INTERNATIONAL MONETARY FUND

GLOBAL FINANCIAL STABILITY REPORT

Financial and Climate Policies for a High-Interest-Rate Era

2023
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. . . to indicate that data are not available or not applicable;

— to indicate that the figure is zero or less than half the final digit shown or that the item does not exist;

– between years or months (for example, 2021–22 or January–June) to indicate the years or months covered, including the beginning and ending years or months;

/ between years or months (for example, 2021/22) to indicate a fiscal or financial year.

"Billion" means a thousand million.

"Trillion" means a thousand billion.

"Basis points" refers to hundredths of 1 percentage point (for example, 25 basis points are equivalent to ¼ of 1 percentage point).

Minor discrepancies between sums of constituent figures and totals shown reflect rounding.

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PREFACE

The *Global Financial Stability Report* (GFSR) assesses key vulnerabilities to which the global financial system is exposed. In normal times, the report seeks to play a role in preventing crises by highlighting policies that may mitigate systemic risks, thereby contributing to global financial stability and the sustained economic growth of the IMF's member countries.

The analysis in this report was coordinated by the Monetary and Capital Markets (MCM) Department under the general direction of Tobias Adrian, Director. The project was directed by Fabio Natalucci, Deputy Director; Jason Wu, Assistant Director; Hiroko Oura, Division Chief; Prasad Ananthakrishnan, Advisor and Unit Chief; Charles Cohen, Advisor and Chapter 2 co-lead; Nassira Abbas, Deputy Division Chief; Srobona Mitra, Deputy Division Chief and Chapter 2 co-lead; and Caio Ferreira, Deputy Division Chief. It benefited from comments and suggestions from the senior staff in the MCM Department.

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This issue of the GFSR draws in part on a series of discussions with banks, securities firms, asset management companies, hedge funds, standard setters, financial consultants, pension funds, trade associations, central banks, national treasuries, and academic researchers.

This GFSR reflects information available as of September 25, 2023. The report benefited from comments and suggestions from staff in other IMF departments, as well as from Executive Directors after their discussions of the GFSR on September 26, 2023. However, the analysis and policy considerations are those of the contributing staff and should not be attributed to the IMF, its Executive Directors, or their national authorities.

FOREWORD

Sentiments in financial markets are quite different now compared to April when we last published the *Global Financial Stability Report*. Concerns about the spread of stress in the banking sector gave way to optimism about brisk disinflation and a soft landing of the global economy. But such optimism can unravel in the face of adverse shocks—like upside surprises to inflation, financial stability concerns in China, and renewed concerns about debt sustainability—resulting in a sharp repricing of assets. Rapid rises in global bond yields in recent weeks provide a glimpse of the abruptness at which financial conditions can tighten. Moreover, though acute strains in the global banking sector have subsided, there are now indications of trouble elsewhere as higher interest rates are beginning to bite, for example, by squeezing the repayment capacity of corporate and household borrowers. Financial stability risks therefore remain elevated, as was the case in April.

Policymakers can take steps to prevent bad outcomes. What are the chief policy priorities to maintain financial stability and enable the financial sector to continue supporting economic growth?

The main priority continues to be returning inflation to target. Global core inflation has slowed so far this year but remains elevated. As sustainable growth requires both price and financial stability, a restrictive stance is needed in economies with still-elevated and persistent inflation until there is tangible evidence that inflation is sustainably moving toward targets. That said, divergence in inflation developments between advanced economies and some emerging market economies has surfaced in recent months, so country-specific circumstances are imperative in monetary policy decision making.

High global interest rates are also affecting the cost of financing in emerging market and developing economies. Most major emerging markets have been resilient so far in 2023. However, a significant number of frontier and low-income sovereign issuers will likely continue to face financing challenges. Sovereigns should focus on structural reforms that foster growth and enhance efforts to manage risks associated with high debt vulnerabilities. Where feasible, refinancing or liability management operations should be executed to rebuild buffers. Moreover, countries nearing debt distress should establish early contact with creditors and find ways to coordinate preemptive and orderly restructuring to avoid costly defaults and prolonged loss of market access. Policymakers should also promote the development of local currency markets and cultivate a stable and diversified investor base that helps to insulate domestic financial conditions from external developments.

The prospect of higher-for-longer rates also impacts the residential and commercial real estate sectors. In certain countries, especially those with a significant share of variable rate mortgages, home prices have registered double-digit declines since their peak. Additionally, vulnerabilities in the commercial real estate sector pose a significant risk to the financial sector, and it has become more apparent over the course of this year that the sector will face a funding pullback by lenders in the coming years. Authorities should conduct stringent stress tests to assess the potential effects of rising interest rates on borrowers' ability to repay loans and the consequences of a sharp fall in real estate prices for households, corporations, and, ultimately, financial institutions. There is also an urgent need to address systemic risks related to commercial real estate stemming from nonbank financial institutions. This can be achieved by broadening the reach of macroprudential tools and enhancing data collection.

Although the acute stress in the global banking system observed last March has subsided, a deeper look reveals that a sizable tail of weak banks remains (see Chapter 2 of the *Global Financial Stability Report*). Supervisors should ensure that banks have corporate governance and risk management processes commensurate with their risk profiles and pay specific attention to bank asset classification and provisions, as well as exposures to interest rate and liquidity risks. Timely, intrusive, and conclusive banking supervision is, therefore, crucial and rests upon safeguarding the operational independence of supervisors by providing them clear safety and soundness mandates, adequate resources, and legal protection. Countries should also

continue to build buffers as necessary to help guard against future losses and to support the provision of credit through periods of stress.

As the dust settles after the bank failures in March and April, the international community can derive lessons to improve the effectiveness of reforms implemented since the global financial crisis. Authorities should evaluate whether the Basel III liquidity standards performed as intended and explore potential improvements in international standards for interest rate risk. Policymakers should also consider expanding the scope of their regulations and resolution regimes to encompass a broader range of banks, as even relatively small banks have proven to be systemic at times of wider stress. Furthermore, addressing obstacles—be they legal, regulatory, or operational—to cross-border funding in resolution, including the ability to mobilize collateral across borders, is essential.

Nonbank financial intermediation (NBFI) has become increasingly important in the global financial system over the past decade, making comprehensive systemic risk assessments of NBFI a financial stability policy priority. Closing data gaps by strengthening disclosures and regulatory reporting is critical to characterizing and identifying systemic risk from NBFI. This will also facilitate the increased supervisory effort required to rein in excessive liquidity mismatches and leverage. These efforts should be the first line of defense. Should central bank liquidity be needed to stem systemic crises involving NBFIs, this would require clear communication about the pertinent financial stability objectives and the parameters of the program, including the time frame for exit.

Finally, addressing climate financing needs in emerging market and developing economies requires a comprehensive set of policies (see Chapter 3 of the *Global Financial Stability Report*). While carbon pricing can be highly effective in directing capital flows toward low-carbon investments, it may take time to be phased in because of political resistance. Policymakers should complement carbon pricing with a mix of fiscal, structural, climate, and financial sector policies. Strengthening the climate information architecture—data, disclosures, and alignment approaches (including taxonomies)—is an important part of the policy mix. Transition taxonomies can help institutions identify activities that may reduce greenhouse gas emissions over time, including in the most carbon-intensive sectors. Disclosures and labels for sustainable investment funds should enhance market transparency, market integrity, and alignment with climate impact–oriented outcomes. Through its convening power, the IMF has a crucial role to play in mobilizing private climate finance, in particular in lower-income countries. The Resilience and Sustainability Facility can be a catalyst for private finance through its policy conditionality, supporting reforms that can help attract private capital.

Tobias Adrian
Financial Counsellor

EXECUTIVE SUMMARY

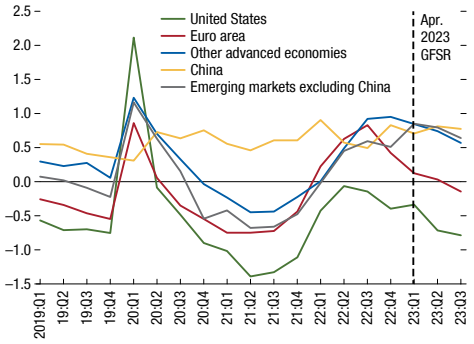
Soft Landing or Abrupt Awakening?

With core inflation still high and declining only slowly in many advanced economies, central banks may need to keep monetary policy tighter for longer than is currently priced in markets. In emerging market economies, progress on lowering inflation appears to be more advanced, with the benefits of early rate hikes becoming apparent. However, there are discrepancies across regions. Widening divergence of inflation and economic outlook could mark the beginning of the desynchronization of the global monetary policy.

Yet, optimism about a soft landing of the global economy, whereby disinflation continues apace and a recession is avoided, has fueled asset valuation since the April 2023 *Global Financial Stability Report*. Despite the declines in equity prices since September, driven by rising long-term real rates, financial conditions for advanced economies have eased on net (Figure ES.1). Taking a slightly longer view, so far this year, stock prices in Europe and the United States have climbed about 10 and 12 percent, respectively, and corporate credit spreads remain near the lowest levels since the beginning of this rate hike cycle. In Japan, equities have outperformed other advanced economies, supported in part by continued monetary policy accommodation and stronger corporate profits. Emerging markets such as Chile, Hungary, India, Mexico, and Poland have also seen notable equity price increases, consistent with the appreciation of most major emerging market currencies in the first half of the year. Upside surprises to the inflation outlook would challenge this soft-landing narrative, resulting in a potentially sharp repricing of assets.

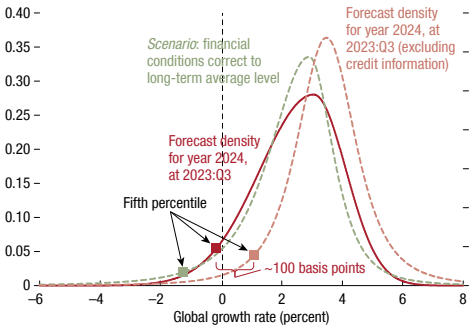
While acute stress in the global banking system has subsided, a weak tail of banks remains in some countries. In addition, cracks in other sectors may also become apparent and could turn into worrisome fault lines. In the event of an abrupt tightening of financial conditions, adverse feedback loops could be triggered and again test the resilience of the global financial system. Most notably, the global credit cycle has started to turn as borrowers' debt repayment capacity diminishes and credit growth slows. The IMF's growth-at-risk measure summarizes this assessment, indicating that risks to global growth are skewed to the downside, similar to the assessment in April 2023 (Figure ES.2). In a scenario wherein the hoped-for soft landing does not materialize, investors pull back from risk taking, and financial conditions tighten toward the long-term average, the growth-at-risk forecasts the growth distribution to be even more firmly skewed to the downside.

Figure ES.1. Financial Conditions Indices
(Number of standard deviations over a long-term average)



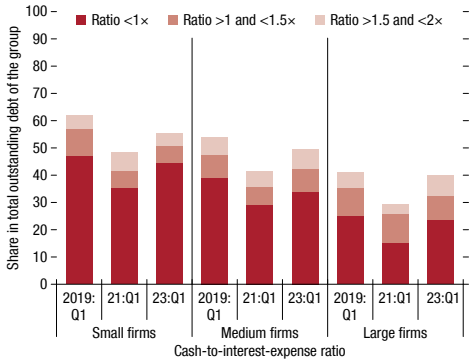
Source: Bloomberg Finance L.P.
Note: GFSR = *Global Financial Stability Report*; Q = quarter.

Figure ES.2. Global Growth at Risk
(Probability density of global growth in 2024)



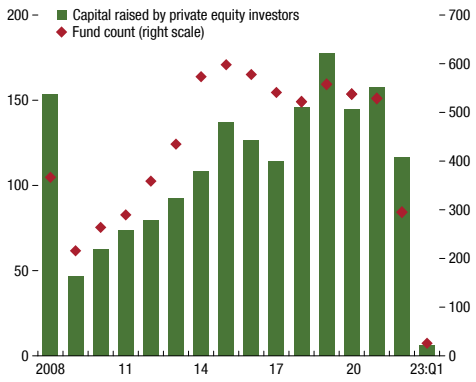
Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: Q = quarter.

Figure ES.3. Corporate Cash-to-Interest-Expense Ratios in Emerging Markets Excluding China
(Percent)



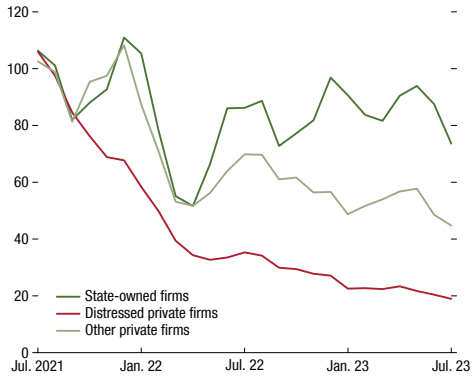
Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: Cash includes cash and cash equivalents. Interest expense includes those on loans and bonds; Q = quarter.

Figure ES.4. Private Equity Real Estate Fundraising
(Billions of US dollars, left scale; fund count, right scale)



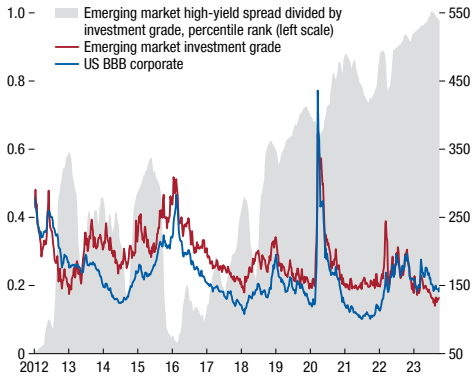
Sources: Preqin; and IMF staff calculations.
Note: Q = quarter.

Figure ES.5. Chinese Property Sales Volume, by Developer Type
(Average of the first half of 2021 = 100, three-month moving average)



Sources: Bloomberg Finance L.P.; and CEIC.

Figure ES.6. Emerging Market Sovereign Spreads
(Percentile rank, left scale; basis points, right scale)



Sources: Bloomberg Finance L.P.; Federal Reserve; national authorities; and IMF staff calculations.
Note: The gray area tracks the ratio of emerging market high-yield sovereign spreads to emerging market investment-grade sovereign spreads, expressed in historical percentiles.

Vulnerabilities

Over the past year, the transmission of rate hikes may have been dulled as corporations and households extend their debt repayment horizon or use savings accumulated during the pandemic to shore up their balance sheets and interest payments. However, these factors may not be sufficient to stave off a trend of rising repayment difficulties. Indeed, the share of firms with low cash-to-interest-expense ratios—that is, weaker firms with fewer buffers—has rebounded over the past two years, including in emerging markets, as firms face tighter funding conditions (Figure ES.3). This rebound is especially evident among small and medium firms. Likewise, mortgage borrowers will continue to face a higher repayment burden, leading to a slowdown in housing activity and a further decline in home prices. Global real house prices have been falling since late 2022, as major central banks have aggressively tightened monetary policy. In advanced economies, real house prices fell 8.4 percent in the first quarter of 2023, whereas emerging markets saw a smaller decline of about 2.4 percent. Countries with a large share of floating-rate mortgages and house prices above the prepandemic average recorded double-digit declines in home prices.

Given the size and concentration of commercial real estate (CRE) and its strong connections with the broader financial system and the real economy, stress in that sector can have significant financial stability implications. As a share of GDP, CRE-related debt equates to nearly 12 percent of GDP in Europe and 18 percent in the United States. Concerns about the risk of a widening funding gap have emerged, as funding sources become less available for CRE borrowers needing to refinance—banks have reported tighter lending standards, private equity fundraising activity has slowed sharply (Figure ES.4), and the issuance of commercial mortgage-backed securities has gone tepid. The prospect of interest rates remaining higher for longer, combined with declining property valuations, will keep refinancing conditions strained in the CRE sector.

In China, weakening economic momentum, a deepening property sector downturn, and growing strains on local government financing weigh heavily on market sentiment. The renminbi has faced notable downward pressure as equity prices have fallen sharply. Disinflationary pressures have grown, prompting the People's Bank of China to cut policy rates—one of the few central banks to ease monetary policy. However, such easing and other announced stimulus measures have not yet restored confidence among businesses, consumers, and, importantly, homebuyers. Stronger private property developers and even state-owned developers have experienced materially lower home sales volumes in recent months (Figure ES.5), and a large private developer missed interest payments on its bonds due in August. Continued stress in the property sector has spilled

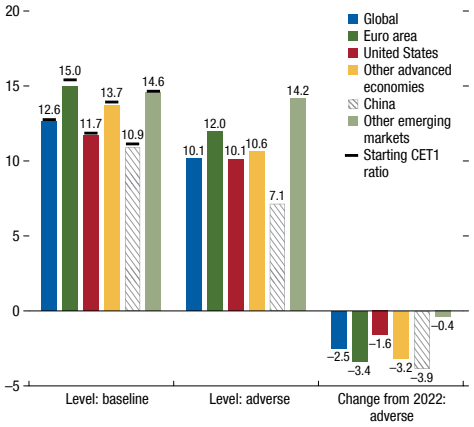
over to local government finances as investors have become increasingly concerned about the debt sustainability of local government financing vehicles (LGFVs). In addition, a major asset manager, which suspended payments and redemptions on its wealth management and trust products, has raised concerns about further financial stress if the public were to lose confidence in investment products.

Investors continue to differentiate between emerging market economies with stronger fundamentals and policy buffers and those considered less resilient and more vulnerable to shocks. Most emerging market sovereign credit spreads have remained narrow despite the continued tightening of monetary policy and higher yields (Figure ES.6). However, the gap between the investment-grade and high-yield segments of emerging market sovereign debt markets remains wide. Repeated credit downgrades since the pandemic have pushed the average frontier sovereign rating lower, driving implied spreads and financing costs higher across many emerging market economies.

As the primary lenders in the global economy, banks are expected to deal with greater credit costs as higher interest rates reduce borrowers' ability to repay loans. In aggregate, the banking system appears to have prudently added provisions for more defaults, and loan-loss reserves seem adequate to cover nonperforming loans in many countries. Higher rates should also support net interest margins on new bank loans. That said, history has shown that credit exposures can deteriorate rapidly, and loan demand can plummet when an economy enters a recession, affecting bank profitability. Chapter 2 presents the IMF's assessment of the quantum of banks vulnerable to higher inflation and interest rates using two new approaches. The assessment conducts an enhanced version of the IMF's global stress test, complemented by a new forward-looking monitoring framework that incorporates analyst forecasts of key risk indicators—bank balance sheet, valuation, and profitability metrics. Both approaches indicate the presence of a notably weak tail of banks. The global stress test shows a wide set of banks will suffer capital losses under an adverse stagflationary scenario, including several systemically important institutions in China, Europe, and the United States (Figure ES.7). This finding is consistent with the key risk indicators which project that some Chinese and US banks are likely to remain under pressure given lower expected earnings and the depressed price-to-book ratios of Chinese banks.

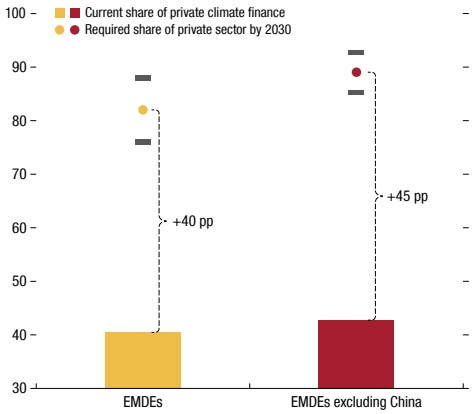
An environment of high interest rates is likely to benefit some nonbank financial intermediaries while challenging the resilience of others. For institutions with longer-term financial obligations, such as insurers and pension funds, elevated interest rates have reduced the present value of their liabilities and improved funded ratios. Such institutions' key risk stems from having moved during the extended period of extremely low interest

Figure ES.7. CET1 Ratios, under Global Stress Test
(Percent for levels, percentage points for changes)



Sources: Bloomberg Finance L.P.; Capital IQ; Fitch Analytics; Vitek 2018; October 2023 *World Economic Outlook*; and IMF staff estimates.
Note: CET1 = Common Equity Tier 1.

Figure ES.8. Projected Private Financing Share in Climate Investments
(Percent)



Source: IMF staff calculations.
Note: EMDEs = emerging market and developing economies; pp = percentage points.

rates into less liquid and more risky assets, like private credit. On the other hand, investment funds with shorter funding structures, especially those providing daily liquidity, could face redemption pressure from their investors, as higher interest rates reduce the value of their fixed-income assets. Those using leveraged investment strategies predicated on swift disinflation may be forced to unwind positions should inflation stay doggedly high.

Chapter 3 shows that, by 2030, climate mitigation investment needs in emerging market and developing economies (EMDEs) are estimated to reach about $2 trillion per year. The private sector is key to financing the required investments in EMDEs, given limited fiscal space and challenging market conditions. By 2030, the share of private finance must increase to about 80 percent of climate mitigation investment needs in EMDEs, and the proportion should be even greater in EMDEs outside of China (Figure ES.8).

Policy Recommendations

Ultimately, sustainable economic growth requires both price and financial stability. Central banks must remain determined in their fight against inflation until there is tangible evidence that it is moving sustainably toward targets, although the stance of monetary policy should reflect a country-specific pace of economic recovery and disinflationary processes. Communication remains crucial to convey policymakers' resolve.

Progress on inflation in a number of emerging market economies has been notable, but central banks should be cautious not to ease policy rates too aggressively. Countries should integrate their policies, including, where applicable, within the Integrated Policy Framework, the IMF's macrofinancial framework for countries to manage the risks stemming from volatile capital flows amid uncertainty in global monetary policy and the foreign exchange environment. Optimal policy combinations depend on the nature of the shock and country-specific characteristics. Any response measures should be part of a plan that tackles underlying macroeconomic imbalances and allows for needed adjustments.

Sovereign borrowers in emerging market economies, frontier markets, and low-income countries should strengthen efforts to contain risks associated with their high debt vulnerabilities, including through dialogue with creditors, multilateral cooperation, and support from the international community. If applicable, the Group of Twenty Common Framework—a reformed quicker and more effective version—should be used, including in preemptive restructurings. Bilateral and private sector creditors should find ways to coordinate preemptive and orderly restructuring to avoid costly hard defaults and prolonged loss of market access. Where feasible, refinancing or liability management operations should be executed to rebuild buffers.

In China, robust policies to restore confidence in the real estate sector will be critical to limit the risk of negative spillovers to the financial sector, corporations, and local governments. Priority should be given to facilitating the completion of housing projects, which could stem the slump in homebuyer sentiment, and the timely resolution and restructuring of troubled property developers. Easing monetary policy further and reorienting fiscal support toward households are necessary to support economic growth. A comprehensive strategy is needed to address the LGFV debt issue to restore LGFVs' debt-servicing capacity and achieve sustainable levels of local government debt. Although authorities have taken steps in recent years to mitigate systemic risks emanating from the asset management sector, further progress is needed to address risky exposures to real estate and LGFVs and liquidity mismatches between their assets and liabilities. For banks, maintaining adequate loss-absorbing buffers, phasing out forbearance policies that could delay loan-loss recognition, and expediting efforts to restructure weak banks are critical for mitigating financial stability risks.

The sizable tail of weak banks in the global financial system and the risk of contagion to healthy institutions highlights the urgent need to implement international standards in a consistent manner across jurisdictions, assess whether specific features of these standards performed as intended during the recent turmoil, and enhance supervision where necessary. Adequate minimum capital and liquidity requirements across large and small institutions alike are essential to contain financial stability risks. Authorities should be more prepared to intervene early to address weaknesses in banks, including ensuring their banks' preparedness to access central bank facilities, and strengthening where needed their bank resolution regimes and preparedness to deploy them.

National authorities should deploy stringent stress tests to estimate the potential effects of diminished borrowers' repayment capacity and a sharp decline in residential real estate prices on household balance sheets and, ultimately, on financial institutions. Continued vigilance is warranted to monitor vulnerabilities

in the CRE sector, including reviews of banks' CRE valuations, and ensure that provisions are adequate. Buffers should be built to help guard against future losses and to support the continued provision of credit during stress times. For example, authorities may raise countercyclical capital buffers or sectoral systemic risk buffers if circumstances allow. To avoid procyclical effects, the raising of buffers should be conditioned on the absence of signs that credit is already being constrained by the adequacy of banks' capital.

A broad mix of structural and financial policies is needed to create an attractive investment environment for private capital to support climate finance needs in EMDEs. A stronger climate information architecture—data, disclosures, and alignment approaches (including taxonomies)—is necessary to attract private investors. Financial sector policies should be focused on creating climate impact. Transition taxonomies in EMDEs can help institutions identify activities that may reduce greenhouse gas emissions over time, including in the most carbon-intensive sectors. Disclosures and labels for sustainable investment funds should enhance market transparency, market integrity, and alignment with climate impact–oriented outcomes. Through its convening power, the IMF has a crucial role to play in mobilizing private climate finance, particularly in lower-income countries. The Resilience and Sustainability Facility can be a catalyst for private finance through its policy conditionality, supporting reforms that can help attract private capital.

IMF EXECUTIVE BOARD DISCUSSION OF THE OUTLOOK, SEPTEMBER 2023

The following remarks were made by the Chair at the conclusion of the Executive Board's discussion of the Fiscal Monitor, Global Financial Stability Report, *and* World Economic Outlook *on September 26, 2023.*

Executive Directors broadly agreed with staff's assessment of the global economic outlook, risks, and policy priorities. They welcomed the continued global economic resilience, particularly of some advanced and emerging market economies, but acknowledged that divergent growth prospects across the world's regions pose a challenge to returning to pre-pandemic output trends. In the case of many emerging market and developing economies (EMDEs), the loss of momentum has reduced prospects for income convergence. Directors recognized that tight monetary policies, necessary to fight inflation, and the withdrawal of fiscal policy support to tackle soaring global debt and support disinflation efforts are also headwinds to growth in the short run. Most Directors agreed that increasing geoeconomic fragmentation is also weighing on the recovery and welcomed the Fund's analysis on the costs of fragmentation. A few Directors emphasized that diversification in supply chains is important to build resilience. More generally, a number of Directors stressed that the Fund's communication on geoeconomic fragmentation should be balanced. Directors generally agreed that ending Russia's war against Ukraine remains the single most impactful action to improve the global outlook.

Directors broadly agreed that risks to the outlook are more balanced relative to April 2023, but remain tilted to the downside. While the acute stress in the banking system seen in March this year has subsided, in part due to swift action in Switzerland and the United States, they broadly noted that financial stability risks remain elevated. In particular, Directors emphasized that persistence in global underlying inflation could warrant higher-for-longer policy rates, which could in turn trigger a correction in financial markets and capital flow volatility. They also considered that commodity prices could see more volatility due to climate and geopolitical shocks. Most Directors noted the risk of a further deterioration in China's property sector and, in this regard, welcomed the recent policy actions taken by the authorities. Directors also highlighted the risk of further debt distress in those EMDEs heavily reliant on external borrowing and generally indicated that the presence of a weak tail of banks in some major economies also poses vulnerabilities. Directors emphasized that should financial conditions tighten abruptly, adverse feedback loops could be triggered and again test the resilience of the global financial system.

Directors noted that global core inflation remains persistent and declining only slowly, and stressed that monetary policy should maintain a restrictive policy stance, tailored to country circumstances, until inflation declines sustainably to target. They called for clear and transparent communication to avoid a de-anchoring of inflation expectations. Directors also indicated that policies aimed at encouraging labor market participation can help ease labor market tightness in many advanced economies, which would support disinflation.

