that a 10 percent increase in the debt-to-GDP ratio leads the interest rate to increase by 17 basis points (Mian, Straub, and Sufi 2021c). A higher (lower) elasticity would decrease (increase) debt thresholds.

zone: primary deficits—either through lower taxes or higher expenditures—can be increased to support the economy without going down an unsustainable debt path. Because increasing debt eventually raises interest rates, the sustainable deficit starts shrinking to the right of the peak as debt increases. Eventually, the

Box 2.1 (continued)

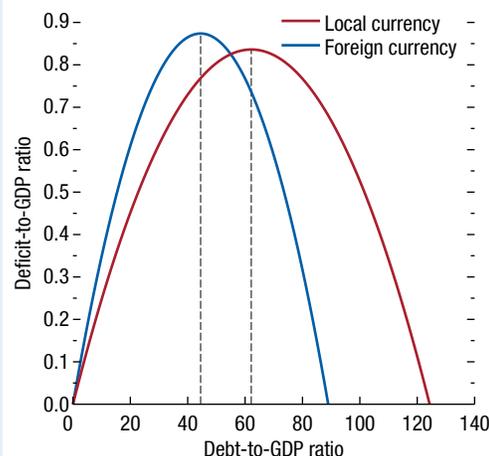
interest-growth differential ($R - G$) becomes positive, and a primary surplus (negative deficit) is required for a stable debt-to-GDP ratio.

Figure 2.1.1 highlights differences between advanced economies and emerging markets:² the sustainable level of debt is larger in advanced economies, because higher convenience premiums for liquidity and safety push R down.³ In both advanced economies and emerging markets, rising income inequality over the past four decades may have helped increase the sustainable *deficit-debt* pairs (Figure 2.1.1, blue lines), and the effect may have been sizable. Reasonable calibration suggests an increase in sustainable deficit of almost a full percentage point in advanced economies. This estimate is a higher bound, however. In countries where inequality undermines progress in education or leads to lower investment as a result of social unrest, for example, potential growth and the sustainable level of debt and deficit may be reduced. A country's resilience to higher debt is also determined

²Parameters for advanced economies have been calibrated to match the purchasing-power-parity-weighted average among advanced economy members of the Organisation for Economic Co-operation and Development in 2019, before the pandemic recession of 2020–21. Emerging market parameters have been calibrated to match the purchasing-power-parity-weighted average for Brazil, Chile, China, Colombia, Costa Rica, Hungary, India, Indonesia, Mexico, Poland, Russia, South Africa, and Turkey in 2019. Also see the note to Figure 2.1.1 for specific calibrations in emerging markets and advanced economies.

³Of course, country-specific factors, such as the elasticity of interest rates to debt, market access, and the currency denomination of public debt, matter as well.

Figure 2.1.2. Debt Denomination
(Percent)



Sources: Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: The model assumes an exchange rate depreciation of 30 percent in the event of a negative shock. The blue line reflects the case in which all debt is denominated in foreign currency, while the red line is the case in which all debt is in local currency. An economy with mixed-denomination debt would lie between these two cases.

by the share of public debt denominated in foreign currency. Calibrating the model above to emerging markets, the analysis shows that a higher share of foreign-currency-denominated debt tends to mean less room for fiscal support in the event of depreciation, highlighting higher solvency risks in emerging markets and the need to build buffers (Figure 2.1.2, blue line).

Box 2.2. Rising Household Indebtedness, the Global Saving Glut of the Rich, and the Natural Interest Rate

The “saving glut of the rich” is a term coined to describe the substantial rise in saving at the very top of the income distribution in the United States over the past four decades (Mian, Straub, and Sufi 2021d). This phenomenon has coincided with rising household indebtedness concentrated among lower-income households and rising income inequality. It may have also contributed to the secular decline of the natural rate of interest (Mian, Straub, and Sufi 2021b; Platzer and Peruffo 2022; Rachel and Summers 2019). Intuitively, as debt-service payments transfer income from low-propensity-to-save (borrower) households to high-propensity-to-save (lender) households, the ensuing rise in net supply of savings puts downward pressure on the natural interest rate.

The phenomenon may not be limited to the United States. This box presents new cross-country evidence of a *global* saving glut of the rich and its implications for the *natural interest rate*. The analysis builds on Allen, Kolerus, and Xu (2022) and combines multiple sources (raw microeconomic survey data, tax tabulations, and national accounts) for 41 advanced and emerging market economies.¹