Directors acknowledged that the fast pace of monetary policy tightening adds further pressure on the financial sector, requiring careful monitoring of risks, better risk assessment and strengthened supervision, and closing supervision gaps in the nonbank financial sector. They called for an assessment of how consistently international standards in banking regulation were implemented during recent financial stresses. Noting vulnerabilities in the commercial real estate sector of some countries, Directors called for continued vigilance and close monitoring.

Directors stressed the need to gradually tighten fiscal policies as deficits and debt remain elevated. They considered that, although the primary responsibility for restoring price stability lies with central banks,

tightening the fiscal stance can further ease inflation by reducing aggregate demand and reinforcing the overall credibility of disinflation strategies. Directors recommended mobilizing revenues through tax capacity building and achieving efficiency gains in spending to help restore some fiscal space, while safeguarding targeted measures to protect the most vulnerable. They also noted that some countries in debt distress may require preemptive and orderly debt restructuring, underscoring the importance of multilateral cooperation in this regard.

Directors expressed concern over the dimming growth prospects for the medium term. In this context, they emphasized the importance of facilitating investment and of targeted and carefully sequenced supply-side reforms, which can enhance productivity growth despite constrained policy space and help dampen inflationary pressures.

Directors called for accelerating decarbonization efforts, while noting that the policy mix will need to strike a balance between climate goals, fiscal sustainability, and political feasibility. They agreed that relying mostly on spending-based measures will be costly and instead favored a combination of revenue, expenditure, and other financing and structural policies to deliver on climate goals. In this context, most Directors agreed that a policy package containing carbon pricing, complemented with measures to address market failures, catalyze private finance and green investment, and mitigate distributional concerns has higher chances to deliver on climate goals and maintain debt sustainability. Some Directors reiterated, however, that carbon pricing is not an adequate solution in all countries. Directors acknowledged that the green transition will be challenging, particularly for EMDEs with high debt and sizable investment needs; at the same time, delaying the transition will only increase its costs. They generally agreed that incorporating climate change considerations into debt sustainability analyses could improve policy planning, while taking into consideration country-specific characteristics.

Directors underscored that internationally coordinated efforts are indispensable to minimize the cost of decarbonization, especially for low-income countries and small developing states. In this context, they highlighted the important catalytic role that the Resilience and Sustainability Trust could play in attracting green financing and investments. Directors stressed that green industrial policies should avoid distortions to trade and investment flows, in line with the rules of the World Trade Organization (WTO). In this context, a few Directors emphasized that measures such as carbon border adjustment mechanisms should also be WTO-compliant to safeguard international trade. While they considered that, in principle, green and food corridor agreements could help safeguard the energy transition and avert food insecurity, a few Directors underscored the difficulty of implementing these mechanisms. More generally, Directors emphasized that safeguarding the rules-based trading system would be important for global prosperity.

CHAPTER 1

SOFT LANDING OR ABRUPT AWAKENING?

Chapter 1 at a Glance

- With core inflation still high and declining only slowly in many advanced economies, central banks may need to keep monetary policy tighter for longer than is currently priced in markets. In emerging market economies, progress on lowering inflation appears to be more advanced, although there are discrepancies across regions.
- Yet, optimism about a soft landing of the global economy has fueled risk asset valuations since the April 2023 *Global Financial Stability Report*. A sudden reassessment of the monetary policy outlook following upside inflation surprises could challenge this narrative, resulting in a potentially sharp repricing of assets.
- While acute stress in the banking system has subsided, a weak tail of banks remains in some countries. In addition, cracks in other sectors may also become apparent and could turn into worrisome fault lines. In the event of an abrupt tightening of financial conditions, adverse feedback loops could be triggered and again test the resilience of the global financial system. On balance, risks to global growth continue to be skewed to the downside, similar to our assessment in April.
- A number of sectors show weakness. The global credit cycle has started to turn as borrower debt repayment capacity diminishes. Residential home prices are declining more quickly in countries with a higher share of variable rate mortgages, defaults are rising in commercial real estate markets, and cash buffers of corporations are eroding as debt-service burden continues to get heftier.
- A number of shocks—such as an escalation of the war in Ukraine and continued stress in the Chinese property sector spilling over more extensively to the financial sector and local governments—could adversely affect financial stability.
- The synchronization of global monetary policy is starting to fade. This has potential implications for asset prices, investor exposures across countries and asset classes, and capital flow volatility.
- Some lower-rated emerging markets continue to be in debt distress and have difficulties accessing external financing.
- Financial institutions face higher funding costs, and a deterioration of asset quality could lead to losses and reduce credit extension to the macroeconomy. Those employing leveraged investment strategies predicated on swift disinflation may be forced to unwind positions should inflation stay doggedly high.

Policy Recommendations

- Ultimately, sustainable economic growth requires both price and financial stability. Central banks must remain determined in their fight against inflation until there is tangible evidence of inflation moving sustainably toward targets. The stance of monetary policy, however, should reflect a country-specific pace of economic recovery and disinflationary processes. Communication remains crucial to convey policymakers' resolve.
- Emerging markets remain vulnerable to a sharp tightening in global financial conditions. Progress on inflation in a number of countries is welcomed, but central banks should be cautious not to ease policy rates too aggressively.
- In China, robust policies to restore confidence in the real estate sector will be critical to limit the risk of negative spillovers to the financial sector, firms, and local governments.
- The sizable tail of weak banks in the global financial system and the risk of contagion to healthy institutions highlights the urgent need to enhance financial sector regulation and supervision.
- Continued vigilance is warranted in monitoring vulnerabilities in the commercial real estate sector to minimize potential risks to bank and nonbank lenders.

Introduction

The soft-landing narrative, wherein disinflation continues apace and a recession is avoided, has dominated markets' views since the April 2023 *Global Financial Stability Report*, boosting investor optimism and lifting risk assets. Supported by market expectations of policy rate cuts in coming quarters and a compression of risk premiums, financial conditions—the cost of funding for households and firms through markets like the stock and bonds markets—have resumed the easing trend that started in 2022, complicating central banks' quest to return inflation back to targets. Further supporting risk appetite, a major curtailment in bank lending feared after the banking turmoil in March has not materialized, even though more recent forward-looking indicators like loan officer surveys point to significantly slower demand for credit and tightening of underwriting standards. Since September, however, investors have pulled back on risk taking as rising long-term real rates, especially in the United States, have challenged asset valuations.

In many advanced economies, core inflation continues to be stubbornly high, and upside surprises to the inflation outlook would challenge the soft-landing narrative and could lead to a potentially sharp repricing of assets. In emerging markets, progress on lowering inflation appears to be more advanced in some economies, with the benefits of early rate hikes becoming apparent. However, there are discrepancies across regions. Widening divergence of inflation and economic outlook could mark the beginning of the desynchronization of global monetary policy. Some central banks in emerging markets have begun cutting policy rates as inflation pressures appear to abate. Such increased heterogeneity in the monetary policy outlook has implications for asset prices, investor positioning, and capital flow volatility.

While acute stress in the global banking system has subsided, a weak tail of banks remains in some countries (see Chapter 2). In addition, cracks in other sectors may also become apparent and could turn into worrisome fault lines. In the event of an abrupt tightening of financial conditions, adverse feedback loops could be triggered and again test the resilience of the global financial system. For example, the credit cycle has started to turn as signs that higher interest rates are weighing on the repayment capacity of households and corporations, especially those servicing floating rate debt. The IMF's growth-at-risk (GaR) measure summarizes this assessment, indicating that risks to global growth are skewed to the downside, similar to the assessment in April. In a scenario wherein financial conditions tighten toward their long-term averages, the GaR forecasts the growth distribution to be even more firmly skewed to the downside.

Over the past year, the transmission of policy rate hikes to tighter financial conditions appears to have been dulled by several factors. Some households and corporations took advantage of exceptionally low borrowing costs over the preceding decade to extend their debt maturities. Others may have used the savings accumulated during the pandemic to shore up their balance sheets or meet higher interest payments. However, these factors may not be sufficient to stave off a deterioration in the credit outlook. In countries where variable rates account for a larger share of the mortgage market, real residential home prices are declining quickly. The commercial real estate (CRE) sector in Europe and the United States is entering a period of rising defaults given fast-declining property prices, substantial maturing debt, and stricter lending standards from bank lenders. Cash buffers of firms and businesses are beginning to erode as interest coverage ratios are declining and earnings are expected to fall.

A number of adverse shocks could materialize and adversely affect the economic outlook and financial stability. A sudden intensification of the war in Ukraine could disrupt commodities markets and put upward pressures on food prices, slowing or even undoing progress on inflation. In China, continued turmoil in the property sector could spread to the financial sector and to local governments with significant dependence on property-related revenues, weighing on the already weakening recovery. Other medium-term challenges could have a more immediate effect than anticipated. For example, rising geopolitical tensions have intensified concerns about global economic and financial fragmentation. Manifestations of climate change have become even more evident in the summer, adding a new sense of urgency to the need to address climate risks and channel much-needed private capital to emerging market and developing economies (see Chapter 3).

Many major emerging markets have benefited from the proactive monetary policy response to rising inflation back in 2021. The currencies of some of these countries have strengthened this year, their sovereign spreads have remained at or near all-time lows, and

inflows have begun to return to local currency bond markets. In contrast, global interest rate hikes have made conditions more difficult for frontier markets, with many facing high repayment burdens, debts set to come due in the near term, and unfavorable conditions for issuing hard currency sovereign bonds. For countries in or near debt distress, access to external financing could be severely impeded.

The majority of global banks emerged from the March banking turmoil largely unaffected. Banking systems in many countries have prudently added provisions for higher expected defaults, and loan-loss reserves seem adequate to cover nonperforming loans. Higher rates should also support net interest margins on new bank loans. That said, history has shown that credit exposures can deteriorate rapidly, hurting bank profitability and prompting depositor outflows and stock price declines for weaker banks. To bring these risks together, Chapter 2 assesses the quantum of banks vulnerable in a scenario of heightened duration, credit, and funding liquidity risks.

Monetary Policy and Inflation

Central Banks in Advanced Economies Expected to Cut Rates Soon Despite Stubborn Core Inflation

Even though core inflation remains stubbornly high in many countries, investors remain hopeful that central banks in advanced economies will manage to engineer a soft landing, allowing them to start cutting policy rates in coming quarters. The market-implied expected path of monetary policy has shifted up since April 2023 in most advanced economies (except for Japan). Yet, a peak in the tightening cycle is expected toward the end of 2023 or in early 2024, at which point monetary authorities are anticipated to gradually ease policy (Figure 1.1). Notwithstanding some third-quarter repricing, this benign outlook—consistent with the belief that aggregate demand will gradually slow, labor market tightness will ease, and price pressures fade (Figure 1.2, panel 1)—has boosted investor risk appetite, fueling the rise in risk asset prices seen since April 2023.

But the outlook for inflation remains highly uncertain. Despite gradual declines, core inflation is still elevated, and pressures could persist for longer than currently priced in financial markets, leaving the global economy susceptible to inflationary shocks such as food and energy price spikes. Reflecting the uncertainty, pricing from inflation options markets suggests that investors disagree about the most likely inflation outcomes expected over the next five years (Figure 1.2, panel 2). Investor disagreement appears to have widened since April 2023 in the euro area, whereas US investors still converge at about a 3 percent outcome—still well above the Federal Reserve's 2 percent target.

Since April 2023, the Federal Reserve has raised the target range for the federal funds rate by 50 basis points to 5.25–5.50 percent as economic indicators have surprised on the upside, on net. The European Central Bank has also hiked policy rates 100 basis points, with the deposit facility rate now at 4.00 percent, the highest value in the history of the institution. After pausing, the Reserve Bank of Australia and the Bank of Canada resumed rate hikes in the second quarter, while recent policy meetings saw the Bank of England, the Norges Bank, Sveriges Riksbank, and the Swiss National Bank tighten policy by 25 basis points.[1] Taking a longer view, advanced economies' central banks have delivered a combined 3,915 basis points of policy rate hikes since September 2021, with the Federal Reserve hiking at a faster pace compared with the previous tightening cycles.

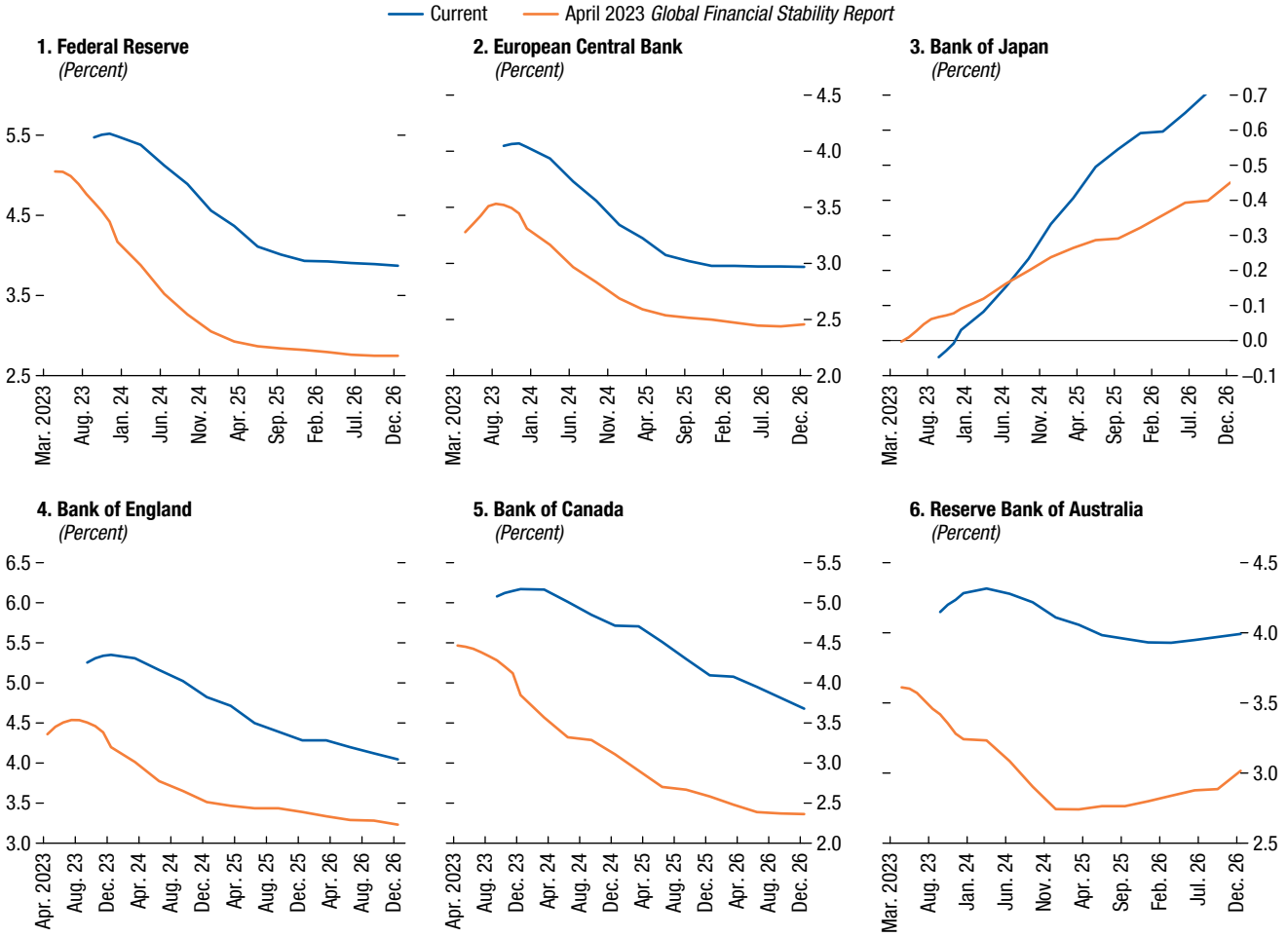
The Bank of Japan remains an outlier, keeping its short-term policy rate unchanged in negative territory. The Bank of Japan indicated it will continue with yield curve control as long as necessary for sustainable and stable attainment of its price stability target of 2 percent.[2] In July 2023, the Bank of Japan announced that it will conduct yield curve control policy with greater flexibility and raised the upper bound of the fluctuation range of 10-year Japanese government bond yields at which it will offer unlimited purchase of 10-year Japanese government bonds to 1 percent instead of the previous 0.5 percent. The Bank of Japan emphasized that these changes were made to "enhance the sustainability of monetary easing under the current framework," rather than to signal a phasing out of yield curve control. Expectations for increased volatility drove yields on long-term Japanese government bonds to a nine-year high (Figure 1.3, panel 1). Boosted by expectations of continued accommodative policy, Japanese equities have outperformed markets of other

[1]The sample is composed of G10 central banks plus Australia, New Zealand, and Norway.

[2]See the Bank of Japan's Statement on Monetary Policy, July 28, 2023: https://www.boj.or.jp/en/mopo/mpmdeci/mpr_2023/k230728a.pdf.

Figure 1.1. Policy Rate Expectations in Advanced Economies

Market-implied paths for policy rates have shifted significantly over recent weeks.



Sources: Bloomberg Finance L.P.; Federal Reserve; national authorities; and IMF staff calculations.

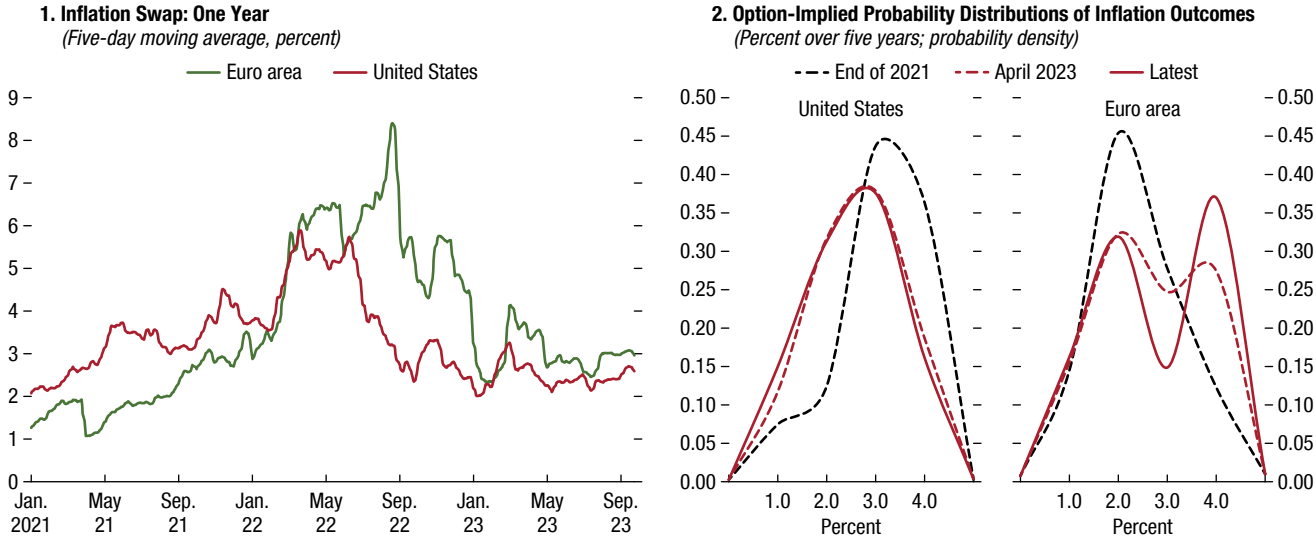
advanced economies in 2023: the Nikkei 225 Index has surged by more than 20 percent partly because Japanese corporations made more share buybacks relative to global peers. Meanwhile, the yen has weakened, as investors expect the interest rate spread between domestic and overseas interest rates to persist over the next few years (Figure 1.3, panel 2). In September, after the news reporting Bank of Japan's comment on a hint of a future policy shift, the yen advanced against the dollar while Japanese bond yields increased.

With risk asset prices increasingly predicated on a soft-landing scenario and expectations of rate cuts in coming quarters, how likely from a historical perspective is such an outcome? More specifically, past soft-landing episodes—as defined in Blinder (2023)—were generally associated with positive real interest rates. That is, excessively easy monetary policy (negative real rates) was typically not required during those episodes (Figure 1.4, panel 1). Second, inflation expectations were fairly modest during soft landings (the yellow dots in Figure 1.4, panel 1). By contrast, cycles ending with hard landings were associated with high inflation expectations (blue dots). Current developments in the US economy (rightmost green dot) point to a situation close to past soft-landing episodes. However, such an outcome is not a foregone conclusion; rather, whether the US economy can avoid a recession will depend on whether inflation continues to decelerate in line with market expectations—a development that would

Figure 1.2. Market-Based Inflation Expectations

Inflation swaps show that market participants expect inflation to continue to moderate one year ahead ...

... however, investor disagreement around most likely inflation outcomes over the next five years continues to be notable.

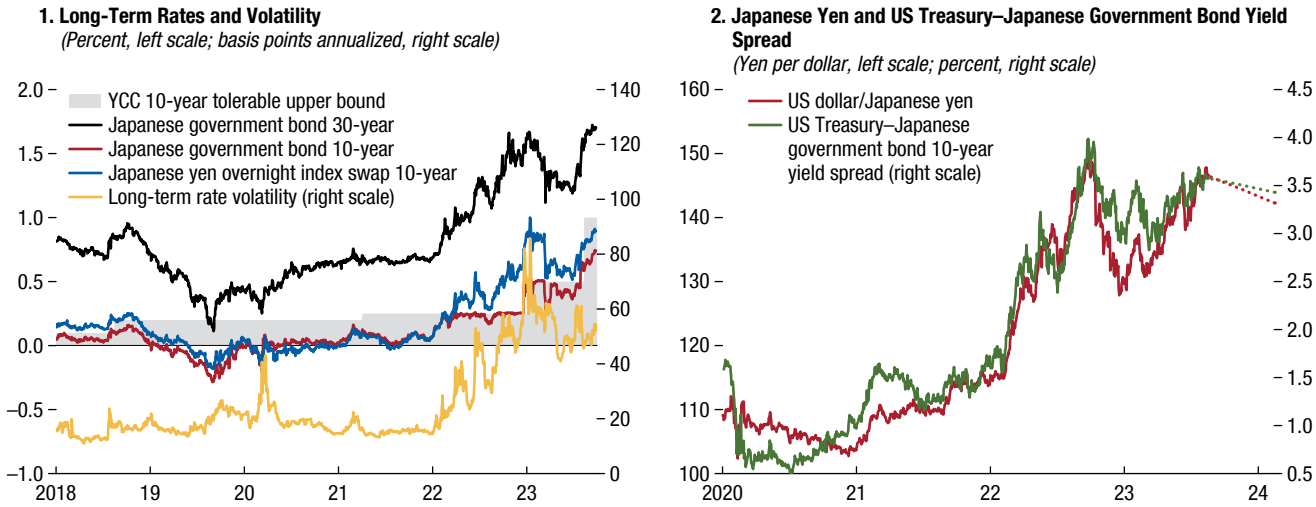


Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, International Financial Statistics database; and IMF staff calculations.
Note: "Latest" refers to the time of publishing the October 2023 *Global Financial Stability Report*. Probability densities shown in panel 2 are based on inflation caps and floors. Results are potentially sensitive to the underlying methodology used to estimate the option-implied densities.

Figure 1.3. Japanese Markets and Bank of Japan Yield Curve Control

Long-term rates surged and volatility increased after the YCC change in July.

The yen has weakened as investors expect the gap between domestic and overseas interest rates to persist.



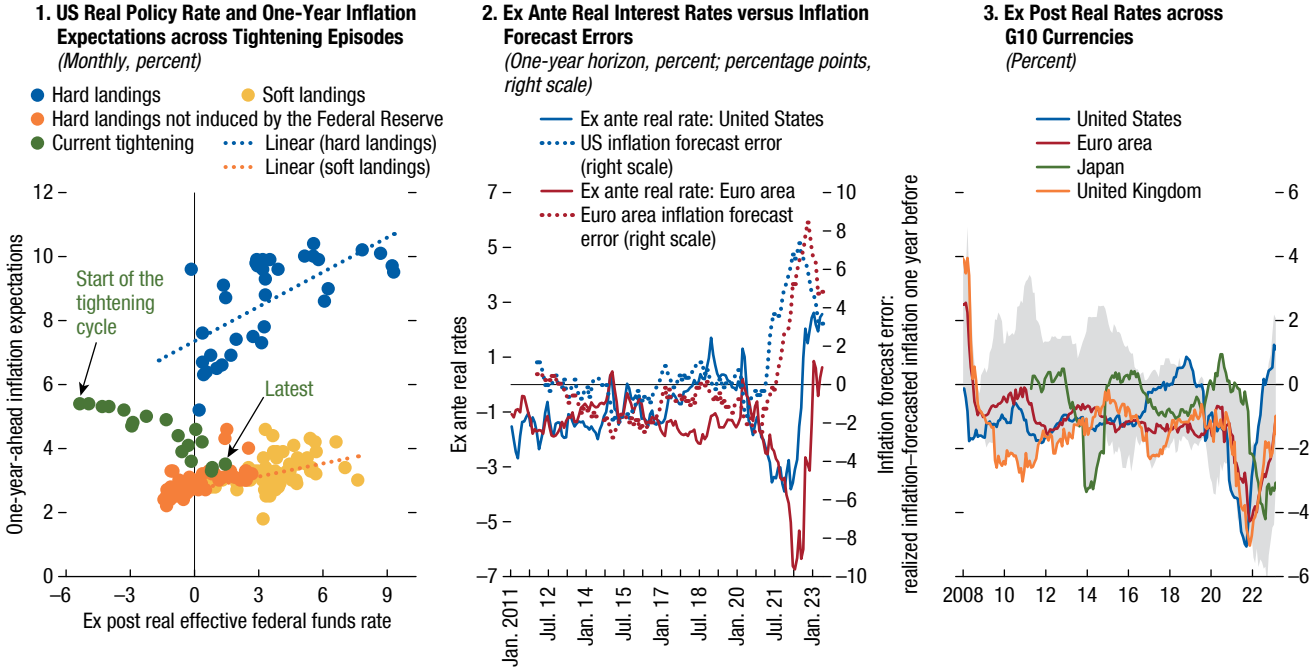
Sources: Bank of Japan; Bloomberg Finance L.P.; and IMF staff calculations.
Note: In panel 1, "volatility" is market-implied volatility by a three-month option on a 10-year overnight index swap rate (three-month option on 10-year LIBOR before 2022). In panel 2, the dotted lines show market-implied forward rates. YCC = yield curve control.

allow the Federal Reserve to end its tightening cycle in coming quarters.

The current tightening cycle has been unusual from a historical perspective. In the United States, the real federal funds rate has continued to be negative since the first quarter of 2022, even as the Federal Reserve embarked on one of the most aggressive hiking cycles for decades (leftmost green dots in Figure 1.4, panel 1). A similar picture appears in other advanced economies. This may help explain—at least

Figure 1.4. Soft-Landing Scenario: How Likely Historically?

Current conditions portend a soft landing, but this tightening cycle began late and monetary policy may not be tight enough to return inflation to targets.