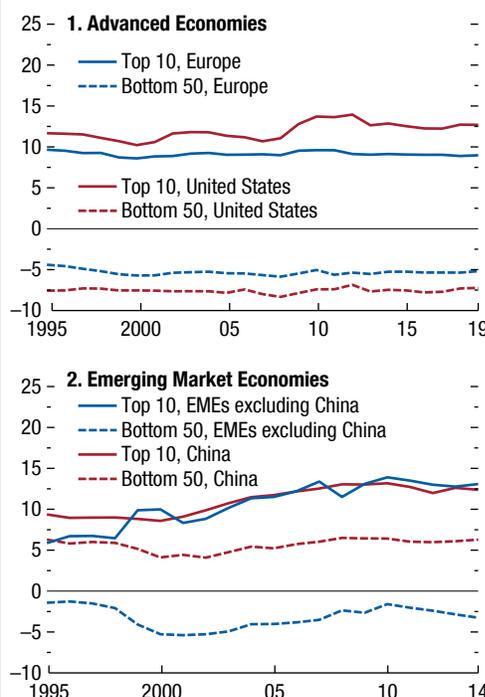
Global Saving Glut of the Rich

Estimating saving out of permanent income or wealth is challenging, especially when considering a panel of countries. This box relies on indirect evidence that income and wealth inequality are highly correlated (Bricker and others 2020; Kuhn, Schularick, and Steins 2020; Figure 2.3) and bases the analysis on current income distribution. Figure 2.2.1 suggests that saving is distributed highly unequally. In advanced economies, the richest 10 percent of households account for most of aggregate saving, about twice that of middle-class households (sixth

The authors of this box are Cian Allen and Christina Kolerus. The analysis extends Allen, Kolerus and Xu (2022) to a larger set of countries.

¹Given important data limitations, extending the series to emerging market economies remains a challenge and relies on key assumptions. First, data on the distribution of (after-tax) disposable income is extended over time using growth rates of the distribution of before-tax income, which is more widely available (for countries with both series available, the time trends are very similar). Second, the raw survey data are not adjusted for under-reporting of the top of the distribution, missing imputed rents and retained earnings, as they are for advanced economies.

Figure 2.2.1. Saving by Income Group
(Percent of national income)



Source: IMF staff calculations.

Note: Europe: Weighted average for 27 European economies; EMEs excluding China: Weighted average of the Dominican Republic, India, Korea, Mexico, Peru, Russia, and South Africa. EMEs = emerging market economies; US = United States.

decile to eighth decile). The poorest 50 percent typically dissave at a rate ranging from 4 percent to 7 percent of national income a year, consistently more in the United States than in Europe.²

Emerging market economies show broadly similar saving levels by the rich but slightly smaller dissaving by the bottom 50 percent, possibly because of more restricted access to finance. China stands out: middle-class saving reaches 20 percent of national income, and saving by the bottom 50 is positive.

The global financial crisis triggered sizable increases in saving by the rich in the United States, unlike in Europe, where the distribution of saving remained

²Fagereng and others (2019) stress that capital gains explain nonhomothetic saving rates across households, which otherwise would be constant.

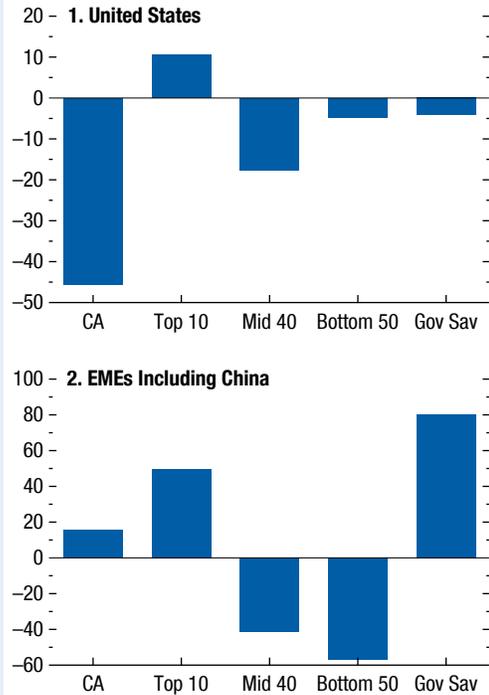
Box 2.2 (continued)

broadly stable. In the largest emerging markets (China, India, Mexico, South Africa), rich households' saving has increased steadily since the 2000s.

Implications for the Natural Interest Rate

Voluminous capital market literature has established that the global saving glut may be one of the drivers of the secular decline in the global natural interest rate (see, for example, Bernanke 2005; Caballero, Farhi, and Gourinchas 2008). The preceding discussion stresses that rich households across the world may have been important contributors to the global saving glut. Figure 2.2.2 suggests that these two insights could be combined. Relative to the mid-1990s, the largest emerging markets have seen exports of savings by the rich, along with public savings, feeding the global saving glut via current account surpluses. In the United States, the situation has been more nuanced. Saving by the rich has been associated with financing large dissaving by the nonrich and the government (Mian, Straub, and Sufi 2021d), but foreign saving has also contributed, leading to a current account deficit (Figure 2.2.2).

Figure 2.2.2. Absorption of Accumulated Saving
(Percent of national income)



Source: IMF staff calculations.
 Note: The figure shows the accumulated difference for each variable over 1996–2019 for the United States and 1996–2015 for EMEs, relative to the average levels in 1994 and 1995, in percent of the national income. CA = current account; EMEs = emerging market economies; Gov Sav = government saving.

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