Sources: Bloomberg Finance L.P.; Federal Open Market Committee; Federal Reserve Bank of St. Louis; Haver Analytics; JPMorgan; Blinder 2023; and IMF calculations.
Note: In panel 1, ex post real effective federal funds rate is measured using year-over-year core personal consumption expenditure inflation. Episodes of monetary policy tightening are identified as in Blinder (2023), using real GDP, the civilian unemployment rate, and the NBER business cycle dates. A hard landing is defined as an episode during which GDP declines by more than 1 percent or there is a NBER recession for at least a year after a Federal Reserve tightening cycle. Hard-landing and soft-landing episodes are defined as in Blinder (2023), using the definitions of soft and soft-ish landings in Table 1. Each dot does not correspond to a landing episode but rather a monthly observation in either hard- or soft-landing episodes. One-year-ahead inflation expectations are derived from the Surveys of Consumers, University of Michigan, University of Michigan: Inflation Expectation, retrieved from Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis. In panel 2, ex ante real rates are based on expected inflation over the next 12 months (that is, a one-year period) from current date. Real rates shown for advanced economies are computed using one-year inflation swaps, whereas inflation forecast errors are calculated using the difference between year-over-year CPI inflation and the forward annual inflation as priced in one year prior. In panel 3, nominal one-month money market rates are adjusted by headline inflation. The shaded area denotes maximum and minimum real policy rates across G10 currencies. CPI = consumer price index; G10 = Group of 10; NBER = National Bureau of Economic Research.

partially—why inflation has been stubbornly elevated in many countries. For example, while ex ante real rates[3]—computed using one-year-ahead inflation expectations—are above zero in the euro area and nearly 3 percent in the United States, the ex post measures (based on actual, realized inflation) are materially lower, at –1 percent in the euro area and 1 percent in the United States (Figure 1.4, panels 2 and 3). Since the pandemic, inflation expectations have frequently undershot realized inflation. An assessment of the stance of monetary policy based on real rates, computed using these expectations, should therefore be complemented by an assessment based on ex post real rates (Figure 1.4, panel 3).

[3]Ex ante real rates are defined as the difference between the nominal rate and market-based inflation rate expectations.

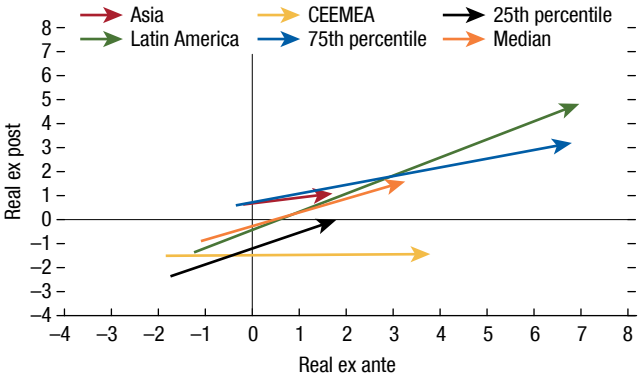
Emerging Market Central Banks Have Room to Ease Monetary Policy

In many major emerging markets, real policy rates have risen substantially since 2021 and inflation has declined over 2023, prompting investors to price in substantial rate cuts in the coming year. Inflation has eased markedly in many emerging markets, notably in Latin America, although survey-based expectations suggest inflation will remain above target through 2024 in several countries (for example, Colombia, Hungary, Poland, and Romania). This environment

Figure 1.5. Emerging Market Policy Outlook

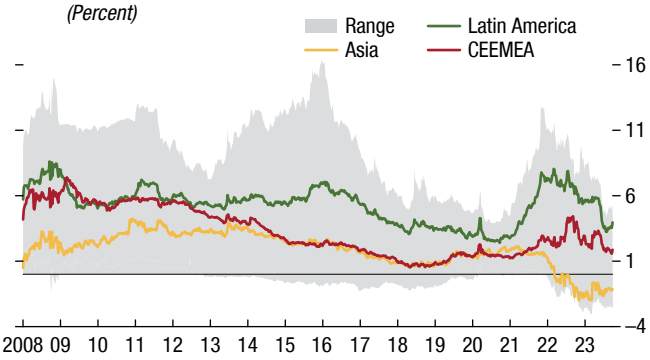
Real rates have risen on both an ex post and an ex ante basis ...

1. Real Policy Rates, Ex Ante versus Ex Post, January 2021 to July 2023
(Percent)



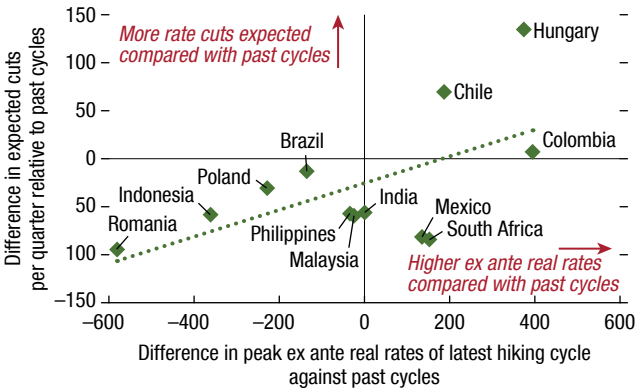
... while market pricing suggests policy buffers will unwind, alongside stark regional differentiation.

2. One-Year-Ahead Market-Implied Emerging Market Policy Rates Differential to the United States
(Percent)



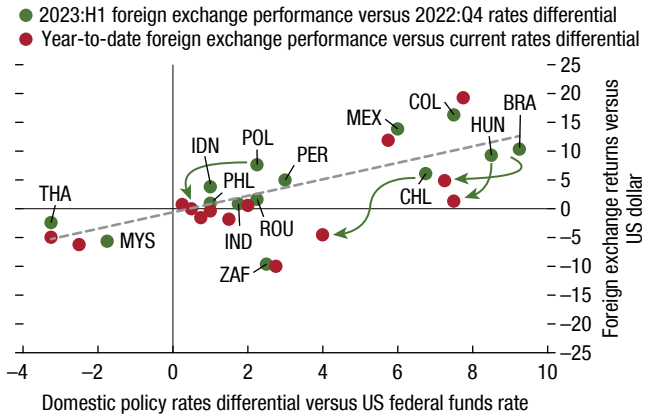
Many emerging markets are expected to embark on a rapid easing cycle.

3. Difference in Peak Ex Ante Real Rates of Latest Hiking Cycle against Past Cycles and Difference in Expected Cuts per Quarter Relative Past Cutting Cycles
(Basis points)



Emerging market currencies have benefited from positive carry trades, although outperformance may fade going forward.

4. Emerging Market Carry Trades
(Percent)



Sources: Bloomberg Finance L.P.; national sources; and IMF staff calculations.
Note: Panel 1 includes a sample of 14 large emerging markets. Panel 2 includes 12 countries with forwards from interest rate swaps, not adjusted for term premium. Ex ante rates are calculated as policy rates minus one-year-forward consensus inflation expectations; ex post rates are policy rates minus realized inflation. Panel 3 looks at the peak in ex ante real rates in the past 10 years. Data labels in panel 4 use International Organization for Standardization (ISO) country codes. CEEMEA = Central and Eastern Europe, Middle East, and Africa; H1 = first half; Q = quarter.

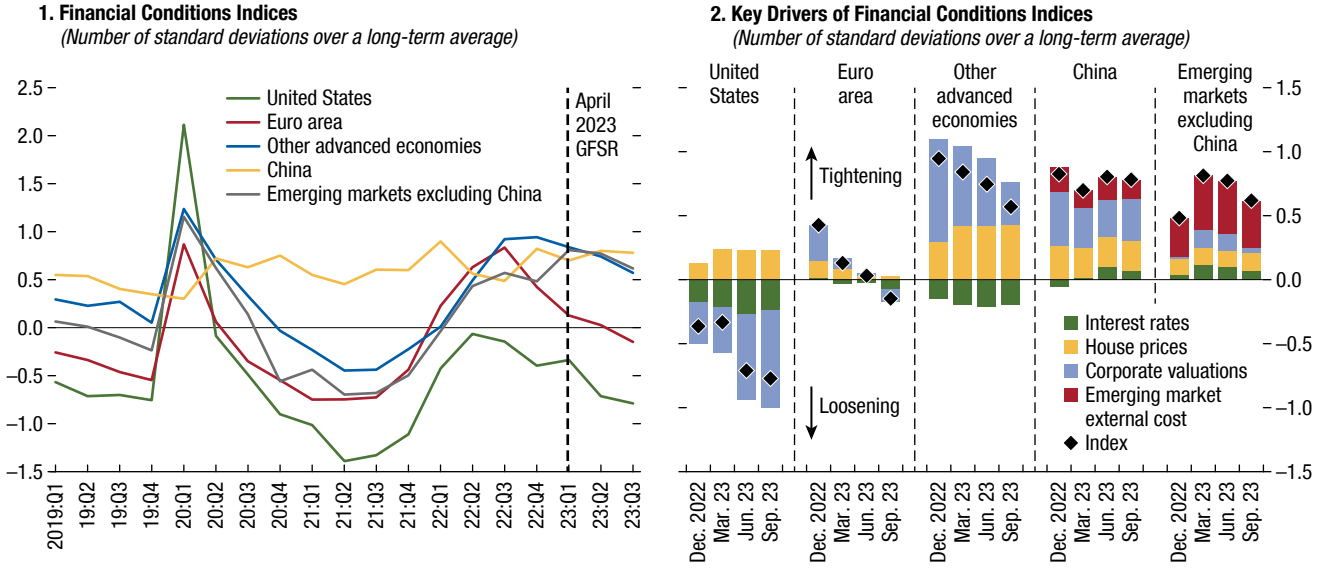
has supported emerging market currencies, but these gains could be at risk if interest rates remain high in advanced economies and policymakers in certain emerging markets cut interest rates without clear evidence that the war against inflation has been won.

Yet, early and aggressive monetary policy tightening in emerging markets has driven real rates significantly higher on both an ex ante and an ex post basis in most countries (Figure 1.5, panel 1). Countries with elevated real rates have started the easing cycle (for example, Brazil, Chile, and Uruguay) or are expected to embark on a period of rapid policy normalization. Regional differentiation remains, in both policy risks and market pricing (Figure 1.5, panel 2). Many emerging markets appear to have hit the natural peak in their tightening cycle, as policy rates and real interest rates both appear at or near historical highs. In addition, those countries where markets expect an unusually rapid pace of cuts should have the policy space to do so, as they also face unusually high ex ante real rates. However, policymakers will need to

Figure 1.6. Financial Conditions Indices

After facing brief episodes of uncertainty in 2023, risk assets are back on track driving financial conditions easier.

In particular, corporate valuations, including higher equity valuations, lower volatility, and narrower corporate bond spreads, led advanced economy financial conditions easier.



Sources: Bloomberg Finance L.P.; Haver Analytics; national data sources; and IMF staff calculations.
Note: The FCIs are calculated using the latest available variables. Standard deviations are calculated over the period from 1996 to present. The IMF FCI is designed to capture the pricing of risk. It incorporates various pricing indicators, including real house prices. Balance sheet or credit growth metrics are not included. For details, please see Online Annex 1.1 in the October 2018 *Global Financial Stability Report*. FCI = financial conditions index; GFSR = *Global Financial Stability Report*; Q = quarter.

carefully manage this easing cycle, particularly given the potential spillover effects from higher-for-longer interest rates in advanced economies (Figure 1.5, panel 3). High interest rate differentials and lower market volatility have driven strong gains for emerging market currencies through carry trades, although recent pullbacks in some emerging market currencies point to choppier conditions in coming quarters (Figure 1.5, panel 4).

Soft Landing and Financial Markets

Financial Conditions Are Easing, But Lending Conditions Could Get Tighter

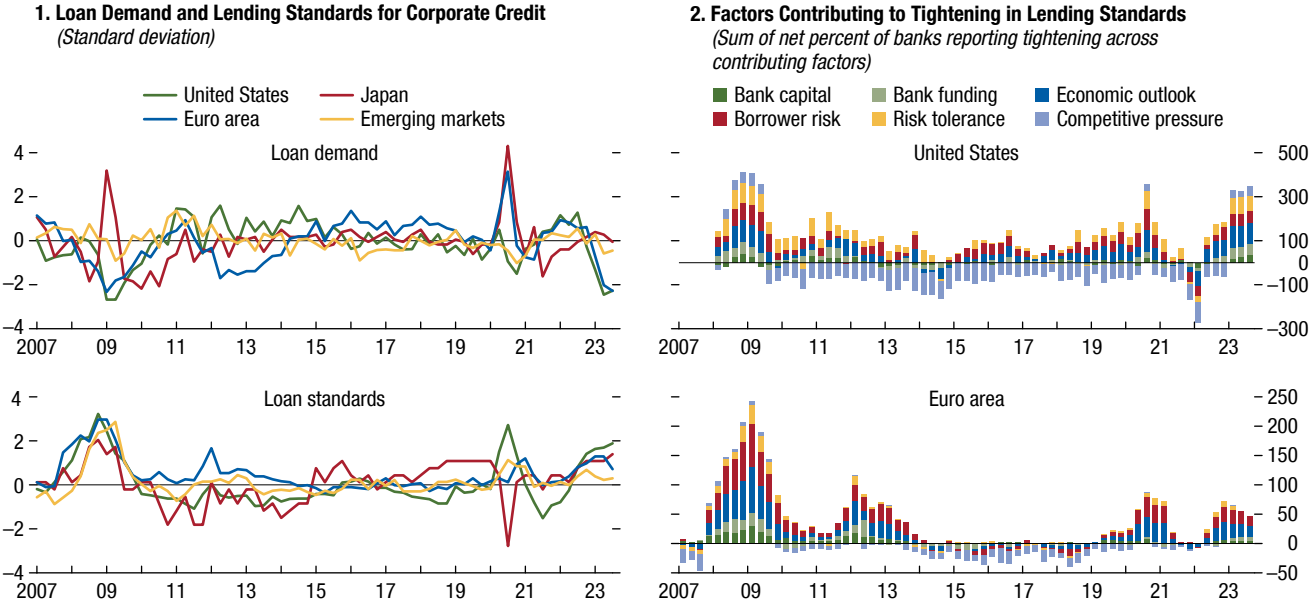
Financial conditions—measuring the cost of funding in capital markets—have eased in advanced economies (Figure 1.6, panel 1), especially in the United States, despite ongoing monetary tightening. Such easing is unusual when compared with past monetary tightening cycles and has been largely predicated on investor expectations. Hopes are that inflationary pressure will abate quickly, and central banks will engineer a soft landing—a scenario that would allow central banks to begin cutting rates in coming quarters. The compression of risk premiums in equity and corporate bond markets (see the "Risk Assets Are Increasingly Exposed to Repricing Pressures" section) has been a tailwind to corporate valuations in the IMF's financial conditions index,[4] particularly for the United States and the euro area (Figure 1.6, panel 2). By contrast, in China, despite some recent modest easing of monetary policy, concerns about the sluggish economic recovery and financial stability risks associated with property market stress have hurt risk assets and investor confidence. In other emerging markets, expectations for rate cuts and higher corporate valuations have loosened financial conditions, on net, even though external costs continue to be a source of headwinds.

Meanwhile, lending conditions continued to tighten globally. Standards and terms have become more restrictive, even though the material contraction in bank credit growth feared in the aftermath of the banking turmoil in March has not materialized.

[4]The IMF's financial conditions index captures the pricing of risk. It incorporates various pricing indicators, including real house prices. Balance sheet or credit growth metrics are not included. For details, please see Online Annex 1.1 in the October 2018 *Global Financial Stability Report*.

Figure 1.7. Bank Lending Standards and Reported Bank Loan Demand

Lending standards continue to tighten, and loan demand is declining across the globe.



Sources: Federal Reserve; national central banks; and IMF staff calculations.
Note: For loan demand, positive values indicate stronger demand; negative values indicate weaker demand. For loan standards, positive values indicate tighter standards; negative values indicate looser standards.

Loan standards tightened in the euro area, the United States, and some emerging markets in the first half of the year, whereas loan demand is reportedly materially weaker in the euro area and the United States (Figure 1.7, panel 1). Concerns about the economic outlook, increased borrower risks, and more challenging bank funding conditions were cited by euro area and US lenders as driving tighter lending standards. In the United States, lower bank risk tolerance also played a role (Figure 1.7, panel 2). The tightening standards and dropping demand are most vivid in CRE loans in the United States likely because of weaker borrower profiles and expected deterioration in the sector.

Risk Assets Are Increasingly Exposed to Repricing Pressures

Risk assets have continued to appreciate, on net, since April 2023, resulting in an easing of financial conditions, especially in the euro area, Japan, and the United States.[5] Equity prices have increased notably in these economies while corporate credit spreads have tightened on net. This rally has been supported by progress on inflation and growing investor expectations of a soft landing that could allow the central banks tightening monetary policy to conclude doing so soon and potentially begin easing in the coming quarters. With valuations stretched in many assets, the risk of a sharp repricing of risk assets remains, should inflation be stickier than markets anticipated and hopes for a soft landing fail to materialize. Historically, equities tend to underperform after the end of a tightening cycle in a more inflationary environment (Figure 1.8, panel 1).

Equity valuations have recovered to the levels before COVID-19. Since the beginning of the year, US equity prices have climbed more than 10 percent (Figure 1.8, panel 2). Gains in technology stocks, boosted by the artificial intelligence boom, have pushed global equity markets higher after June. Since September, however, investors have pulled back on risk taking as rising long-term real rates, especially in the United States, have challenged asset valuations. In Japan, equities have outperformed other advanced economies, supported by continued monetary policy accommodation, a weak yen that made Japanese stocks more attractive to foreign investors, stronger corporate profits, and a high level of share buybacks.

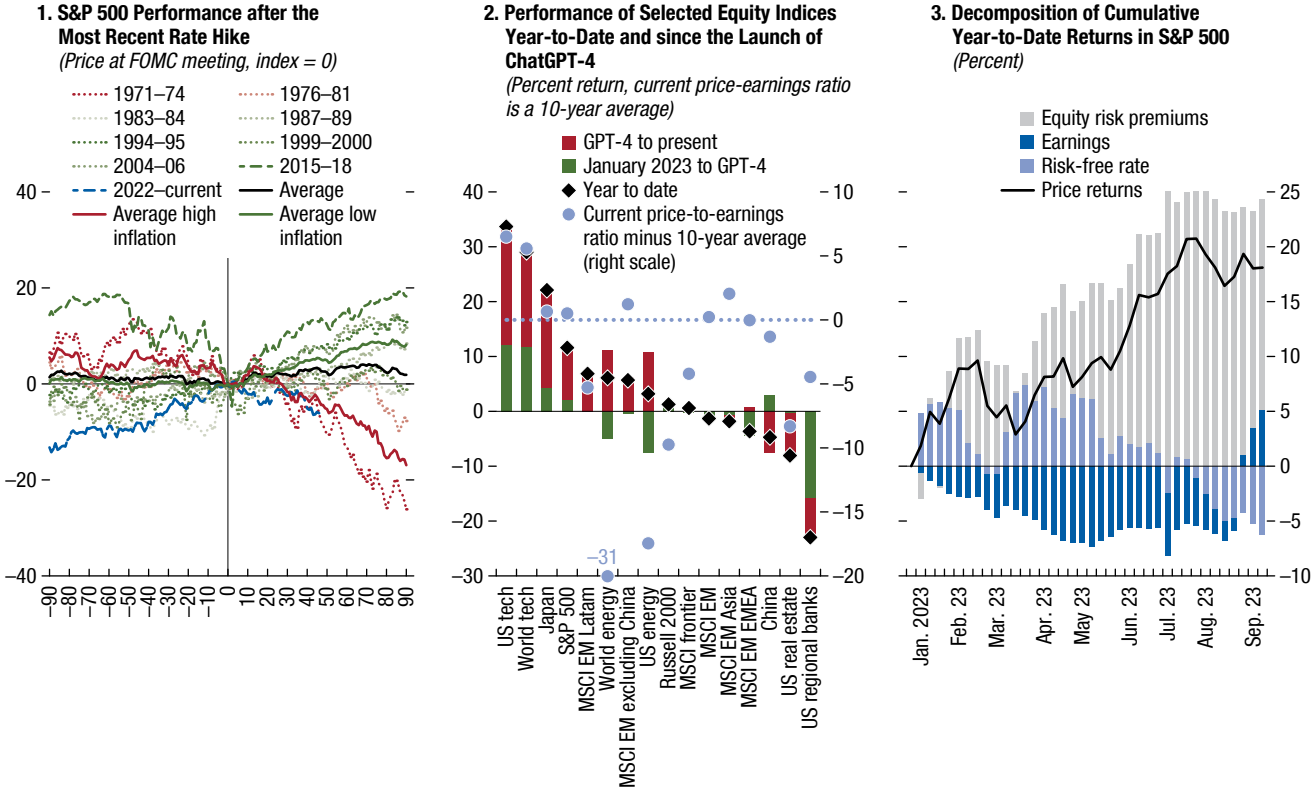
[5]After a strong start in 2023, crypto assets have lost momentum and traded range bound since April 2023, showing low volatility. Higher expected policy rates and idiosyncratic factors related to the future of the industry have deterred investors.

Figure 1.8. Equity Markets' Rally Led to Increasingly Stretched Valuations

Equity performance toward the end of a tightening cycle depends on the inflationary environment.

Artificial intelligence and technology soared after release of ChatGPT-4.

Equity market performance this year is largely driven by lower risk premiums.



Sources: Bloomberg Finance L.P.; Haver Analytics; and IMF staff calculations.
Note: In panel 2, the launch of ChatGPT-4 was set to March 14, 2023. In panel 3, data are as of September 26, 2023. Lower equity risk premiums, lower risk-free rates, and higher earnings contribute positively to stock market returns, and vice versa. EM = emerging market; EMEA = Europe, the Middle East, and Africa; FOMC = Federal Open Market Committee; Latam = Latin America; tech = technology.

Emerging markets such as Chile, Hungary, India, Mexico, and Poland have also seen notable equity price increases, consistent with the appreciation of most major emerging market currencies in the first half of the year.

After net gains since April 2023, valuations appear significantly stretched in the technology sector. In the United States, this sector is trading close to 30 times earnings, above the 10-year historical average of 22 times earnings (Figure 1.8, panel 2), although still well below its 1999 peak. The broader S&P is also somewhat above historical averages. Based on a standard discount cash flow model, the rise in the S&P 500 is primarily driven by investors' risk appetite and optimism—proxied by a compression of risk premiums (Figure 1.8, panel 3, gray bars).

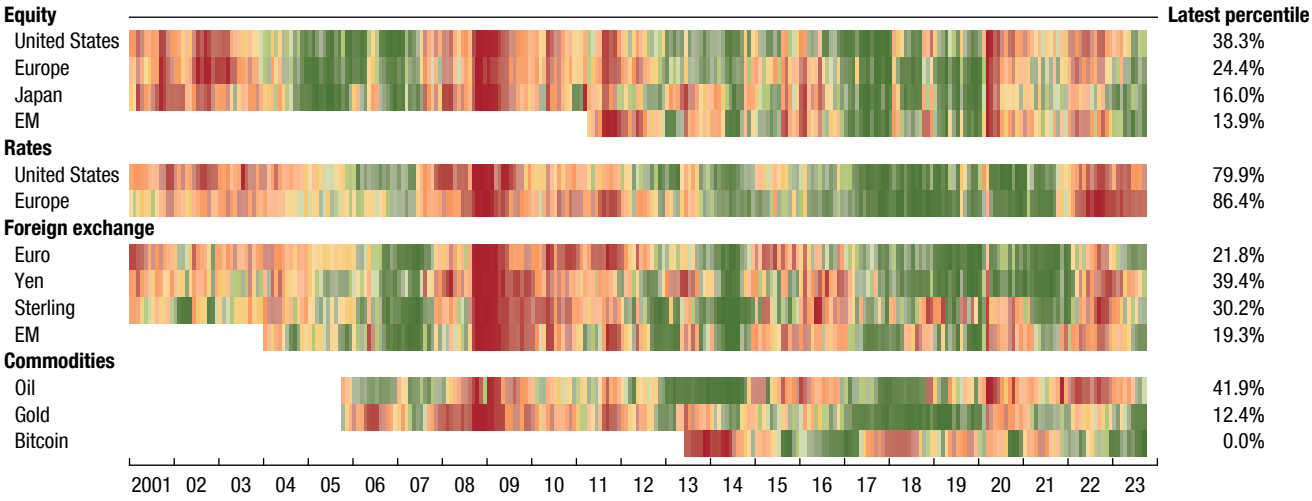
Investor optimism about the economic outlook has helped compress market volatility (Figure 1.9, panel 1). Before recent deterioration in market sentiment, the decline in volatility was most notable in US equity markets, where both realized and implied volatility were in the lowest historical quartile. In addition, the term structure of US equity implied volatility has returned to an upward slope since April 2023 (Figure 1.9, panel 2). Investor positioning—for example, trend-following investors (commodity trading advisors and volatility-targeting funds) and market participants reportedly selling short-dated volatility to boost returns—appears to have also asserted downward pressure on near-term volatility. Volatility risk premiums, measured as the spread between market-implied volatility and model-based fair value, have continuously dropped across maturities over the last year, particularly in shorter-dated volatility (Figure 1.9, panel 3).[6]

[6]Volatility risk premiums seem to have dropped based on a Glosten-Jagannathan-Runkle generalized autoregressive conditional heteroskedasticity (GARCH) volatility model.

Figure 1.9. Market Volatility

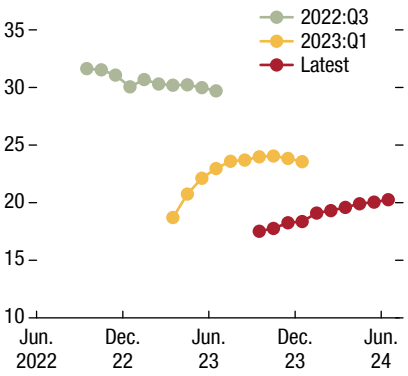
Market volatility has declined across asset classes, except in interest rate markets.

1. Global Volatility Heat Map



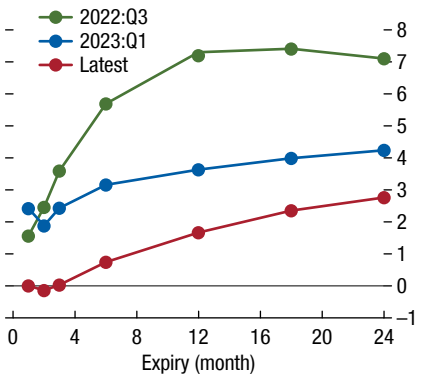
In equity markets, the volatility term structure has normalized.

2. Volatility Index Futures Term Structure
(Percent annualized)



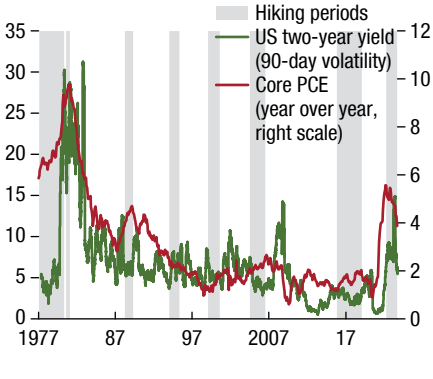
Investor optimism and positioning has compressed near-term volatility risk premiums.

3. Spread between S&P 500 Option-Implied and Model-Based Volatility
(Percent annualized)



Interest rate volatility tended to rise when inflation still ran high after the rate hikes ended.

4. 90-Day Volatility of Two-Year US Treasury Yield and Year-over-Year Change in Core PCE Index
(Percent)



Sources: Bloomberg Finance L.P.; Refinitiv Datastream; and IMF staff calculations.
Note: The heat map shows the percentile of implied volatility against own history across asset classes, with red (green) denoting high (low) volatility. The underlying volatility measures include the following: equities are based on a 15-day moving average of implied volatility; rates are based on implied volatility; foreign exchange is based on implied volatility; commodities are based on implied volatility; and Bitcoin is based on 180-day realized volatility of weekly returns. Panel 3 shows the difference between S&P option implied volatility and a forward-model-based volatility estimated using the Glosten-Jagannathan-Runkle generalized autoregressive conditional heteroskedasticity (GARCH) model. EM = emerging market; PCE Index = personal consumption expenditure price index; Q = quarter.

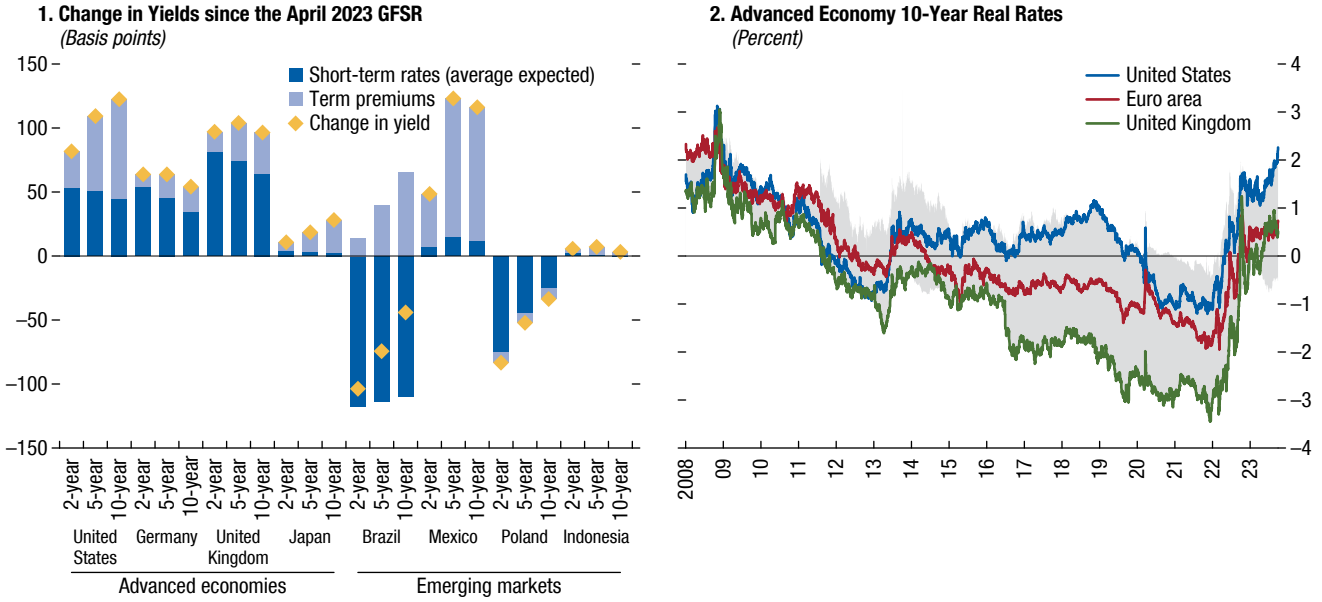
Most recently, markets have become more volatile. A sudden change in sentiment or a reassessment of the policy or economic outlook could result in a decompression of volatility—made worse by an unwinding of investor positions—and a sharp tightening of financial conditions.

By contrast, volatility in interest rate markets has remained elevated, reflecting continued uncertainty about the policy outlook. In past US tightening cycles, interest rate volatility tended to rise when inflation was still running high after the end of rate hikes, such as in late 1970s and 1980s (Figure 1.9, panel 4). A similar dynamic seems evident during this cycle: with core inflation still high, Treasury yields gyrated midyear as investors pondered when peak policy rates would be reached and whether the Federal Reserve would begin easing policy.

On net since April 2023, medium- to longer-tenor bond yields have risen noticeably across advanced economies (Figure 1.10, panel 1). A decomposition

Figure 1.10. Government Bond Yield Changes and Decompositions

In advanced economies, yield rises were driven by both higher expected policy rates and term premiums, whereas in some emerging markets, a lower expected policy path has put downward pressure on yields.



Sources: Bloomberg Finance L.P.; national central banks and authorities; and IMF staff calculations.
Note: In panel 2, the gray range represents minimum and maximum 10-year real rates across Australia, Canada, the euro area, Japan, the United Kingdom, and the United States. For the euro area, real rates reflect the difference between nominal interest rate swaps and inflation swaps. For the other countries, real rates are based on inflation protected government securities. Given data limitations, real rates for Japan start from 2013 onward. GFSR = *Global Financial Stability Report*.

of the increases into the expected short-term rates and term premium components shows that upward shifts of the market-implied expected path of policy account for large shares of the increase (see the "Central Banks in Advanced Economies Expected to Cut Rates Soon Despite Stubborn Core Inflation" section).[7] Increases in term premiums, however, have also played a role, especially for bond yields in the United Kingdom, the United States, and to some extent Japan, reportedly reflecting in part deteriorating fiscal conditions and other central bank actions, like quantitative tightening and, in Japan, a more flexible implementation of the yield curve control policy. With the rapid rise of bond yields in advanced economies, longer-tenor real rates have also increased markedly (Figure 1.10, panel 2). A continuation of this rise could weigh on the valuation of risk assets, especially growth assets such as information technology stocks. By contrast, bond yields have fallen in several emerging markets, pushed down by expectations of rate cuts, particularly in Brazil and Poland.

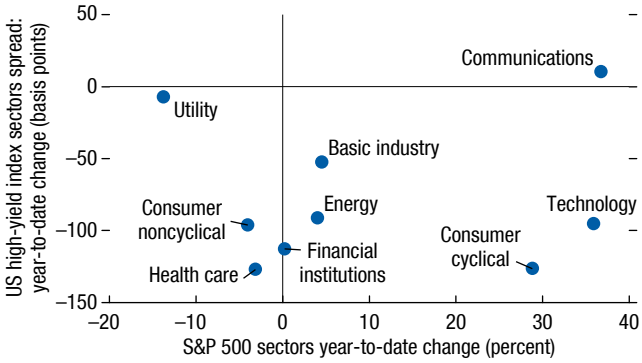
[7]Term premiums represent the compensation investors seek to bear the risk that interest rates may change over the life of the bond.

Global corporate bonds have also rallied since April 2023, with spreads narrowing below long-term averages, particularly in the high-yield segment. By sector, spreads have outperformed the most in the consumer cyclical and technology sectors on a year-to-date basis, in line with equity performance, reflecting strength in the household sector and artificial intelligence–related investor enthusiasm (Figure 1.11, panel 1). However, narrower spreads have not translated into cheaper corporate funding costs, as absolute yields remain elevated. After accounting for the increase in government yields since the beginning of the policy-hiking cycle, speculative-grade corporate borrowing costs are approaching the level seen during the COVID-19 pandemic and investment-grade yields are already higher than their levels at the height of that crisis (Figure 1.11, panel 2). The narrow spreads are therefore indicative of stretched valuations in the corporate market. Indeed, corporate bond spread misalignment—measuring the extent to which spreads are lower than those implied by model values—have become more severe in the euro area high-yield market and in US investment-grade and high-yield markets (Figure 1.11, panel 4).

Figure 1.11. Corporate Bond Spread Valuations

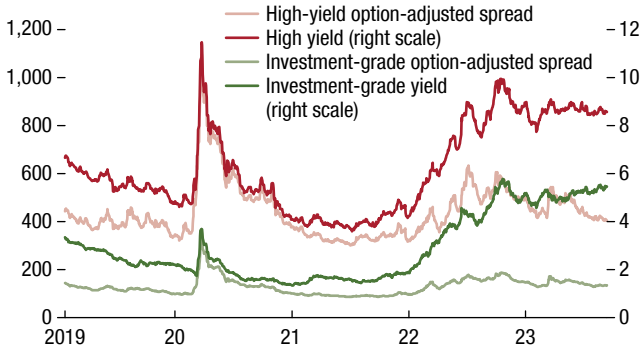
US consumer cyclical and technology sectors have outperformed in corporate bond and stock markets.

1. US High-Yield Corporate Bond Spreads and S&P 500 Returns, by Sector



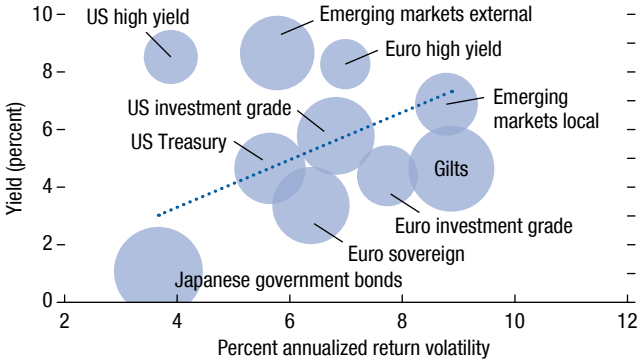
Despite spreads narrowing, firms are still facing high borrowing costs.

2. Global Corporate Bond Yield and Spread
(Basis points, left scale; percent, right scale)



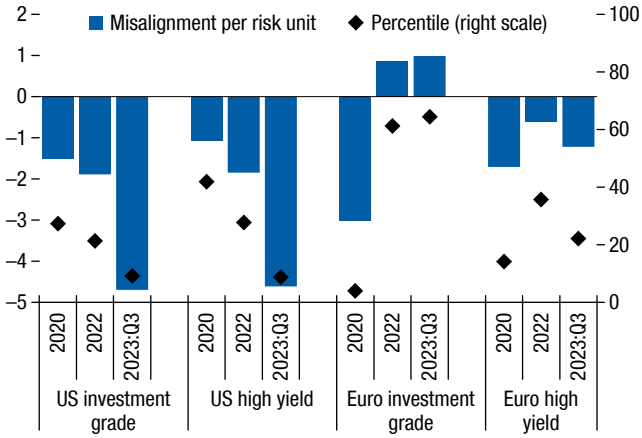
US dollar assets are more attractive than Euro assets, with higher yield and lower volatility, partly explaining stretched valuations.

3. Global Fixed-Income Assets Yield versus Volatility
(Bubble size = modified duration of index)



US corporate bond spreads are narrower than model values based on corporate and macrofundamentals.

4. Corporate Bond Spread Misalignments
(Deviation from fair value per unit of risk, quarterly averages, left scale; percentiles, right scale)



Sources: Bloomberg Finance L.P.; Haver Analytics; Refinitiv Datastream; and IMF staff calculations.
Note: In panel 1, US high-yield corporate bond sector indices are based on Bloomberg Bond index classification (BCLASS). S&P 500 index sectoral returns are based on the Global Industry Classification Standard (GICS). Panel 4 is scaled by standard deviation to aid comparison across regions where the underlying volatility may differ. See Section 1 of the October 2019 *Global Financial Stability Report's* Online Annex 1.1 for details of the asset valuation models.

Leveraged Trading Strategies Could Exacerbate Market Dysfunction

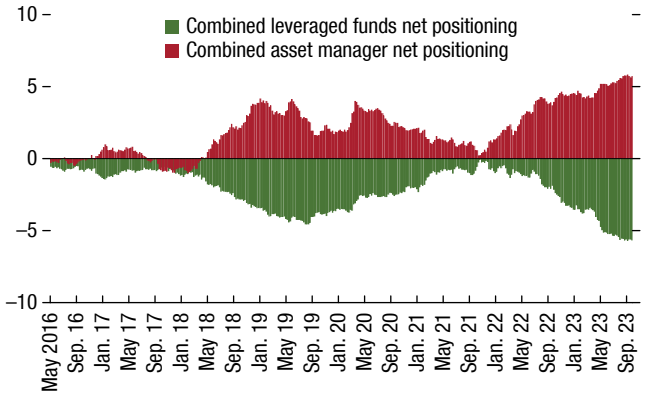
With market volatility low, some investors have taken large leveraged positions to boost returns on their trading strategies. Outsized leveraged positions are vulnerable to volatility: An unexpected resurgence can force investors to unwind their positions, setting off a feedback loop of deleveraging, forced selling, and further price declines. Policymakers and market participants have recently flagged this risk for the US Treasury market (Bank of England 2023; Federal Reserve 2023).

Since the end of 2021, asset managers have increased their long positions in Treasury futures beyond those observed at the 2019 peak, apparently based on the view that the rate hike cycle in the United States will soon end. Leveraged funds have taken the other side of the trade (Figure 1.12, panel 1), as banks and broker–dealers appear to have stepped back because of balance sheet constraints. It is important to note that the increase of leveraged funds' short positions in the futures market has coincided with greater holdings of cash Treasuries (Figure 1.12, panel 2), likely financed by repurchase

Figure 1.12. Positions of Investors in Treasury Cash and Futures Markets

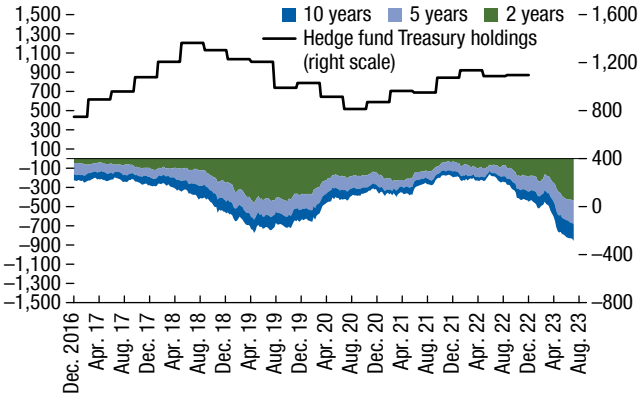
Leveraged funds have increased short positions in Treasury futures, mirroring asset managers' positions.

1. Leveraged Funds and Asset Managers' Future Positioning
(Contracts, millions)



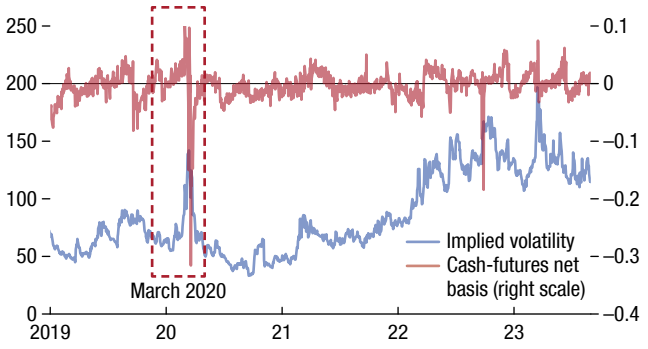
There are signs that hedge funds are engaged in "basis trade."

2. Hedge Funds' Cash Treasury Holdings and Leveraged Funds' Future Shorts
(Billions of US dollars)



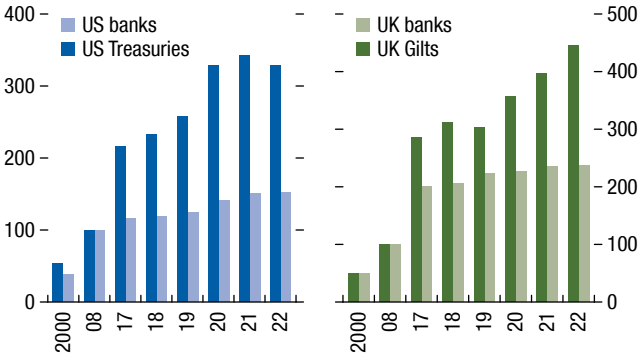
A spike in volatility could see forced unwinding of futures positions, amplifying liquidity stress ...

3. Treasury Cash-Futures Net Basis and Volatility
(Basis points annualized, left scale; cents, right scale)



... and growth in outstanding sovereign bonds has outpaced growth of intermediaries' balance sheets.

4. Relative Growth of Primary Dealers' Balance Sheet Size and Outstanding Sovereign Bonds
(Indices: 2008 = 100)



Sources: Bloomberg Finance L.P.; Federal Reserve; JPMorgan Big Data and AI Strategies; JPMorgan Chase; Nasdaq; Refinitiv Datastream; and IMF staff calculations.
Note: In panel 2, the black line shows the aggregate Treasury holdings of all hedge funds that file Form PF with the Securities and Exchange Commission. In panel 3, "Treasury cash-futures net basis" is the spread between the forward price of the futures contract's cheapest-to-deliver cash security and the futures price adjusted by a conversion factor. "Volatility" is the one-month option on seven-year overnight index swap implied basis point volatility. In panel 4, primary dealer data are estimated based on available data from Bloomberg Finance L.P.

agreement transactions. This suggests that leveraged funds may be conducting basis trades—a strategy based on exploiting the valuation gap between futures and comparable bonds.

Basis trading was prevalent in 2019 and was severely tested during the "dash for cash" in March 2020, when cash Treasury yields spiked, leading to a reversal of the basis (Figure 1.12, panel 3). This price move, together with a jump in volatility, forced many leveraged investors to unwind their basis trade positions to stop losses, meet margin calls on futures positions, or keep their risk exposures below targets (see the April 2020 *Global Financial Stability Report*).

The current positioning by leveraged investors may similarly be tested by a sudden bout of bond market volatility, forcing them to unwind positions and sell bonds just as prices for these securities fall. Further adding to concerns is limited intermediation of broker–dealers in sovereign bond markets. For example, in the United Kingdom and the United States, primary dealers' respective Gilt and Treasury balance sheets have been materially

outpaced by the growth in bonds outstanding (Figure 1.12, panel 4).

A deleveraging and forced selling feedback loop could be amplified by insufficient market liquidity. Liquidity conditions—the cost and ease of transacting—have deteriorated across several key financial markets since 2022, driven by the unprecedented pace of removal of monetary policy accommodation (see the "Banks and Markets May Be Affected by Central Bank Balance Sheets" section), uncertainty about the economic outlook, and structural factors such as reduced intermediation capacity of key financial institutions. Stress in the banking sector in March and the US debt ceiling standoff in June further contributed to the liquidity deterioration. While market liquidity since appears to have stabilized in equity and foreign exchange markets, conditions in sovereign bond markets remain challenging. Failed transactions have increased and persist in several markets, suggesting that market functioning remains impaired.

Credit Quality of Corporate and Household Borrowers

The Credit Cycle Is Turning as Corporate Cash Buffers Deplete

A sudden tightening in financial conditions, such as the inflation outlook turning less benign than markets currently anticipate, may cause distress in the corporate sector and test the resilience of some firms, particularly those heavily indebted. Corporations have generally managed to protect their profit margins since the pandemic, benefiting from the recent drop in some raw material and energy prices, and have also demonstrated price power by passing some cost inflation to consumers. However, realized earnings show that, despite a slight rebound in the second quarter, US corporate earnings have declined for two consecutive quarters,[8] indicating that the upward trend since 2020 may lose steam. Nonetheless, growing expectations for a soft-landing scenario and expectations that central banks are close to the end of the tightening cycle have further supported one-year-ahead earnings per share forecasts (Figure 1.13, panel 1).

However, interest coverage ratios have declined in both Europe and the United States but remain high by historical standards (Figure 1.13, panel 2). The sector's large cash buffers, built during the pandemic, have provided financial cushioning. In the United States, corporations held financial assets exceeding total liabilities in 2021, providing resources to weather the adverse effects of higher interest rates (Figure 1.13, panel 3). Abundant interest-bearing assets have helped meaningfully lower net interest payments since 2022, contrary to the previous rate hike cycle when net interest payments increased substantially (Figure 1.13, panel 4). The difference in the interest rate sensitivity of assets and liabilities is a key factor. Corporations have reportedly invested a sizable portion of fixed-rate borrowings during the extremely low-rate period after the pandemic in 2020–21 in variable rate deposits, benefiting from higher rates (Edwards 2023). Of course, such rates are not usual for all corporate assets and liabilities, nor are lower net interest payments guaranteed should rates rise further.

Instead, the risk of declining corporate earnings, combined with tighter funding conditions, will likely continue to erode corporate buffers globally (Figure 1.13, panels 5 and 6). The share of firms with low cash-to-interest-expense ratios—that is, weaker firms with fewer buffers—has rebounded over the past two years. This is especially true among small and medium firms. Reduced buffers could lead to repayment difficulties for these weaker firms (see Chapter 1 of the April 2023 *Global Financial Stability Report*), considering that the corporate sector will be exposed to rollover risks in the coming years. While refinancing is not an imminent problem for the average corporation in most countries, as the tenor of outstanding debt is longer than six years, some companies need to refinance as early as next year. Global corporate refinancing needs in 2024 total more than $5 trillion, with approximately half accounted for by US companies (Figure 1.14, panel 1). Furthermore, in some countries, floating rate corporate debt represents a considerable share of overall corporate debt, putting firms at risk of a heavier debt-service burden as interest rates climb (Figure 1.14, panel 2). If US interest rates continue to stay high, the potential rise in debt-servicing costs might be more severe for firms with substantial amounts of floating rate US dollar–denominated debt.

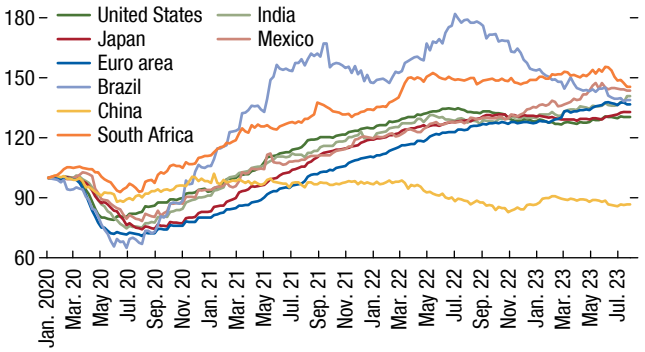
These dynamics could be further compounded by negative rating events. Downgraded firms would face much higher funding costs as a significantly higher premium is required for financing (Figure 1.15, panel 1). In the United States, rating downgrades

[8]"Gross Domestic Product (Third Estimate), Corporate Profits (Revised Estimate), and GDP by Industry, First Quarter 2023," Bureau of Economic Analysis, US Department of Commerce, news release, June 29, 2023, https://www.bea.gov/sites/default/files/2023-06/gdp1q23_3rd.pdf.

Figure 1.13. Corporate Earnings and Debt Servicing

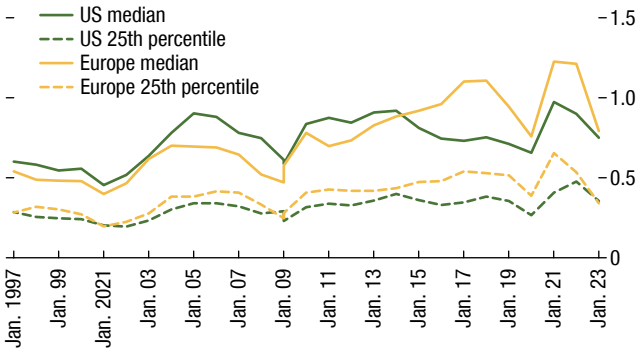
Corporate profitability prospects are close to peak in most jurisdictions.

1. Global 12-Month-Forward Earnings per Share Ratios
(Indices, January 2020 = 100)



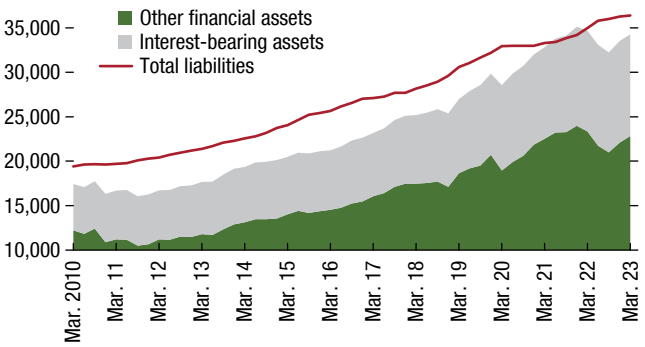
Interest coverage ratios have declined, but they remain higher than historical averages.

2. Nonfinancial Firms' Interest Coverage Ratio
(Ratio, US S&P 500 and S&P Europe 350 firms)



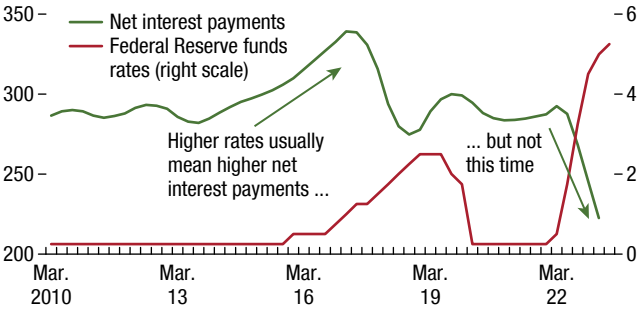
Financial assets of nonfinancial firms, including variable interest rate bearing assets, exceeded the total liabilities in 2021 ...

3. US Nonfinancial Firms' Financial Assets and Total Liabilities
(Billions of US dollars)



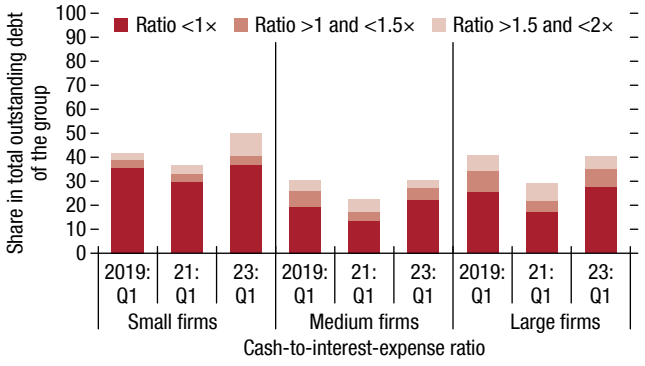
... as a result, net interest payments have significantly decreased since 2022.

4. US Nonfinancial Firms' Net Interest Payments
(Billions of US dollars, left scale; percent, right scale)



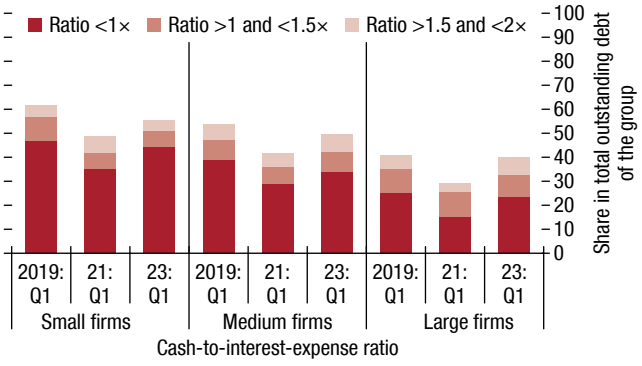
In advanced economies, nearly 40 percent of small firms do not own enough cash liquidity to cover their annual interest expenses ...

5. Cash Liquidity Buffers at Risk in Advanced Economies
(Percent)



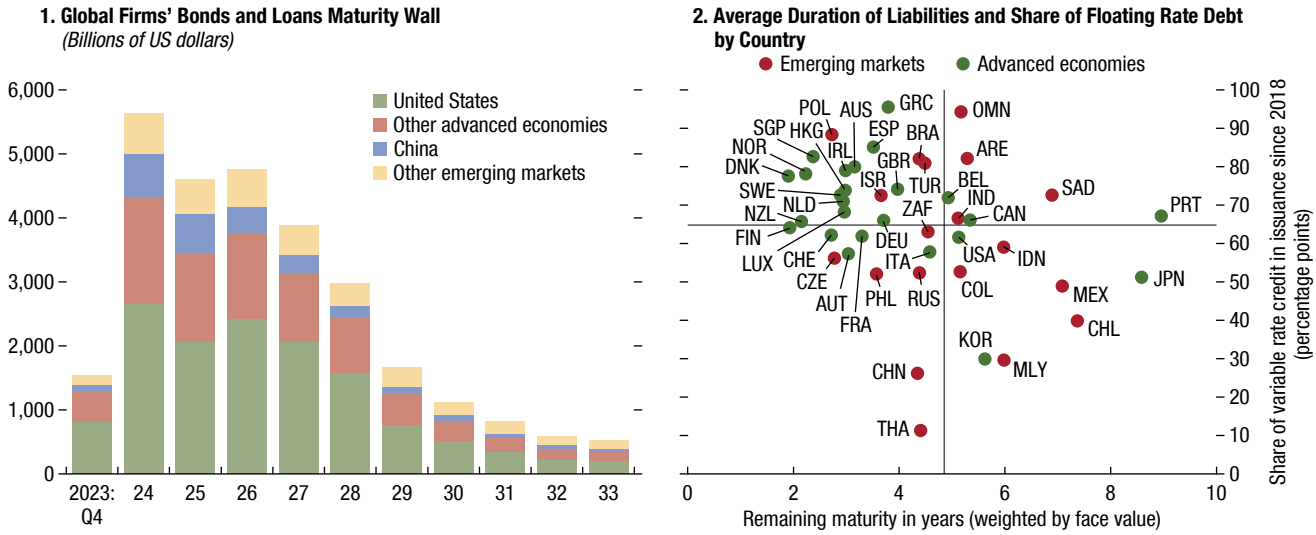
... in emerging market economies, the debt-servicing capacity of small and medium firms has also deteriorated.

6. Cash Liquidity Buffers at Risk in Emerging Market Economies excluding China
(Percent)



Sources: Bloomberg Finance L.P.; Bureau of Economic Analysis; Dealogic; Haver Analytics; Refinitiv Datastream; and S&P Global.
Note: In panel 3, the repayment schedule is based on data available for 163 countries as of August 2023 and includes both loans and bond instruments. For advanced economies, the nonfinancial corporations group either includes private sector utilities, industrial and other companies except those operating in the financial sector (including insurance), and closed-end funds, or is composed of holding companies. In addition to these, the emerging market nonfinancial corporate group includes public sector corporations such as utilities, industrial, and others. Issuances by special purpose financing vehicles are not included for advanced economies and emerging markets. In panels 5 and 6, "cash" includes cash and equivalents. Q = quarter.

Figure 1.14. Corporate Debt Profile



Sources: Dealogic; Federal Reserve Bank of St. Louis; and IMF staff calculations.
Note: In panel 1, remaining tenors as of September 2023 are calculated based on all debt (loans and bonds) issued since 1980. In the absence of information on interest rates on loans, 81 percent of loans (by value) are assumed to carry a variable rate based on the estimates by the Federal Reserve Bank of St. Louis for the United States in 2021. Because of limitations in the coverage of the loan data used to calculate the average duration, for some jurisdictions, the results may differ from other estimates. Panel 2 displays two lines in the chart area: a vertical line representing the debt-weighted average remaining maturity of liabilities and a horizontal line representing the debt-weighted average share of variable rate debts. Data labels in panel 2 use International Organization for Standardization (ISO) country codes.

have recently outpaced upgrades and default rates have gradually increased, partly because the effects of postpandemic fiscal support measures are waning (Figure 1.15, panel 2). The default rate for higher-rated firms has remained low but that for lower-rated firms has already exceeded the long-term average (Figure 1.15, panel 3). A rise in bankruptcies in the euro area and the United States points to a deterioration in conditions, especially for smaller businesses (Figure 1.15, panel 4).

So far, investors have continued to show strong risk appetite, as evidenced by valuations misalignments (see the "Risk Assets Are Increasingly Exposed to Repricing Pressures" section). However, sentiment could change abruptly, leading to a sudden repricing. For example, investment funds and exchange-traded funds (ETFs) with significant exposure to the corporate sector are particularly vulnerable to sentiment shifts. Historically, high-yield bond funds have experienced large outflows during times of stress (see the "Higher Rates Benefit Some NBFIs but Could Exacerbate Structural Vulnerabilities" section). Another source of vulnerabilities is reduced demand for credit assets from insurance firms. Insurers, as large holders of BBB-rated corporate bonds, are sensitive to rating downgrades due to greater capital requirements for sub-investment-grade holdings. A pickup in policy lapses and surrenders could require insurers to sell credit assets.

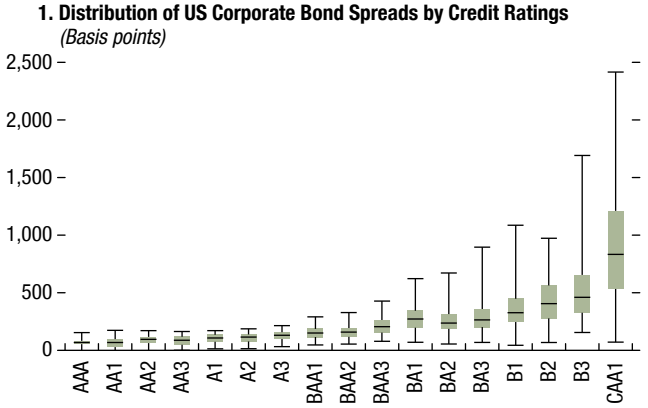
Higher Interest Rates Keep Housing Affordability under Pressure

Mortgage borrowers will continue to face heavier repayment burdens, leading to a slowdown in housing activity and further declines in home prices. Global real house prices have been declining since late 2022, as major central banks have continued to tighten monetary policy aggressively. In the first quarter of 2023, real house prices fell 5 percent in advanced economies and declined 1.9 percent in emerging markets. This reflects a decline of nominal house prices, which are growing at a slower pace than inflation in most countries (Figure 1.16, panel 1). However, the picture is mixed across and within regions, reflecting both varying degrees of monetary policy tightening and different sensitivity of housing markets to interest rate increases.

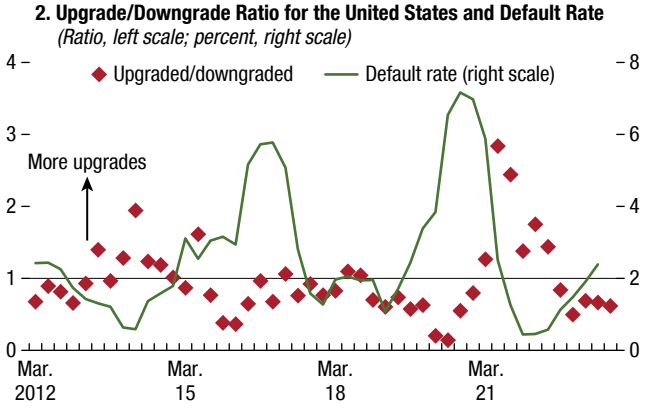
Mortgage rates have risen globally, affecting loan originations, borrower repayment ability, and housing prices. However, the effect varies across economies. Countries with a large share of variable rate mortgages and house prices still above the prepandemic average (for example, Australia, Canada, and New Zealand)

Figure 1.15. Corporate Performance and Pricing

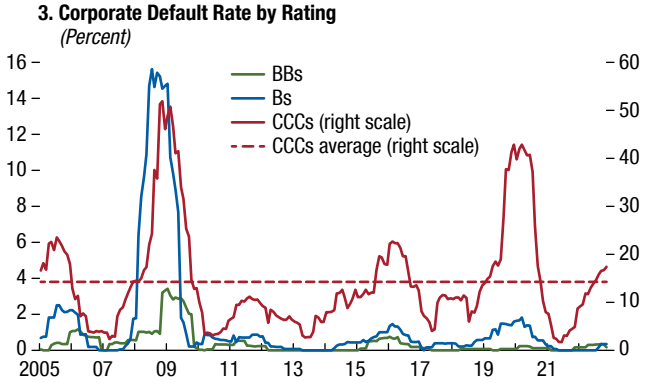
Lower-rated firms are required to pay a significantly increased funding premium on an exponential scale.



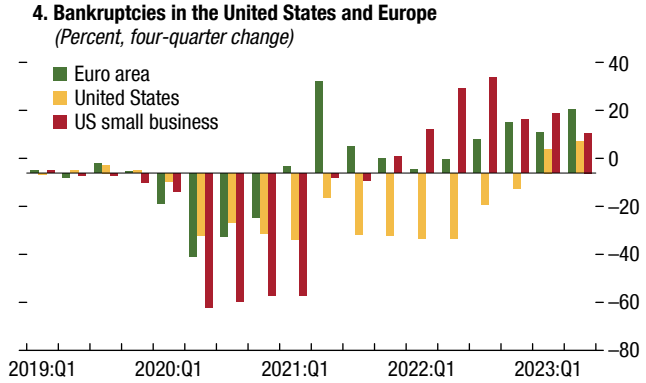
With the policy effects waning, rating downgrades have outpaced upgrades in the United States.



Default rates for lower-rated firms have already exceeded the long-term average.



The rise in bankruptcies indicates that smaller businesses face significant difficulties.



Sources: Bank of America; Bloomberg Finance L.P.; Haver Analytics; and IMF staff calculations.
Note: In panel 2, upgrade/downgrade ratio is the average of three rating agencies: S&P Global; Moody's Investors Service; and Fitch Ratings. In panel 4, US bankruptcies are counted as the sum of Chapters 7 and 11. US small businesses are proxied by Chapter 13 bankruptcies. Q = quarter.

recorded double-digit declines in home prices since their peak.[9] Countries with these characteristics are likely to experience the largest effect on household debt-service ratios from further increases in interest rates, according to an IMF simulation (Figure 1.16, panel 2; see also Valderrama and others 2023). For example, in an adverse scenario in which interest rates increase by 200 basis points, countries with debt-service ratios already above 10 percent could see an increase in servicing costs of up to 1.8 percentage points. In other countries with high house-price-to-income ratios (for example, Denmark, The Netherlands, Norway, and Sweden), further rate rises will lead to heavier mortgage debt-service burdens and could lead to higher defaults. However, a severe increase in defaults remains a tail risk, as underwriting standards remain tighter and household debt is generally lower than before the global financial crisis.

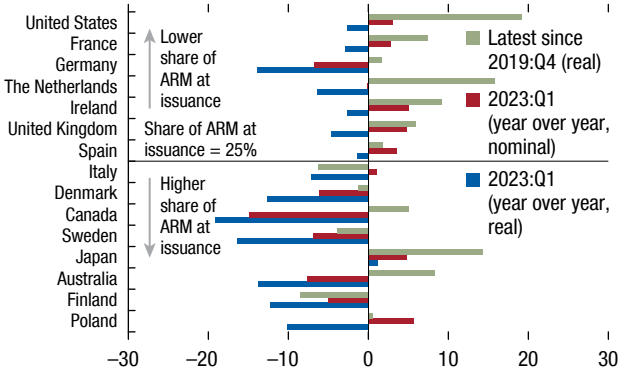
Some housing markets are experiencing unusual dynamics. While higher mortgage rates and lower affordability have suppressed demand, supply constraints have nonetheless contributed to keeping house prices above prepandemic levels in several countries and complicating central bank efforts to bring inflation back to target. In the United States, housing starts have declined while inventory has remained low (Figure 1.16, panels 3 and 4) in part because existing homeowners are deterred from purchasing new properties by the prospect of ending up with a new mortgage with much

[9]In countries with a prevalence of hybrid mortgage rates (fixed up to five years), such as the United Kingdom, demand from buy-to-let investors could experience the cliff-edge effect of higher interest rates over the medium term as fixed interest rate periods end.

Figure 1.16. Developments in Residential Real Estate Markets

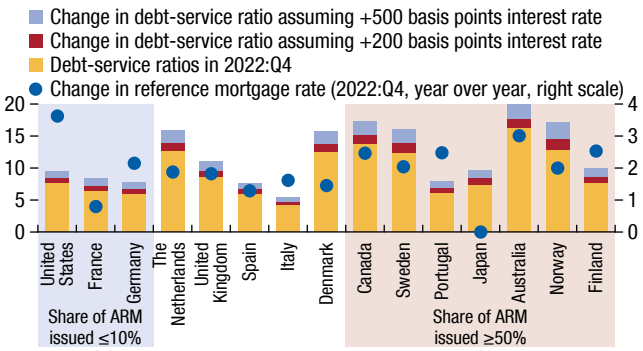
A high-interest-rate environment has weighed on real house prices.

1. Real and Nominal House Price Growth by Country
(Percent)



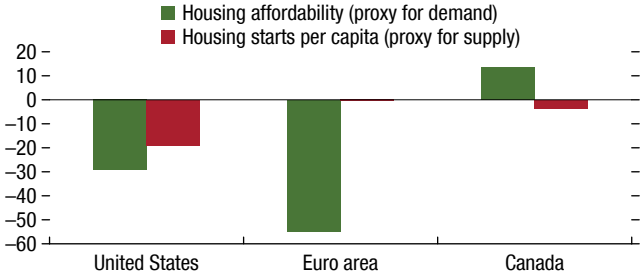
Increasing mortgage rates could result in higher debt-service ratios.

2. Debt-Service Ratio under Various Reference Mortgage Rate Scenarios in Selected OECD Countries
(Percent, left scale; percentage change, right scale)



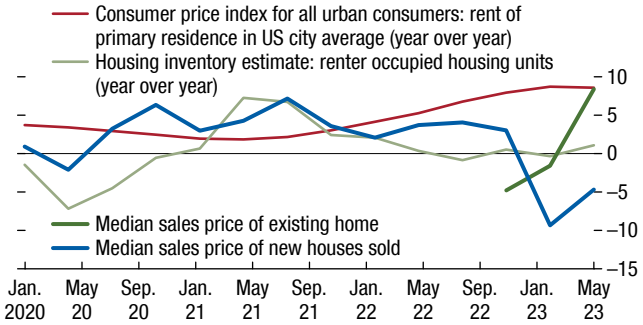
Housing demand and supply conditions vary across jurisdictions.

3. Housing Supply and Demand for Selected Advanced Economies in 2023:Q1
(Year over year, percentage change)



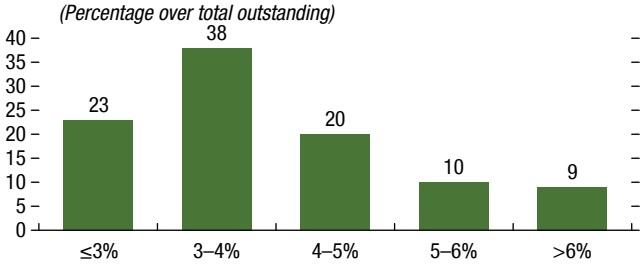
Scarce supply has led to a rebound in US home prices, creating a headwind to the Federal Reserve's efforts to control inflation.

4. Prices and Inventory of Homes in the United States
(Percentage change)



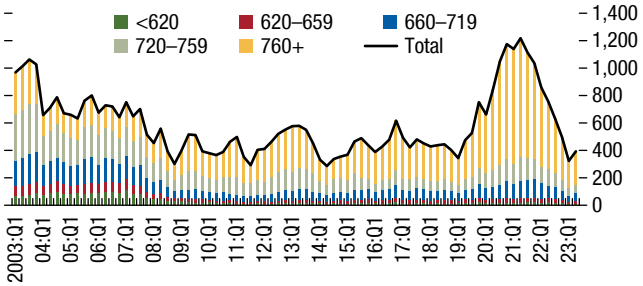
Higher rates reduce homeowners' incentives to sell their current home and buy a new one ...

5. Share of US Mortgages Outstanding by Interest Rates in 2023:Q1
(Percentage over total outstanding)



... while mortgage originations in the United States are slowing down for high-credit-score borrowers.

6. Mortgage Origination by Credit Score
(Billions of US dollars)



Sources: Apollo Insights; Bank for International Settlements; European Central Bank; Eurostat; Federal Housing Finance Agency; Haver Analytics (G10 Accounts); National Association of Realtors; New York Fed Consumer Credit Panel/Equifax; UK Office for National Statistics; and IMF staff calculations.
Note: In panel 1, the change since the fourth quarter of 2019 is with respect to the average between the first quarter of 2023 (where available) and the fourth quarter of 2022. In panels 1 and 2, ARM loans are new loans issued at variable rate or with an initial rate fixed for a period of up to 1 year, based on the OECD, November 2022. The data refer to 2022 or to the latest available data. For the United States and Poland, data refer to December 2021. In panel 2, the debt-service ratio (DSR) is defined as the ratio of interest payments on the aggregate debt stock plus amortizations to income. The reference mortgage rate in each country is obtained from Haver Analytics' G10 Accounts. For Belgium, Denmark, Finland, France, Germany, Italy, The Netherlands, Portugal, Spain, Sweden, and the United Kingdom, this is represented by a weighted average of the prevailing mortgage interest rates. For Canada, the reference rate is the five-year average residential mortgage lending rate, whereas for the United States it is the 30-year fixed mortgage rate. The panel shows debt-service-to-income ratios in the fourth quarter of 2022, year over year, under two alternative scenarios. The alternative scenarios correspond to an increase of 200 basis points and 500 basis points of the average interest rate paid on the outstanding stock of debt, all else equal. The average remaining maturity of household debt across countries is assumed equal to 18 years. Income is proxied by households' gross disposable income, which proxies for the amount of money available to households to pay debt-service costs. In panel 3, housing affordability for the United States is measured by the Affordability Index of the National Association of Realtors, whereas data for Canada is compiled by Haver Analytics (G10 Accounts). For the euro area, affordability is calculated as Housing Affordability Index = (Median Family Income/Qualifying Income), where qualifying income is derived from the monthly payment on the residential real estate price of new and existing homes, at the reference mortgage interest rate. ARM = adjustable rate mortgages; OECD = Organisation for Economic Co-operation and Development; Q = quarter.

larger monthly payments—the so-called lock-in effect (see Fonseca and Liu 2023). More specifically, about 80 percent of existing mortgages have rates below 5 percent and nearly one-fourth are below 3 percent. With 30-year mortgage rates currently above 7 percent, this would imply a significant increase in monthly payments on a new mortgage (Figure 1.16, panel 5). While present also in other countries, the lock-in effect is more powerful in the United States due to the prevalence of long-term fixed rate mortgages, the larger proportion of mortgage owners, and higher shifting preference to work from home after the pandemic. As a result, mortgage origination has continued to decelerate, especially among high-quality borrowers (Figure 1.16, panel 6), while refinancing applications have declined more than 50 percent relative to a year ago.

Commercial Real Estate Continues to Face Headwinds

Fragilities in the CRE sector are a major source of credit risk for the financial sector. At the start of 2023, CRE transaction volumes plummeted 55 percent year over year to $147 billion as investors reevaluate the value proposition of owning CRE properties amid rising funding costs and tighter credit conditions in the sector (Figure 1.17, panel 1).[10] The decline in transaction activity has contributed to a sharp repricing across major CRE markets and CRE segments (Figure 1.17, panel 2). For example, while CRE valuations (in real terms) have declined 1.5 percent in aggregate, high-quality properties owned by real estate investment trusts (REITs) have experienced much larger declines in Europe (more than 26 percent) and in the United States (18 percent) relative to the previous year. Among CRE segments, the office segment has experienced the most pronounced decline in prices on average, followed by retail and multifamily properties.

The outlook for the CRE sector will depend on structural factors and fundamentals as well as funding and credit conditions. Market participants expect supply growth to be limited by pandemic-related structural changes, supply chain issues, labor shortages, rising funding costs, and falling exit values (Figure 1.17, panel 3). At the same time, there are signs that demand in the retail and office sectors may be structurally lower after shifts catalyzed by the pandemic in consumer and worker behavior, respectively. For example, the absorption rate—the rate at which properties sell in a specific market in a given period—has remained negative in these sectors since the pandemic. Economies with strained funding markets amid high volumes of refinancing coming due imminently are vulnerable (see Box 1.2). For example, the CRE sector in the United States is likely to face big challenges as the US banking sectors have tightened lending standards to the CRE (see Figure 1.17, panel 4, and the section "Higher Rates Benefit Some NBFIs but Could Exacerbate Structural Vulnerabilities").

All told, given fundamentals, the IMF's CRE price-at-risk model estimates that in a tail scenario, global CRE prices could decline by more than 10 percent over the next year across several segments.[11] This may have a significant effect on small and regional banks, which are generally less well capitalized and have a larger exposure to the CRE sector than large banks, constraining their ability to lend to the CRE sector and potentially creating a vicious cycle of tighter funding conditions, falling CRE prices, and bank losses, with broader implications for macrofinancial stability (April 2021 *Global Financial Stability Report*, Chapter 3).

Financial Stability Risks Remain Elevated

Growth at Risk Indicates Risks Are Skewed to the Downside

Given the easing of financial conditions since April 2023, on net, especially in advanced economies, the one-year-ahead forecast distribution of global growth based on a model that includes financial conditions (the pink dashed distribution in Figure 1.18, panel 1) is reasonably symmetric, suggesting that risks to the

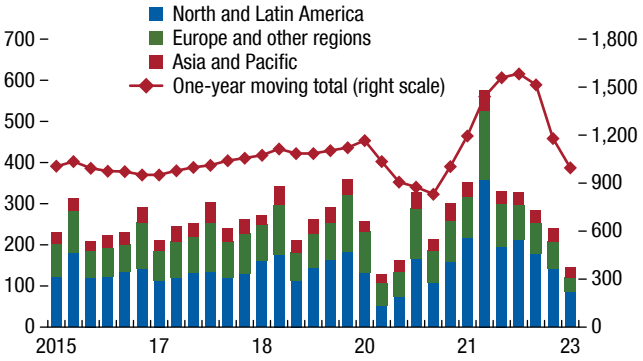
[10]CRE transaction activity declined significantly (by 64 percent, year over year) in Europe in the first quarter of 2023, notably affecting the industrial segment with a 70 percent reduction in transaction volumes. The Asia-Pacific region, on average, experienced a somewhat smaller decline of 20 percent (year over year) owing to robust transaction activity in some economies like Japan. In the United States, CRE transaction volume plummeted by 57 percent (year over year), with the largest decline experienced by the office sector, followed by retail.

[11]CRE price forecasts are estimated using a CRE price-at-risk model at the country level following the approach described in Deghi, Mok, and Tsuruga (2021) and averaged across country areas using nominal GDP as weights. The model allows prediction of CRE price growth in an adverse scenario, that is, the range of outcomes in the lower tail of the future CRE price distribution. Baseline projections refer to the decline in an adverse scenario with a 5 percent probability (fifth percentile). The baseline model includes selected fundamental factors such past growth in CRE prices (which captures momentum effects), CRE price misalignment, GDP growth, credit-to-GDP growth, capital-flow-to-GDP ratio, monetary aggregates, and vacancy rates.

Figure 1.17. Developments in the Commercial Real Estate Sector

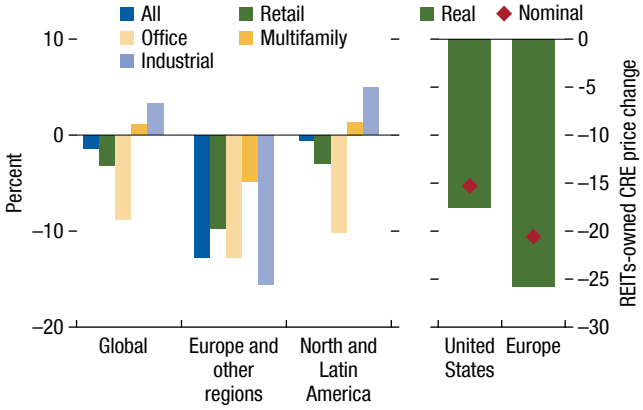
Global commercial real estate transactions fell 55 percent year over year in the first quarter of 2023.

1. Transaction Volumes by Country Area, 2015–23:Q1
(Billions of US dollars)



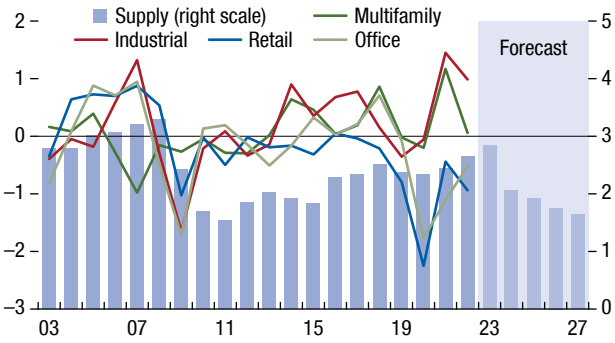
Amid rising funding costs, a repricing is occurring but at different speeds across countries and sectors.

2. Changes in CRE Valuations by Regions and CRE Sectors
(Latest, real year-over-year growth)



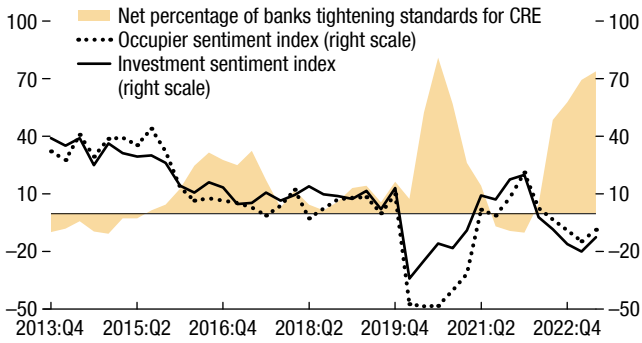
Completions of new space are set to fall back sharply, while demand for multifamily housing is also slowing ...

3. Normalized Global Real Estate Absorption by Sector and Net Additions to All Property Supply
(Normalized absorption, left scale; percent, right scale)



... due to tighter lending standards and subdued investor sentiment.

4. US Lending Standards and CRE Sentiment
(Percent, left scale; index, right scale)



Sources: CBRE; Federal Reserve Bank of St. Louis, Federal Reserve Economic Data (FRED); Green Street Advisors; MSCI Real Estate; RICS; and IMF staff calculations.
Note: In panel 1, the one-year moving total is a rolling sum of CRE transaction volumes computed on four trailing quarters. In panel 2, CRE price changes by sector are measured as of the first quarter of 2023. Year-over-year growth of appraised value of high-quality properties owned by real estate investment trusts are measured as of May 2023 for the United States and April 2023 for Europe. In panel 3, "absorption" is an index that measures the rate at which properties sell in a market in a given period. The indicator is normalized relative to the historical average. The bars show the overall completions of new space (relative to existing CRE stock). Forecasts are sourced from market agencies. In panel 4, occupier sentiment index is constructed by taking an unweighted average of readings for three series related to the occupier market measured on a net balance basis: occupier demand, the level of inducements, and rent expectations. The RICS Investment Sentiment Index is constructed by taking an unweighted average of readings for three series relating to the investment market measured on a net balance basis: investment inquiries, capital value expectations, and the supply of properties for sale. CRE = commercial real estate; REITs = real estate investment trusts.

economic outlook are more or less balanced, as discussed in the October 2023 *World Economic Outlook*. The distribution points to a GaR metric showing that, with a 5 percent probability, global growth in 2024 is expected to be 1 percent or less (the pink markers in Figure 1.18, panel 1).[12]

[12]The GaR framework assesses downside risks by gauging the range of severely adverse growth outcomes falling within the lower fifth percentile of the conditional growth forecast distribution.

The banking turmoil in March raised concerns about the economic headwinds brought about by a sudden pullback of credit growth, especially among policymakers.[13] Credit growth should therefore be considered in models of downside risks. In this *Global Financial Stability Report*, we introduce an enhanced version of the GaR model

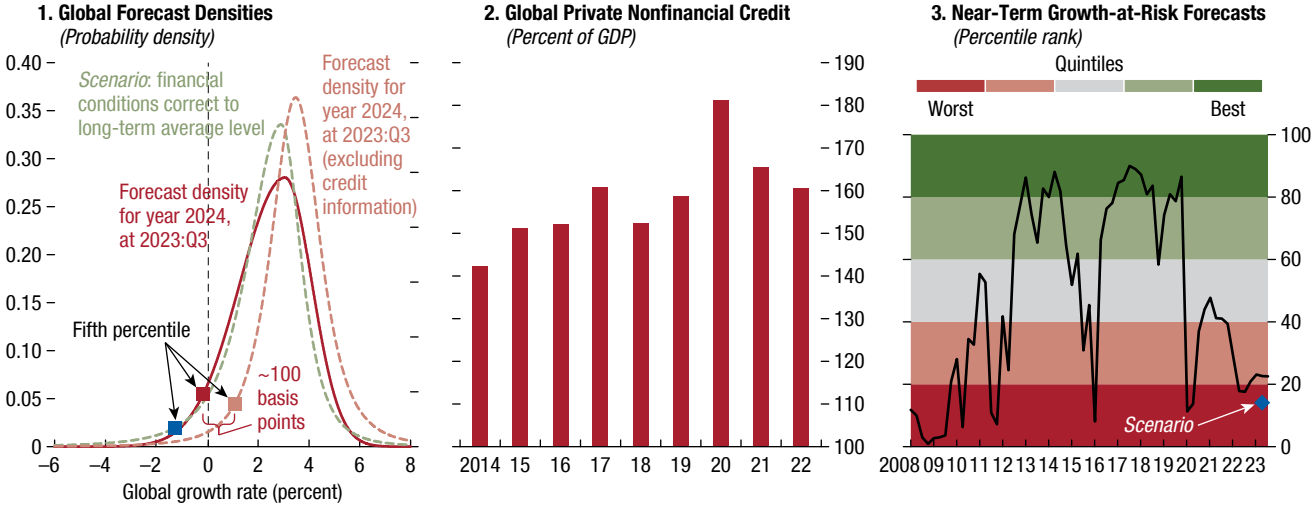
[13]See, for example, the speech "Financial Stability and Economic Development" delivered by Jerome Powell on June 29, 2023.

Figure 1.18. Global Growth at Risk

Risk to global growth over the following year is skewed to the downside.

The private debt level helps inform growth at risk.

Growth-at-risk forecasts remain elevated compared with historical norms.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, International Financial Statistics database; and IMF staff calculations.
Note: The global conditional forecast density model employed here augments information on current quarter growth and financial conditions (see the April 2018 *Global Financial Stability Report*) with a proxy for global credit growth (see Adrian and others 2022). This credit growth variable is constructed as a PPP-GDP weighted aggregate of country-specific quarterly growth rates in total credit to the private nonfinancial sector, provided by domestic banks and all other sectors of the economy. Credit data are sourced from the Bank for International Settlements. The sample of countries accounts for 90 percent of total GDP of all systemically important jurisdictions, covering all major advanced and emerging market economies. Given lags in availability of the Bank for International Settlements' credit data, credit growth for the current quarter is (conservatively) assumed to be around the average quarterly rate recorded since start of 2022. The mode (that is, the most likely outcome) of the forecast density estimate accords with the October 2023 *World Economic Outlook* forecast for year 2024, as of the third quarter of 2023. In panel 3, the black line traces the evolution of the fifth percentile threshold (the growth-at-risk metric) of near-term growth forecast densities. The color of the shading depicts the percentile rank for the growth-at-risk metric, from 1991 onward. PPP = purchasing power parity; Q = quarter.

augmented with information on private nonfinancial credit growth in addition to the pricing of risk in global capital markets (that is, financial conditions). Global private nonfinancial credit growth, after increasing briskly during the pandemic, has slowed over the past two years (Figure 1.18, panel 2). Tighter bank lending conditions and a deceleration in bank loan growth will likely slow credit growth further.[14] With the incorporation of information on private nonfinancial credit growth and financial conditions, this enhanced GaR version may more accurately estimate future growth distribution. When credit growth is included, the forecast distribution is skewed to the downside (red distribution in Figure 1.18, panel 1) relative to when the model is informed only by financial conditions. Moreover, the GaR metric in this augmented model is slightly below 0 percent (Figure 1.18, panel 1), as the slowdown in credit growth is expected to offset the positive effect of easier financial conditions on growth. In other words, once information about credit growth is included, the distribution of global growth skews leftward, and the GaR metric is 100 basis points lower—that is, downside risks increase, with a 5 percent probability that the global economy in 2024 may contract. This version of GaR is currently at about the 20th percentile of its historical distribution (Figure 1.18, panel 3), similar to where it would have been by the time of the April 2023 *Global Financial Stability Report*.

We also consider an adverse scenario wherein the hoped-for soft landing does not materialize, investors pull back from risk taking, and financial conditions tighten sharply toward their long-term average. As a result, the forecast growth distribution becomes even more firmly skewed to the downside

[14]For example, household loan growth in the euro area has slowed to 1.3 percent in July 2023 from 4.5 percent a year ago, while nonfinancial corporate loan growth slowed to 2.2 percent in the same month from 7.6 percent a year ago.

(the green distribution in Figure 1.18, panel 1), with a GaR metric comparable with the level at the onset of the pandemic (the blue markers in Figure 1.18, panels 1 and 3).[15] Financial stability is therefore susceptible to shocks to investor and credit market sentiments as demonstrated by this scenario.

Emerging Market Economies

China Concerns Have Rattled Markets

One source of such shocks could be the Chinese economy. Heightened concerns about China's weakening economic momentum, a deepening property sector downturn, and growing strains on local government financing weighed on global market sentiment in recent months. Disinflationary pressures have intensified, prompting the People's Bank of China to cut policy rates—one of the few central banks to ease monetary policy. In addition, the People's Bank of China has also cut the reserve requirement ratio for foreign currency deposits by banks. However, the announced stimulus measures have not yet restored confidence among businesses and consumers and, importantly, homebuyers. Fading economic momentum and continued property market sluggishness heighten the likelihood of further financial strains. The financial system's resilience could be further tested on top of existing vulnerabilities that include high debt for the whole economy, asset quality pressures, falling bank profitability, and interconnectedness between banks and nonbank financial institutions (NBFIs).

Chinese financial markets have underperformed broader emerging market assets since early 2023. The renminbi has faced notable downward pressure, underperforming most other emerging market currencies in the year to date even in the face of policy measures to stem the depreciation, while equity prices have fallen sharply. Market sentiment was briefly lifted in July after Chinese authorities pledged policy support for various sectors, but quickly faded in August after weak economic data and disappointment about announced policy measures. When a major financial conglomerate suspended payments and redemptions of its wealth management and trust products, some investors turned their attention to the broader trust sector. With assets under management of about 21 trillion yuan as of the first quarter of 2023, this sector is one of the riskiest segments of China's financial system (Figure 1.19, panel 1).[16] So far, money markets and corporate bond markets have not experienced stress, partly thanks to liquidity injections by the People's Bank of China. However, were the public to lose confidence in wealth management products following future shocks, contagion to widespread financial stress could occur.

One reason for renewed market pessimism is that, after experiencing a short-lived stabilization through the first five months of the year, the property sector has weakened again. Policy support rolled out since late 2022 has not boosted homebuyers' confidence or helped secure financing for property developers. Even state-owned and nondistressed private property developers have seen home sale volumes shrink in recent months (Figure 1.19, panel 2). Furthermore, many property developers are financially weak, and their housing development projects may not be commercially viable (Figure 1.19, panel 3). The largest private property developer missed interest payments on its bonds due in August, increasing risk aversion toward the property sector among both homebuyers and creditors. As developers continue struggling to raise adequate funding, real estate investment and housing starts have declined, affecting local government land sale revenues (Figure 1.19, panel 4).

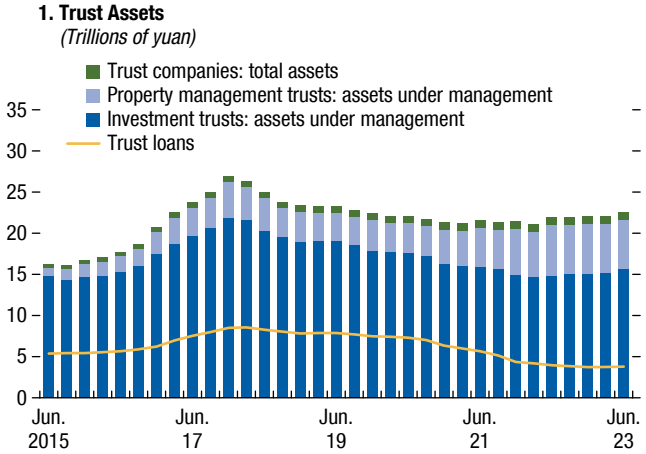
Investors have also become increasingly concerned about the sustainability of the local government financing vehicles (LGFVs) used to fund infrastructure and other investments. LGFVs are highly leveraged, with limited capacity to generate earnings and tend to rely on local government support to service their debt. Some LGFVs in fiscally weaker provinces are facing elevated funding costs and are relying on more debt to cover both expenses and investment (Figure 1.20, panel 1). Total LGFV debt (based on public financial statements) stood at about 45 percent of GDP in 2022. Four-fifths is held by banks, mainly in the form of loans, with the rest in corporate bonds and borrowings from nonbank lenders. On the asset side, two-thirds of LGFV assets are fixed long-term

[15]For the United States, if financial conditions tighten and credit growth slows further by severe but plausible magnitudes, downside risks to one-year-ahead growth could match the hard-landing episode of 1980–81 in the United States (see Box 1.1).

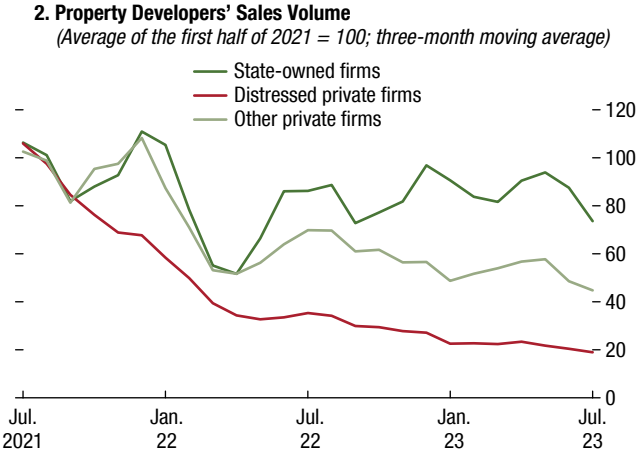
[16]Investment trust products (70 percent of the sector) are privately sold to high-net-worth individuals and professional investors and generally offer high yields through risky investments in liquid and illiquid assets.

Figure 1.19. Development in China's Financial Markets and Property Sector

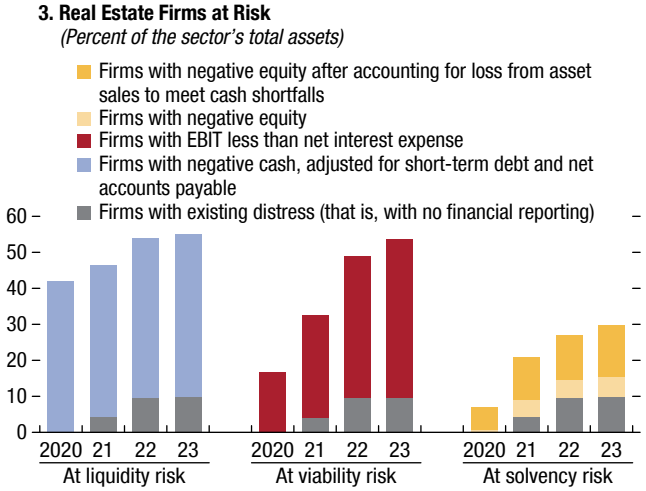
Trust assets start growing again after a multiyear decline, whereas trust loans remain on a declining trend.



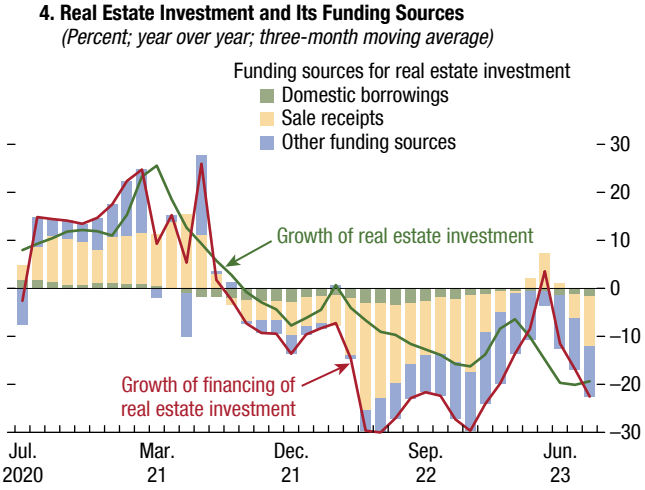
The housing market weakened again, with stronger private and state-owned property developers also facing poor sales performance.



Many property developers are financially weak, undermining homebuyers' confidence and efforts to deliver unfinished housing.



The decline in real estate investment has deepened as policy support has not been effective in boosting home sales and securing financing for property developers.



Sources: Bloomberg Finance L.P.; CEIC; S&P Global; WIND; and IMF staff estimates.
Note: In panel 1, trust assets are composed of trust companies' own balance sheets (green bars) and assets under management of trust products (dark blue and light blue bars). "Trust loans" refers to loans extended by trust companies and trust products based on the total social financing statistics. In panel 2, the figure covers the top 50 property developers in terms of sales value in 2020. "Other private firms" does not include firms with indirect government ownership. In panel 3, real estate firms are at (1) liquidity risk if they face cash shortfalls (that is, having a negative cash position after accounting for short-term debt and net accounts payable), (2) viability risk if they lack debt-servicing capacity (that is, having EBIT less than net interest expense), and (3) solvency risk if they have negative equity. The exercise also considers a scenario in which additional losses may occur if real estate firms need to sell assets, subject to a 50 percent haircut, to cover their cash shortfalls. In panel 4, other funding sources mainly include property developers' own funds, nondebt liabilities (for example, accounts payable), and overseas borrowings. EBIT = earnings before interest and taxes.

investments such as land and infrastructure assets, leaving relatively few liquid assets to meet short-term funding needs. More than 30 percent of LGFV debt has had an interest coverage ratio below 1 for the last three years and can be considered commercially nonviable without government support (sum of yellow bars in Figure 1.20, panel 2). The IMF staff estimates that over half of the debt cannot be serviced by current earnings alone if average LGFV funding costs are more than 3 percent (most LGFVs currently borrow at rates above this level).

Addressing LGFV debt is a complex challenge requiring a comprehensive approach. In a recent LGFV debt restructuring case, terms on bank loans (the

majority of the debt stock) were modified while bonds were left untouched, despite bank loans' seniority to bonds in most capital structures.[17] However, relying heavily on banks to solve the LGFV debt problem could lead to significant bank losses. If all LGFVs were restructured to ensure financial viability (with current earnings covering interest expenses), losses would be large. If banks were to take half of the responsibility of the debt restructuring cost, they could face impairment charges of about 3.4 trillion yuan, equivalent to a reduction in capital ratios of 1.7 percentage points. Although systemically important banks would be able to manage, local banks could face capital shortfalls, even in relatively fiscally healthy provinces (Figure 1.20, panel 3). With banks already under pressure from deteriorating property assets (see the October 2022 and April 2023 issues of the *Global Financial Stability Report*), this hypothetical exercise—notwithstanding some data limitations (for more details, see note to Figure 1.20)—illustrates the importance of a comprehensive solution for LGFVs.

Another obstacle is the fiscal positions of some Chinese regions. The challenge of bringing the LGFV debt burden to a sustainable level is particularly daunting for fiscally weaker regions. Banks in provinces with higher LGFV bond yields face higher funding costs (Figure 1.20, panel 4). More broadly, evidence shows that provinces with weak fiscal positions tend to experience a more pronounced real estate downturn, weaker economic growth, and a more limited credit expansion, which highlights the role of the property banking–local government nexus in propagating and amplifying financial stress (Box 1.5 in the October 2021 *Global Financial Stability Report*).

Emerging Market Outlooks Continue to Diverge

Most major emerging markets have been resilient so far in 2023. IMF analysis finds that capital flows at risk have improved marginally since the April 2023 *Global Financial Stability Report*, reflecting strong risk appetite in global markets. The probability of outflows has fallen slightly to 32 percent from 34 percent, with the fifth percentile of outflows remaining steady at 2.9 percent of GDP (see the April 2020 *Global Financial Stability Report*).[18] Investors continue to differentiate between sovereigns with stronger fundamentals and policy buffers, and those perceived as less resilient and more vulnerable to shocks. Overall, emerging market sovereign credit spreads have remained narrow, in sync with corporate credit spreads in advanced economies, despite the continued tightening of monetary policy and higher yields in advanced economies (Figure 1.21, panel 1). However, the gap remains large between the investment-grade and high-yield segments of emerging market sovereign debt markets, even with material tightening in spreads for many distressed issuers. Investment-grade sovereign spreads have tightened to levels below those of US BBB-rated firms, the lowest since before the global financial crisis, although this may partly reflect the changing composition of the emerging market sovereign ratings universe. This segment now includes several oil exporters with high per capita income, increasing the index share of countries rated single A or higher (Figure 1.21, panel 2).

Portfolio flows into emerging markets have been relatively strong in 2023, despite some renewed outflows in August and September (Figure 1.21, panel 3). Sizable inflows across asset classes have been buffeted by headwinds from more hawkish monetary policy tightening, financial instability concerns, and tepid growth in China at various points in the year. Local currency bond flows have benefited from the perception that inflation pressures are easing amid still meaningful rate differentials. In equity markets, several countries have seen large inflows, notably India. Chinese local currency bonds have faced large outflows since February 2022 (close to $130 billion) despite a short-lived respite in the second quarter of 2023. Chinese equity outflows accelerated again in August, with over $15 billion in outflows in August to September alone. Overall, a weaker-than-expected recovery, deepening housing market stress, divergent monetary policy, and rising geopolitical risk concerns continue to be headwinds to portfolio flows into China.

Sovereign hard currency bond issuance has moderated after an exceptionally strong start to the year, with investment-grade issuers accounting for

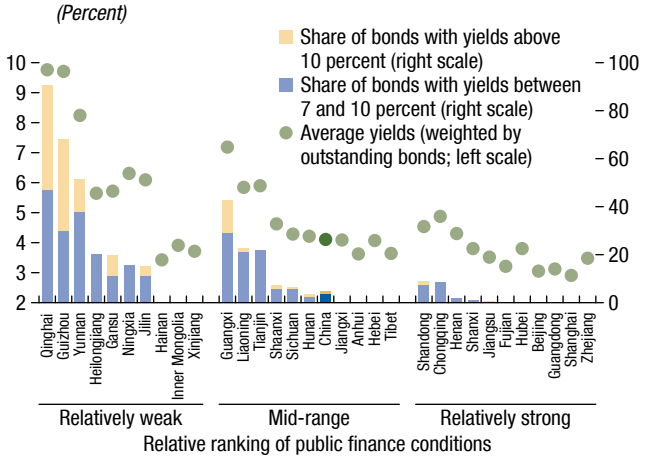
[17]The restructuring of an LGFV based in the city of Zunyi early in the year—mostly through an extension of the bank loan repayment period from 5 to 25 years, no principal payments due during the first 10 years, and significant reduction in interest rates—has been regarded by some investors as a potential blueprint for how authorities will restructure other LGFVs with unsustainable debt burdens.

[18]Capital flows at risk are defined as the fifth percentile of the three-quarters-ahead capital flows probability density.

Figure 1.20. Financial Stability Implications Arising from China's Local Government Financing Vehicle Debt

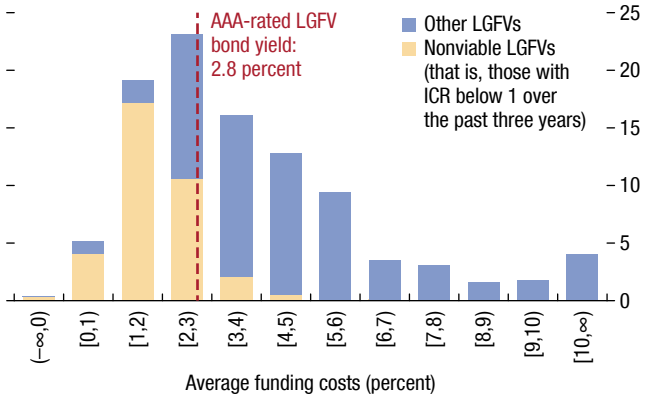
LGFVs in provinces with relatively weak public finances face elevated funding costs.

1. LGFVs: Bond Yields and Share of High-Yield Bonds, Mid-August 2023
(Percent)



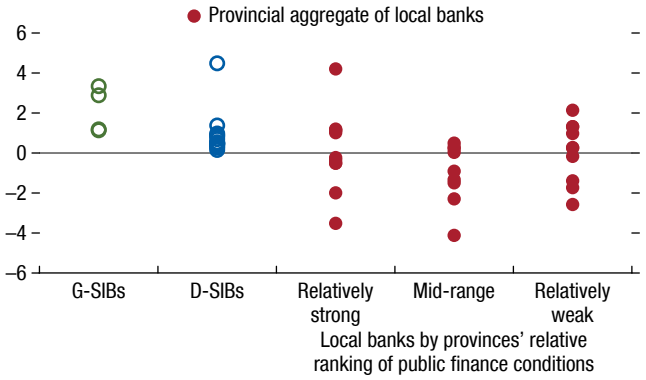
Over half of LGFV debt cannot be serviced by current earnings if LGFVs' average funding costs are above 3 percent.

2. Distribution of LGFVs by the Level of Average Funding Costs They Can Afford to Service
(Percent of total debt)



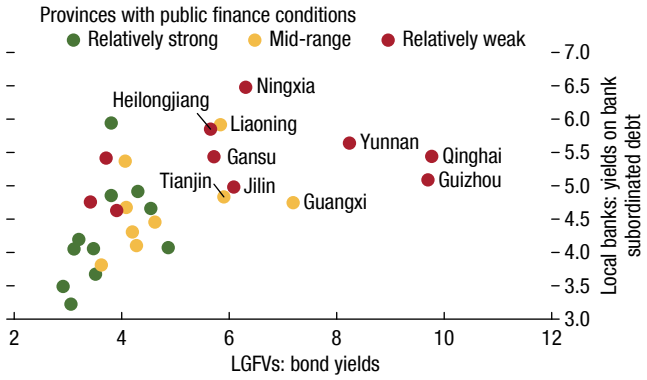
If banks are forced to bear losses arising from LGFV debt restructuring, impairment charges could be substantial, raising concern about their solvency.

3. Hypothetical Remaining Bank Capital in Excess of Minimum Capital Requirement If LGFV Is Debt Written Off to Restore Repayment Capacity
(Percent of banks' risk-weighted assets)



Macrofinancial spillovers could be amplified through the property–banking–local government nexus, exacerbating regional divergence of macrofinancial conditions.

4. China's Provinces: Funding Costs of LGFVs and Local Banks, Mid-August 2023
(Percent)



Sources: Bloomberg Finance L.P.; CEIC; S&P Capital IQ; WIND; and IMF staff estimates.
Note: In panel 1, the ranking of public finance conditions is based on local governments' general budget deficit and official debt. In panel 2, serviceable interest rate is the implied interest rate at which an LGFV can service debt based on its existing EBITDA and debt load. In panel 3, the hypothetical debt restructuring exercise considers debt write-off such that a reduction of debt would enable existing EBITDA to cover interest expense based on the remaining debt at an average funding cost of 3 percent. The exercise considers G-SIBs, D-SIBs, and city commercial banks and rural commercial banks with publicly available information. Due to the lack of data on individual banks' exposure to LGFVs, the exercise assumes that lending to LGFVs accounts for 17.5 percent of total loans for G-SIBs and D-SIBs (Moody's Investors Service 2023). Individual banks' lending to LGFVs is assumed to be proportional to their lending to construction, leasing and business services, and transportation and utilities sectors. D-SIBs = domestic systemically important banks; EBITDA = earnings before interest, taxes, depreciation, and amortization; G-SIBs = global systemically important banks; ICR = interest coverage ratio (that is, earnings before interest and taxes over net interest expense); LGFV = local government financing vehicle.

70 percent, including a record 33 percent accounted for by issuers rated A or above. Issuance by frontier markets has remained tepid. Corporate issuance has also remained weak, with Chinese issuers notably absent from the market over the last two years (Figure 1.21, panel 4).

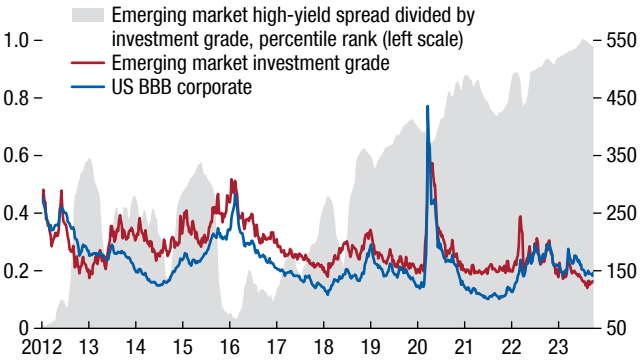
High-Yield, Frontier, and Low-Income Sovereigns Face Financing Challenges

A significant number of frontier and high-yield sovereign issuers will likely continue to face financing challenges amid higher global interest rates, weak fundamentals, and an uncertain credit cycle. Domestic

Figure 1.21. Emerging Market Risk Sentiment

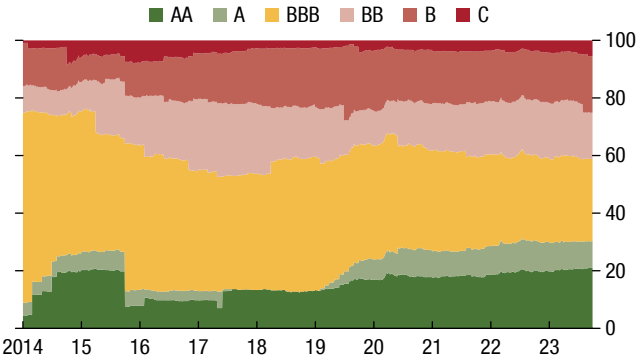
Investment-grade sovereign spreads have tightened to levels not seen since before the global financial crisis, and the ratio to high-yield spreads is near historical extremes.

1. Spreads and Ratio of Emerging Market High-Yield to Investment-Grade Spreads
(Percentile rank, left scale; basis points, right scale)



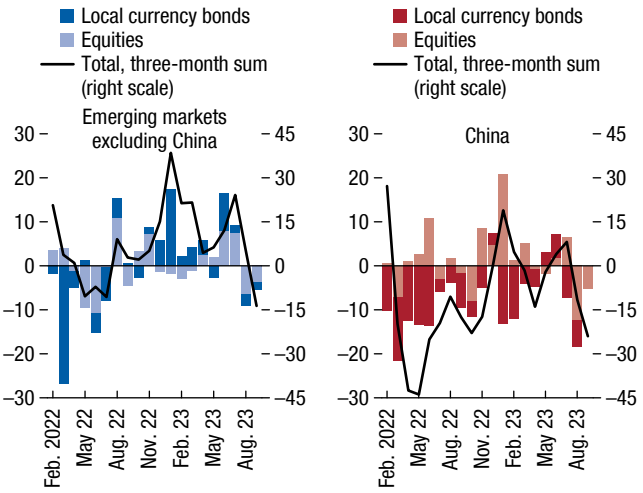
The share of emerging market sovereigns with very high ratings (A and AA) has increased as index rules have changed.

2. Share of Emerging Market Dollar Bond Index, by Rating
(Percent share)



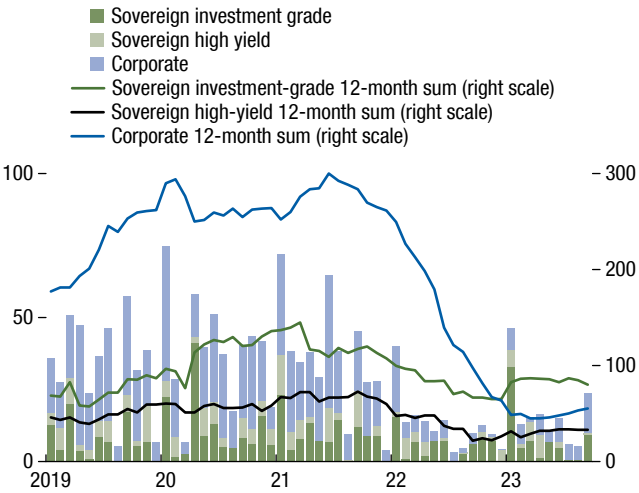
Portfolio flows have been relatively strong in 2023, while outflow pressures from China have been persistent.

3. Portfolio Flow Tracking: Local Currency Bonds and Equities
(US billions, monthly and three-month moving sum)



External bond issuance has rebounded somewhat from a very weak 2022, although frontier and corporate issuance remains tepid.

4. International Hard Currency Bond Issuance
(US billions, 12-month sum)



Sources: Bloomberg Finance L.P.; Bond Radar; Federal Reserve; Fitch Ratings; Haver Analytics; JPMorgan; Moody's; S&P Global; national sources; and IMF staff calculations.
Note: In panel 1, the gray area tracks the ratio of emerging market high-yield sovereign spreads to emerging market investment-grade sovereign spreads, expressed in historical percentiles. Panel 3 includes an unbalanced sample of up to 24 emerging market economies. August and September data may be incomplete or not available at the time of publication, including Chinese bond flows for September. Panel 4 includes bonds issued internationally (predominately US dollars, euro, and Japanese yen).

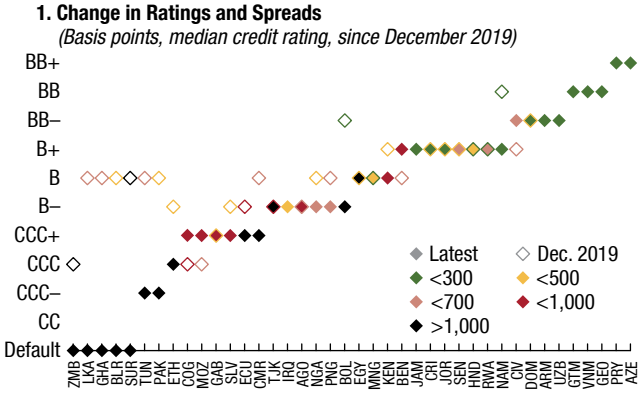
fundamentals and macroeconomic buffers remain strained for a weak tail of countries. Moreover, repeated credit downgrades since the pandemic have pushed the average frontier sovereign rating lower, driving implied spreads and financing costs higher for many sovereigns[19] even during periods of improved market sentiment (Figure 1.22, panel 1). As noted in the October 2019 *Global Financial Stability Report*, issuers with lower ratings tend to be more vulnerable to a deterioration of external risk sentiment absent sustained improvement on the domestic front.

Market access for weaker sovereign issuers may remain restrictive under current market conditions if rising longer-term Treasury yields remain higher for

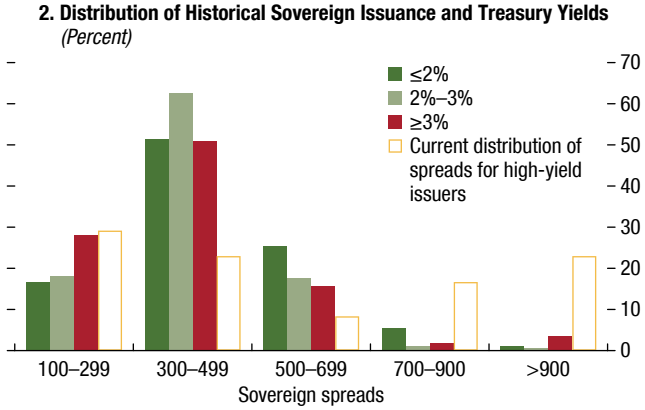
[19]Among the BB and B ratings segments, every notch lower is historically associated with between 60 and 140 basis points of additional spread level; downgrades to and within the CCC segment have tended to correspond to multiples of that.

Figure 1.22. High-Yield and Frontier Sovereign Financing Vulnerabilities

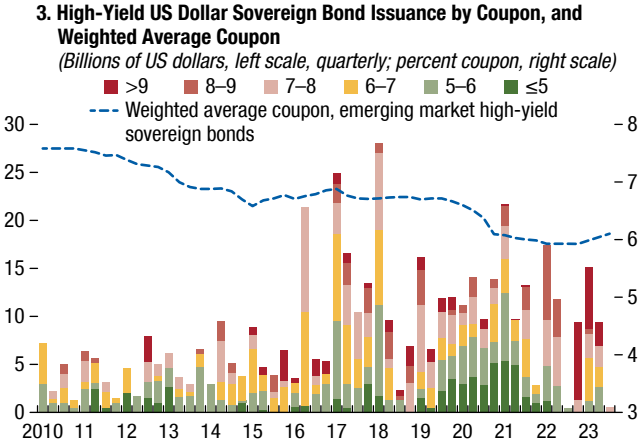
A long downgrade cycle has eroded the credit quality of many emerging and frontier sovereigns.



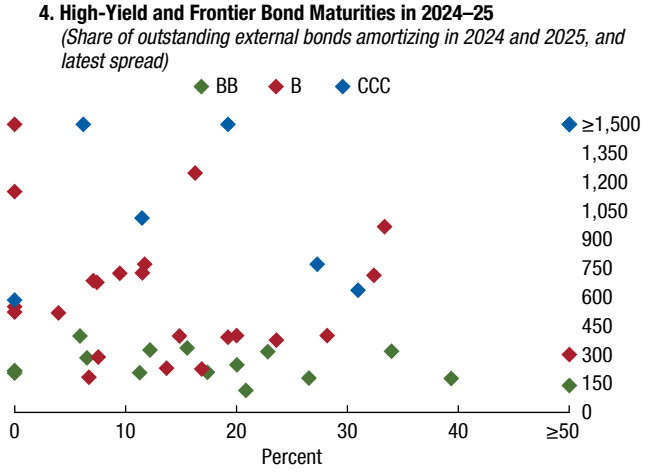
Financing could be challenging for many issuers if global interest rates remain higher for longer.



Investor demand for higher coupons is gradually resetting the stock of sovereign bonds at higher rates.



Some sovereigns will need to refinance a substantial share of their outstanding Eurobond stock in the next two years.



Sources: Bloomberg Finance L.P.; Bond Radar; Fitch Ratings; JPMorgan; Moody's; S&P Global; and IMF staff calculations.
Note: High yield refers to sub-investment-grade sovereign issuers. Frontier markets include 45 countries, derived from JPMorgan Next Generation Index and additional low-income countries with outstanding Eurobonds. Rating is the median of the big three rating agencies, or lower of two when one is not available. In panel 1, solid diamonds reflect the current rating, color coded by the latest sovereign spread. Empty diamonds reflect the rating and spread in December 2019. Overlapping diamonds indicate the rating has not changed. Data labels in panel 1 use International Organization for Standardization (ISO) country codes. Panel 3 includes bonds issued internationally in US dollars and the weighted coupon on the JPMorgan Emerging Markets Bond Global Diversified Index.

longer. The high volumes of sovereign issuance since 2010 occurred during periods of low risk-free rates, making the current environment less predictable for frontier markets. Close to 90 percent of high-yield sovereign issuance has taken place with 10-year Treasury yields below 3 percent, and 30 percent with yields below 2 percent. Moreover, when the 10-year Treasury yield has been below 2 percent, investor demand has tended to be strong across the sovereign credit spectrum, including a few risky issuances with spreads near or above 700 basis points.[20] By contrast, in periods with Treasuries above 3 percent, for example, close to 90 percent of sovereigns that issued international debt were trading with spreads below 525 basis points at the time. The current backdrop remains difficult, as more than 40 percent of high-yield sovereigns not in default are trading with secondary market spreads above

[20]Spreads are measured as secondary market spreads on the bond issuance date where available.

that level, and 35 percent are above 700 basis points (Figure 1.22, panel 2).

The stock of external hard currency bonds among high-yield sovereigns has slowly begun resetting at higher rates. When interest rates were low, the weighted average coupon on high-yield emerging market sovereign bonds fell,[21] from just under 8 percent in 2010 to just under 6 percent by early 2021. However, upcoming sovereign refinancings and any additional net issuance would likely occur at much higher interest rates, which may contribute to debt-servicing strains in the future. While some sovereigns have lengthened their maturity profiles in recent years, refinancing needs are set to increase, and 14 countries will see at least 30 percent of their outstanding bond stock amortize through the end of 2025, including several rated B, CCC, or lower (Figure 1.22, panels 3 and 4).

Notable progress has been made on sovereign debt restructuring in four of eight countries that were in default as of April 2023. Even as markets have welcomed the restructuring, improving debt transparency and expediting the process will continue to be crucial. In Ghana, the official creditor committee provided financing assurances in May 2023 and committed to restructure the country's bilateral debt, while government authorities made further progress on restructuring its domestic debt. Sri Lanka, which defaulted in April 2022, has continued to restructure its debt with domestic and foreign creditors and launched its domestic debt restructuring operation in July 2023. Outside the Common Framework, Suriname, which defaulted on its Eurobonds in March 2021, finalized its debt restructuring agreement with its bondholders after restructuring its debt with its Paris Club creditors last year. Under the Group of Twenty (G20) Common Framework, Zambia reached an agreement on debt restructuring with its official creditors in June 2023, and discussions are ongoing to reach an agreement on comparable terms with private sector creditors.

Local Investors Are Stabilizing Emerging Market Bonds

The footprint of domestic institutional investors has increased in local currency government bonds over the past decade, whereas nonresident investors have reduced their share of holdings. Earlier this year, the confluence of the expectations for a soft landing for the global economy and high real rates relative to the past has led major emerging markets to rally in both foreign exchange and local currency government bond markets (Figure 1.23, panel 1), which could draw nonresident investors back into local currency government bonds at a time when emerging markets' government-debt-to-GDP ratios are rising (Figure 1.23, panel 2). Nonetheless, the recent rise in advanced economy yields and threats to the disinflation narrative pose headwinds to nonresident flows.

The decline in nonresident participation over the past decade can be attributed to multiple negative shocks—the taper tantrum of 2013, the shock to commodity prices in 2015 and 2016, China's large devaluations during those two years, heightened geopolitical and trade tensions, and more recent concerns over fiscal sustainability—that have weighed on investors' risk appetite for local currency emerging market economy assets. In its place, a more stable domestic investor base has emerged over time. Domestic institutional investors, specifically pension funds and contractual savings and insurance firms, have bought a large portion of emerging market local currency government bonds (Figure 1.23, panel 3). The rise of domestic institutional investors has allowed governments to continue fiscal expansion by relying more on funding in domestic currencies.

Increasing reliance on domestic markets has also somewhat insulated domestic financing conditions from external developments. The increase in 10-year US Treasury yields during the present tightening cycle is brisk compared with previous cycles. Large and sudden rises in Treasury yields typically coincide with turbulence in emerging foreign exchange and local currency government bond markets, as rising US interest rates reduce the relative attractiveness of local currency government bonds. Even so, benchmark medium-term yields of major local currency government bonds have been less reactive to movements of US Treasury yields than in previous tightening episodes (Figure 1.23, panel 4). The decline in nonresident participation is also likely to have mitigated spillovers from advanced economies to emerging markets (Figure 1.23, panel 5).

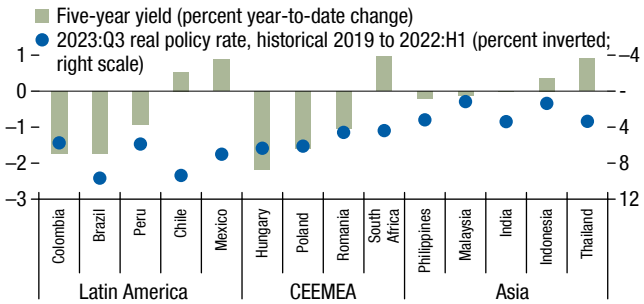
The reduced sensitivity of foreign exchange and local currency government bond markets to the rise in Treasury yields could also be partly attributed to benign financial conditions in advanced economies, tempering the reactions of benchmark-driven investors to flee emerging

[21]The weighted average coupon on high-yield emerging market sovereign bonds is calculated on the JPMorgan Emerging Markets Bond Global Diversified Index.

Figure 1.23. Stability in Emerging Markets' Local Currency Government Bond Markets

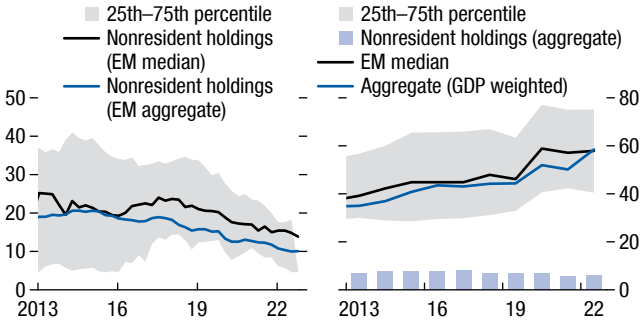
Emerging markets' local currency bond markets have been resilient despite sell-offs in advanced economy bonds ...

1. Year-to-Date Change in Five-Year Yield, Real Yield Historical Average
(Percentage)



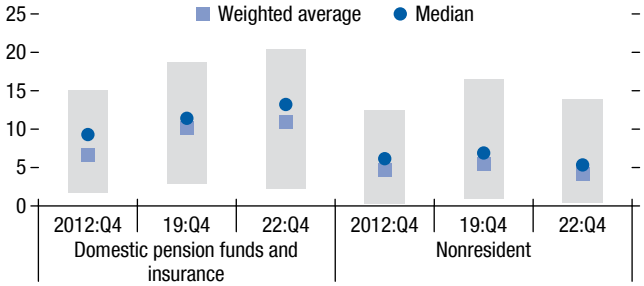
... halting the declining trend in nonresident participation seen over the past decade.

2. Nonresident Ownership Debt and General Government Debt
(Percent of outstanding debt, left scale; percent of GDP, right scale)



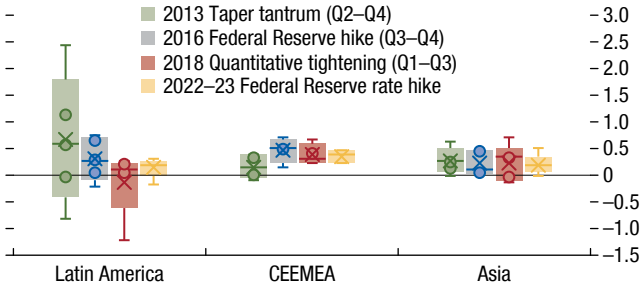
For large emerging markets, long-term domestic investment institutions have stepped in.

3. Local Currency Government Bond Ownership for the Eight Largest Emerging Market Economies, by Institutions
(Percent of GDP)



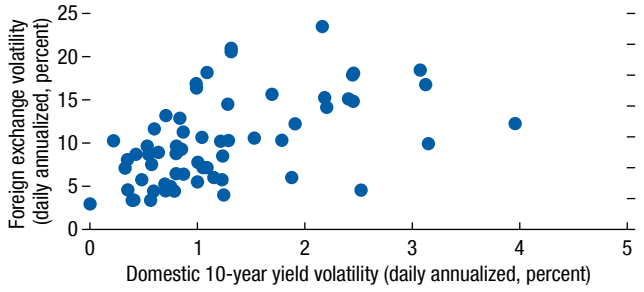
Long-term local yield sensitivity to US Treasury yield compressed to low levels for major emerging markets during this tightening cycle compared with previous tightening episodes ...

4. Changes to 10-Year Local Currency Government Bond Yield Sensitivity to 10-Year US Treasury
(Coefficient)



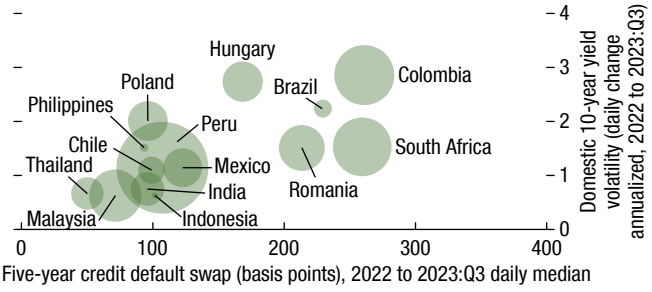
... which could have limited spillover to emerging market foreign exchange, whose volatility typically rises when domestic bond volatility heightens during periods of tightening advanced economy monetary policies.

5. Benchmark 10-Year Domestic Yield Volatility, Foreign Exchange Volatility
(Daily change, annualized, for 2016, 2018, 2022, and year-to-date 2023)



Nonetheless, emerging market structural idiosyncrasies continue to be pivotal for domestic long-term rate stability.

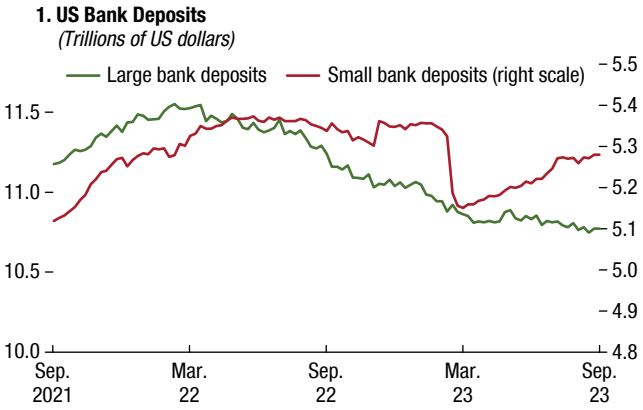
6. Benchmark 10-Year Domestic Yield Volatility; Five-Year Credit Default Swap
(Daily change annualized; basis points, daily median 2022 to 2023:Q3; size of bubbles reflects nonresident holdings [percent outstanding as of 2022])



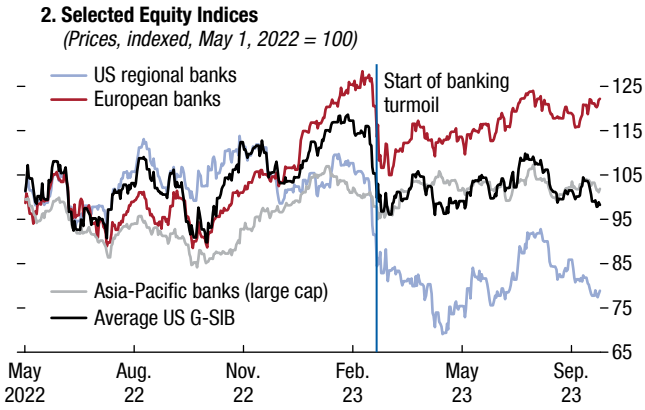
Sources: Bloomberg Finance L.P.; and IMF staff calculations. Nonresident investor base estimates by Arslanalp and Tsuda (2014), updated to the fourth quarter of 2022. Resident holders' breakdown was from respective national authorities as of the end of 2022.
Note: Panel 1 reflects year-to-date five-year yield movements as of September 29, 2023, current real rate as reflected by latest policy rate – latest inflation, while historical real rates are from the second half of 2019 to the first half of 2022, with realized inflation one year ahead. Emerging markets in panel 2 are the 20 major countries excluding China and Russia. Panel 3 includes the top eight emerging markets by market capitalization (Brazil, India, Mexico, Indonesia, Malaysia, South Africa, Thailand, and Poland), representing 81 percent of outstanding major local currency government bonds at the end of 2022. Panel 4 reflects sensitivity of weekly changes in domestic 10-year yields during periods of 10-year US Treasury repricing. CEEMEA = Central and Eastern Europe, the Middle East, and Africa; EM = emerging market; Q = quarter.

Figure 1.24. Banking Sector Challenges

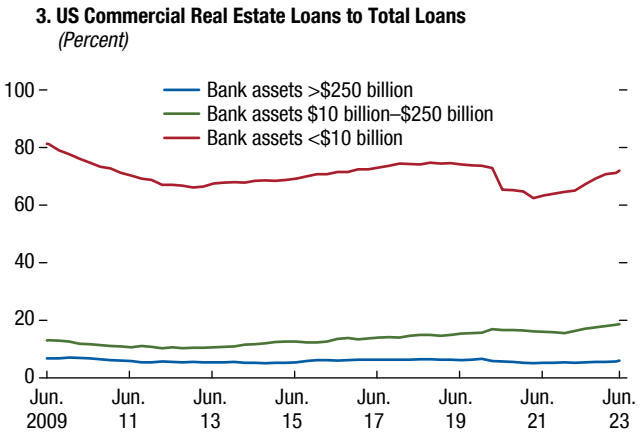
US bank depositors are returning to small banks.



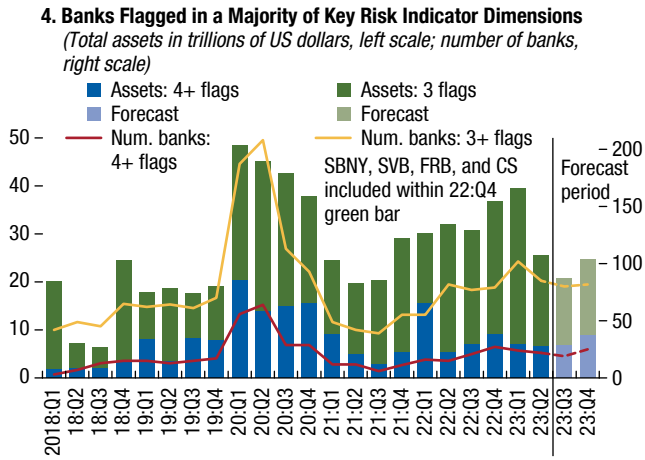
However, US regional banks' equity prices have recovered but remain well below levels before the March 2023 turmoil ...



... and there is high concentration of CRE lending in small US banks.



Globally, the tail of vulnerable banks remains elevated.



Sources: Bloomberg Finance L.P.; Federal Reserve; Visible Alpha; and IMF staff calculations.
Note: cap = capitalization; CRE = commercial real estate; CS = Credit Suisse; FRB = First Republic Bank; G-SIB = global systemically important bank; Num. = number of; Q = quarter; SBNY = Signature Bank of New York; SVB = Silicon Valley Bank.

market assets. Emerging market sovereigns with weaker positions generally see more bond yield volatility, suggesting that efforts to improve market depth should be complemented by efforts to improve domestic strength and mitigate external vulnerabilities (Figure 1.23, panel 6).

Financial Institutions

Rising Funding Costs and a Negative Credit Outlook Test Bank Resilience

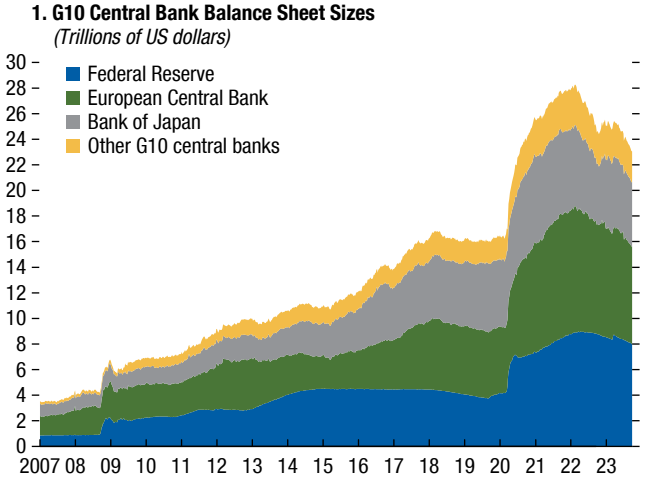
After the March turmoil, funding liquidity pressures have receded in the global banking sector and calm has been restored. Recent increases in long-term interest rates may benefit banks. However, the cost of funding is expected to continue to rise, and loan losses are likely to accelerate, especially if the hoped-for soft landing fails to materialize, challenging banks' profitability amid economic uncertainty.

The banking sector has been resilient since the pandemic, confronting challenging conditions of economic uncertainty, elevated inflation, rising interest rates, and, most recently, a crisis of confidence. In the first quarter of 2023, the failure of three regional banks in the United States and a global systemically important bank in Switzerland in March appear to have had a limited effect on most banks' balance sheets. Actions to provide liquidity support helped limit broader contagion in the banking systems.

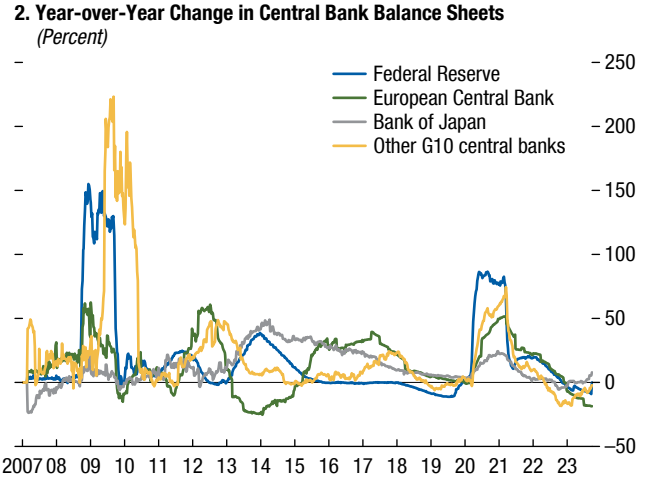
In the United States, after sizable outflows, deposits at smaller banks have started to rebound (Figure 1.24,

Figure 1.25. As Advanced Economies' Central Banks Tighten Their Balance Sheets, Bank Reserves Are Shrinking

The balance sheets of G10 central banks are declining slowly ...



... while the pace and approach for reducing balance sheets differs across central banks.



Sources: Bloomberg Finance L.P.; and Haver Analytics.
Note: G10 = Group of 10.

panel 1). Stock prices of banks—including regional banks—have recovered but remain well below levels before the sell-off in the second quarter, a time when bank earnings were solid (Figure 1.24, panel 2). Overall, banks are well capitalized and have ample liquidity (see Chapter 2). However, take-up at the Federal Reserve's Bank Term Funding Program is still high, and reliance on brokered deposits, a more expensive source of funding, is increasing, signaling that some institutions still need liquidity. Fragilities remain higher than usual for regional banks that experienced large outflows and have a large share of uninsured deposits, increased borrowing at Federal Home Loan Banks, sizable unrealized losses to capital, and high concentrations of CRE lending (Figure 1.24, panel 3). These banks have embarked on strategies to repair balances by reducing risk and appear to have curtailed lending.

Globally, banks continue to be profitable, earning higher net interest income from rising medium- and long-term interest rates and slower-than-expected repricing of deposit betas. However, funding costs are rising across regions, especially in North America, putting pressure on net interest margins. In addition, nonperforming loans and provision expenses are increasing as credit quality begins to deteriorate. So far, these indicators are still faring better than prepandemic levels, but they will likely challenge bank profitability. Regional differences are meaningful. In the United States, competition for deposits with other banks and money market funds is contributing to net interest margin compression, with more compression for banks not of global systemic importance. In most countries in Asia, net interest margin compression has been smaller, reflecting in part that policy rate changes have been smaller.

Although banks have been able to manage the turmoil in March relatively well, conditions have nonetheless tightened. The effect on bank balance sheets could be negative if a soft landing fails to materialize amid high inflation that requires central banks to hike policy rates. Building on international standards, banks need to comprehensively monitor risks, as recent events show that a group of weak banks, even if not individually systemic, can pose financial stability risks. To identify and assess risks to the global banking sector, the IMF staff developed a key risk indicator framework to identify vulnerable banks (Chapter 2). The results pointed to a weak tail of banks that will be adversely affected by rising funding costs, market expectations of falling demand for loans, and asset quality deterioration amid economic uncertainty (Figure 1.24, panel 4; Chapter 2).

Banks and Markets May Be Affected by Central Bank Balance Sheets

While continuing to raise interest rates, central banks in advanced economies have made further progress in normalizing balance sheets (Figure 1.25, panel 1). The Bank of Canada, the European Central Bank, the Reserve Bank

of Australia, and the Federal Reserve have opted for a passive quantitative tightening, by not reinvesting either a portion or the full amount of maturing assets, whereas the Bank of England, the Reserve Bank of New Zealand, and the Riksbank have chosen to sell their security holdings, either back to the market or in the case of New Zealand to the Debt Management Office (Figure 1.25, panel 2).[22] Notably, in the cases of the Reserve Bank of New Zealand and Riksbank, quantitative tightening has persisted for extended periods—over 18 months in New Zealand—without detectable market illiquidity or disruptions to funding. For other central banks, whether quantitative tightening will proceed smoothly depends on its effect on liquidity in the financial system.

Looking at changes in the Federal Reserve's balance sheet size and composition can help shed light on how quantitative tightening affects markets and banks. On the asset side, the Federal Reserve's footprint in the US Treasury market and in the mortgage-backed securities and agency securities markets has shrunk. Instead, since March 2023, the asset side of the balance has risen because of the provision of liquidity during the banking turmoil, including the discount window lending, the Bank Term Funding Program, and other credit extensions to depository institutions subsequently placed into receivership with the Federal Deposit Insurance Corporation (Figure 1.26, panel 1). On the liability side, since the start of quantitative tightening, reserves from the banking system have dropped to about 3.2 trillion dollars. Net issuance of approximately $477 billion in bill supply, following the resolution of the debt ceiling impasse, was absorbed without a significant effect on bank reserves or money market rates. The recent significant decline in use of the reverse repo facility suggests that money market funds have purchased a substantial share of the new bill supply (Figure 1.26, panel 2).

Meanwhile, the US Treasury Department has outlined plans to increase debt issuance to fund its obligations, just as the Federal Reserve scaled down its footprint in the Treasury market (Figure 1.26, panel 3). During quantitative easing, purchases of Treasury securities by the central bank have reduced the share of securities in private hands, leading to a compression in term premiums, thus putting downward pressure on Treasury yields. By contrast, quantitative tightening increases the net supply—or "free floating"—of Treasury securities, potentially leading to a decompression of term premiums and yields (Figure 1.26, panel 4). In August 2023, Treasury term premiums started to decompress, resulting in the 10-year Treasury yields having reached their highest levels since 2007. Until then, the upward pressure on term premiums as a result of both quantitative tightening and increased supply of Treasury securities has been muted. In September, term premiums moved back into positive territory, but, so far, the increase remains modest compared with similar episodes in the past. For example, if progress on inflation is slower than expected or the US fiscal outlook deteriorates further, foreign investors may continue to repatriate funds to their domestic bond markets once the hiking cycle ends in the United States.

In the euro area, banks appear to have navigated smoothly the repayments of targeted longer-term refinancing operations (TLTROs) in June—a combination of scheduled TLTRO loan redemptions and voluntary repayments.[23] The sharp decline of the excess liquidity resulting from the repayment (€506 billion) had a limited effect on money markets. With liquidity still ample in the financial system, money market rates remain anchored to the deposit facility rate at 4 percent, limiting the increase of funding cost for some institutions. The repayment of the TLTROs has narrowed asset swap spreads (top part of Figure 1.27, panel 1) by freeing some securities, which somewhat alleviated collateral scarcity concerns (bottom part of Figure 1.27, panel 1).[24]

As part of its balance sheet normalization, the European Central Bank in July ended reinvestments under its Asset Purchase Programme. This decision, combined with the TLTRO repayments, shrank the central bank's balance sheet by €91 billion to €7.2 trillion (about 57 percent of euro area GDP). The central bank confirmed its intention to continue flexibly reinvesting the maturing principal payments in the

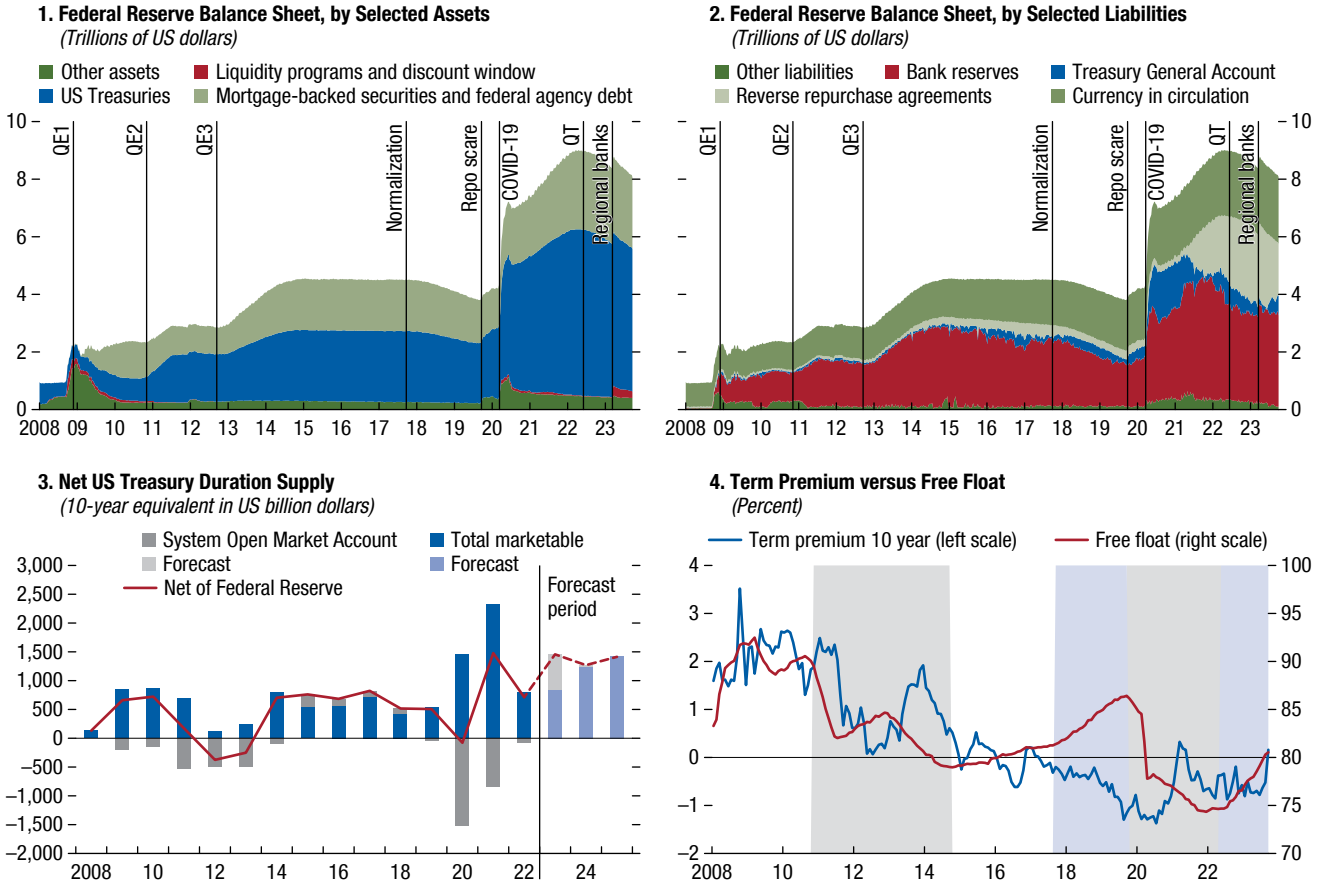
[22]Moreover, the approach to quantitative tightening is also influenced by the maturity profile of central bank assets.

[23]At the end of June, European banks repaid €477 billion of TLTRO loans. In addition, banks on June 28 also voluntarily repaid another €29 billion of outstanding TLTRO loans. See, respectively, "June 2023 Press Conference," European Central Bank, transcript, June 15, 2023, and "Summary of Ad Hoc Communication," press release, June 16, 2023.

[24]However, collateral scarcity, notably in Germany, remains a key concern for the European bond market. According to market participants, the Bundesbank's announcement on August 4 to reduce the remuneration of government deposits to 0 percent from October 1 may lead to a higher demand for short-term debt, and in turn, exacerbate the shortage of high-quality securities in the euro zone. The European Central Bank late in 2022 lifted the renumeration ceiling for government deposits to address the collateral scarcity, pricing them to market rates in a bid to provide an attractive alternative to other investments that would require high-quality collateral, such as repos. See "Bundesbank Adjusts Remuneration of Domestic Government Deposits," Bundesbank, press release, August 4, 2023.

Figure 1.26. The Federal Reserve's Quantitative Tightening amid Expanding Fiscal Supply to Put Pressure on Term Premiums

Although the asset holdings of the Federal Reserve have risen because of liquidity support since the March 2023 banking turmoil, ongoing quantitative tightening has resulted in a reassessment of term premiums, also reflecting increased supply of US Treasury securities.



Sources: Bloomberg Finance L.P.; Federal Reserve Bank of New York; Federal Reserve Bank of St. Louis; Haver Analytics; US Department of the Treasury; and IMF staff calculations.
Note: Panel 4 shows term premiums based on the Adrian, Crump, and Moench (2013) model. Free float is defined as the percentage share of outstanding coupon paying Treasury debt securities and Treasury bills held by price-sensitive investors (that is, adjusted by corresponding security holdings acquired and held by the Federal Reserve). Regions shaded in gray correspond to a quantitative easing episode; regions shaded in light blue correspond to quantitative tightening episodes. QE = quantitative easing; QT = quantitative tightening.

Pandemic Emergency Purchase Programme (PEPP) until at least the end of 2024 (Figure 1.27, panel 2). Thus, the European Central Bank implicitly upheld that the flexibility of the PEPP remains the first line of defense to ensure a proper functioning of monetary policy transmission (European Central Bank 2022, Box 1). This decision—along with the existence of the Transmission Protection Instrument, considered a last-resort intervention tool[25]—appears to have alleviated the fragmentation concerns once related to the central bank's ongoing monetary tightening, with southern European bond spreads remaining shallow (Figure 1.27, panel 2). Many market participants expected the European Central Bank to discontinue PEPP reinvestments earlier,[26] given the stickiness of inflation and the tightening of other policy tools. Analysts still anticipate the central bank will review its forward guidance and announce adjustments by early

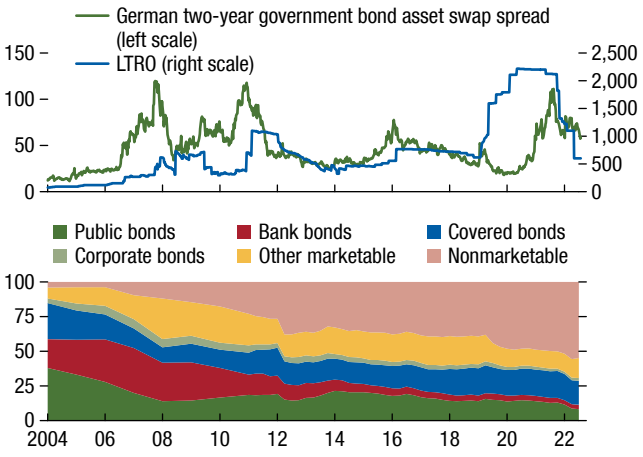
[25]The Transmission Protection Instrument, announced in July 2022, is intended to address the fragmentation risk that could impair the effective transmission of monetary policy across the euro area countries. See "The Transmission Protection Instrument," European Central Bank, press release, July 21, 2023.

[26]Before the European Central Bank June meeting, a Bloomberg Finance L.P. survey showed that 83 percent of participants expected the bank to bring forward the end of PEPP reinvestments before the end of 2024. See "Economists See Goldilocks Scenario for ECB Rates," Bloomberg Finance L.P., survey, June 9, 2023.

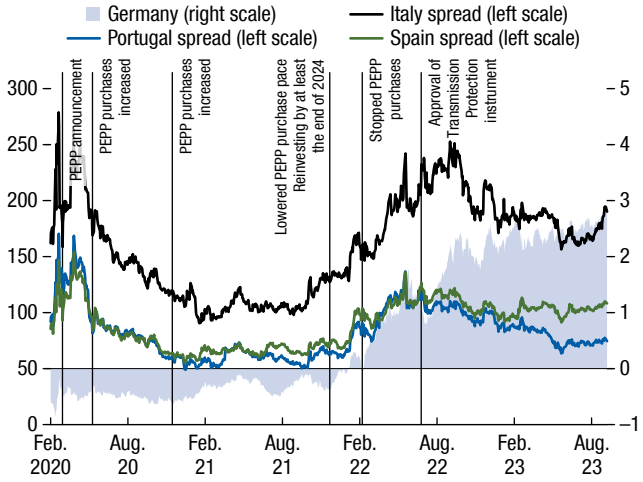
Figure 1.27. Dynamics in Euro Area Government Bond Markets

TLTRO repayments have freed up pledged securities, and the continuation of the PEPP reinvestments has kept fragmentation concerns contained so far.

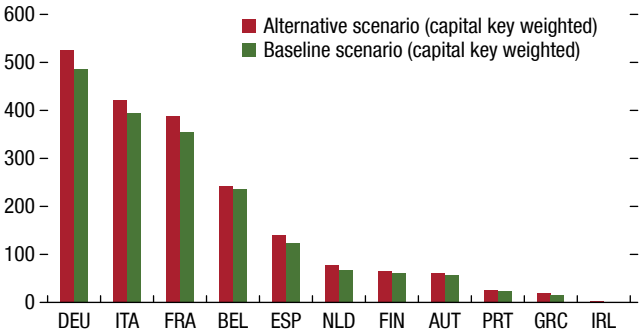
1. European Government Bond Asset Swap Spreads, LTRO Size, and Composition of Collateral
(Basis points, left scale; billions of euros, right scale; percent, bottom scale)



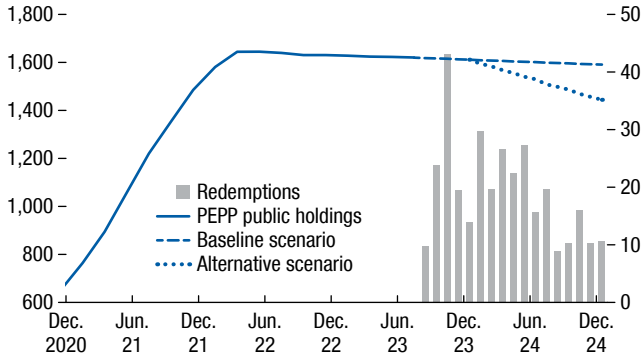
2. Euro Area Yield Spreads and Benchmark Yields along with Main PEPP Announcement Dates
(Basis points, left scale; percent, right scale)



3. Gross Government Issuance Net of Public PEPP Reinvestments by the End of 2024
(Billions of euros)



4. Public Holdings of the European Central Bank's PEPP along with Baseline and Alternative Scenario and Core and Noncore Bond Redemptions through the End of 2024
(Billions of euros, left scale; redemptions, right scale)



Sources: Bloomberg Finance L.P.; European Central Bank; Haver Analytics; Refinitiv Datastream; and IMF staff calculations.
Note: In panel 1, the collateral composition is based on the European Central Bank's quarterly report on Eurosystem Collateral Data with latest available data until the second quarter of 2023. In panels 3 and 4, the baseline scenario captures consensus expectations on Eurosystem stock of bonds under the PEPP from the September 2023 Survey of Monetary Analysts (that is, continuation of current pace), whereas the alternative scenario assumes PEPP redemptions to be fully reinvested in 2023 and reduced by 50 percent in the first half of 2024 and by 100 percent in the second half of 2024. Data labels in panel 3 use International Organization for Standardization (ISO) country codes. LTRO = long-term refinancing operation; PEPP = Pandemic Emergency Purchase Programme; TLTRO = targeted longer-term refinancing operation.

next year. Under a baseline scenario, which maintains the current pace of PEPP reinvestments, the net issuance of government bonds would not have to be as large in all euro area countries (Figure 1.27, panel 3). Under the alternative scenario, the PEPP holdings could decline by €175.5 billion, which—together with the quantitative tightening from the Asset Purchase Programme—could bring the European Central Bank balance sheet to €6.5 trillion by the end of 2024, putting some jurisdictions under pressure at a time when fiscal deficits are expected to remain large (Figure 1.27, panel 4).

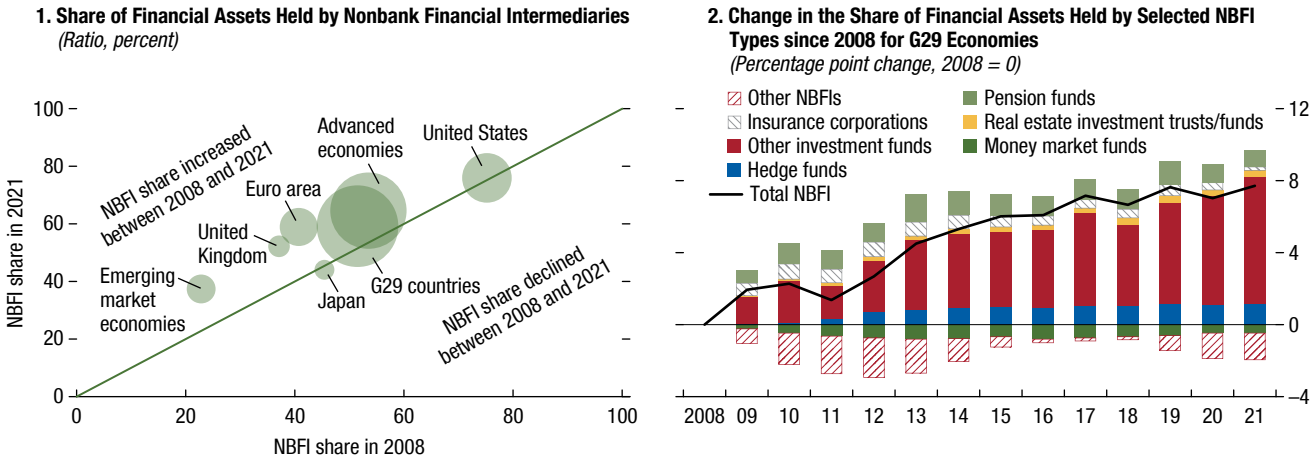
Higher Rates Benefit Some NBFIs but Could Exacerbate Structural Vulnerabilities

Higher interest rates and a deterioration of credit quality could exacerbate existing vulnerabilities in the

Figure 1.28. Nonbank Financial Intermediaries

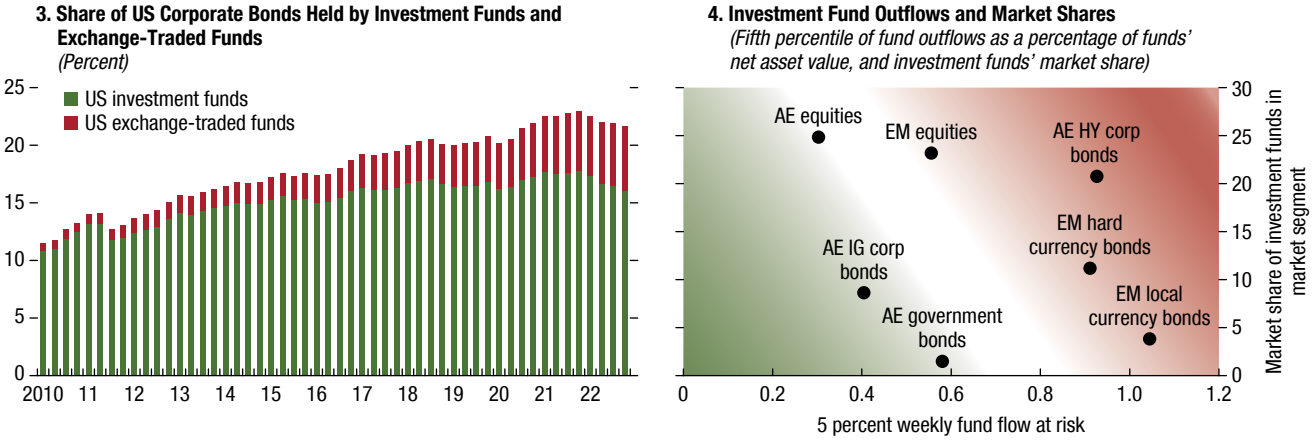
The share of financial assets held by nonbank financial intermediaries has grown between 2008 and 2021, especially for emerging markets, the euro area, and the United Kingdom ...

... with investment funds accounting for most of the growth.



Investment funds hold an increasingly large share of the US credit market, heightening vulnerabilities to redemptions ...

... and high-yield corporate bond markets are especially vulnerable to procyclical behavior of investment funds.



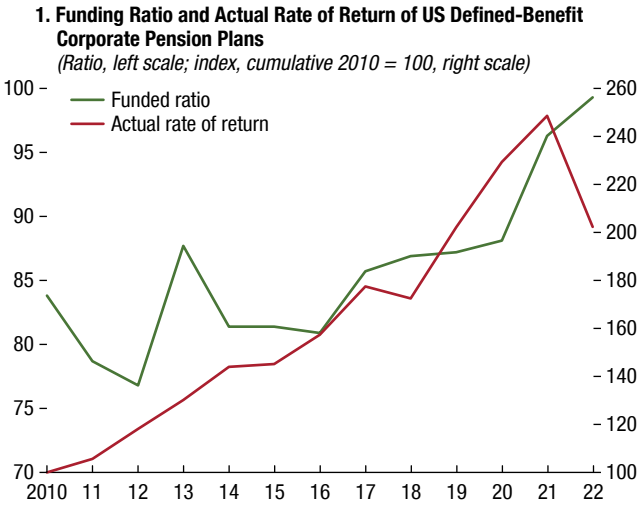
Sources: EPFR Fund Flows; Federal Reserve; Financial Stability Board; Haver Analytics; and IMF staff calculations.
Note: In panel 1, the bubble size reflects the nominal size of the nonbank financial intermediary sector in US dollars for the reference year 2021. In panel 2, the share of total financial assets held is a percentage of total financial assets net of central-bank-held assets. The category "other investment funds" includes all funds that do not fall under the categories of hedge funds, money market funds, and real estate funds. The data in panel 3 represent the share of US-domiciled investment funds and exchange-traded funds of the corporate and foreign bond sector as defined by the US Flow of Funds (L.213) and, as such, it also includes some dollar-denominated foreign bonds. Panel 4 reflects fund flows and market shares of investment funds (mutual funds and exchange-traded funds) categorized as bond or equity funds in EPFR data. The 5 percent weekly fund flow at risk reflects the fifth percentile of historically observed weekly fund flows, in absolute value. For example, a value of 1 percent implies that historically, in 5 percent of weekly flow data, the fund outflows were equal to or larger than 1 percent of the net asset value in the fund category. G29 refers to Argentina, Australia, Belgium, Brazil, Canada, the Cayman Islands, Chile, China, France, Germany, Hong Kong SAR, India, Indonesia, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, The Netherlands, Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Switzerland, Türkiye, the United Kingdom, and the United States. AE = advanced economy; corp = corporate; EM = emerging market; HY = high-yield; IG = investment grade; NBFI = nonbank financial intermediary.

NBFI sector. Investment funds have increased their exposure to credit markets, raising concerns about market disruptions wherein large outflows would require fire sales of assets. In addition, elevated holdings of riskier lower-rated bonds and illiquid private credit assets could result in losses at pension funds and insurers, potentially leading to market stress in the event of sizable policy surrenders or margin calls.

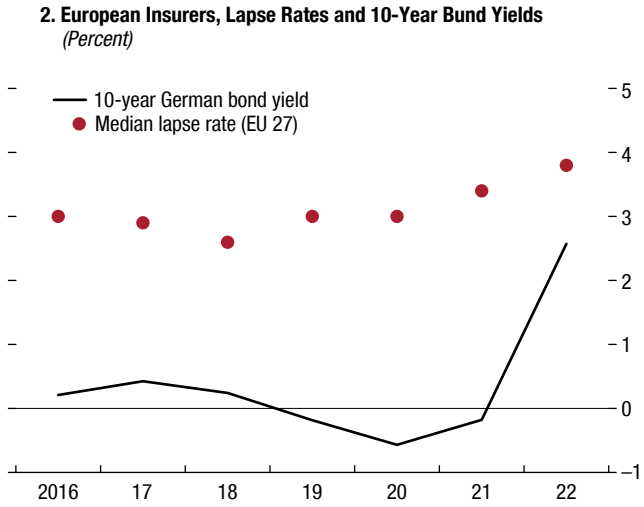
NBFIs have become increasingly important in the global financial system over the past decade (Figure 1.28, panel 1). Although NBFIs are less prominent in emerging market economies, their share of

Figure 1.29. Institutional Investors and Higher Bond Yields

The funding ratios of pension funds have improved with higher interest rates ...



... while the lapse rates of insurers have increased modestly so far; high interest rates might accelerate the trend.



Sources: Bloomberg Finance L.P.; European Insurance and Occupational Pensions Authority; Federal Reserve; Millman; S&P Capital IQ Pro; and IMF staff calculations.
Note: Panel 1 is based on the financial disclosures of the 100 US corporations sponsoring the largest defined-benefit pension plans. The funded ratio measures the ratio of the estimated value of aggregated assets and liabilities. The data in the red dots of panel 2 are for the median lapse rate of insurers in the 27 members of the European Union (EU), with the latest data available as of the fourth quarter of 2022, as reported in the July 2023 Risk Dashboard of the European Insurance and Occupational Pensions Authority.

financial assets has nearly doubled since 2008. Investment funds have been the main driver of the expansion, although considerable variations exist between countries and regions (Figure 1.28, panel 2).

This remarkable growth has heightened vulnerability to redemptions from investment funds that offer investors daily liquidity. Investment funds, together with ETFs, represent a growing share of the US credit markets, with ETFs having expanded most (Figure 1.28, panel 3).[27] Investment funds can destabilize financial markets if rapid outflows force fund managers to liquidate assets in already distressed markets (see Chapter 2 of the April 2023 *Global Financial Stability Report*). High-yield corporate bond markets seem particularly vulnerable: high-yield bond funds and ETFs hold a large share of the market, the bonds are illiquid, and high-yield funds have historically more frequently shown relatively large outflows (Figure 1.28, panel 4).

Defined-benefit pension funds and life insurance corporations have benefited from the higher interest rate environment. Higher interest rates have, for example, reduced the present value of defined-benefit pension liabilities in the United States, and so have significantly improved funding ratios even as their bond portfolios have suffered substantial mark-to-market losses (Figure 1.29, panel 1). Given that more than half of life insurers' investments are held in bonds, these funds are also mitigating the prolonged erosion of their investment returns by directing new premiums and reinvesting proceeds from matured portfolios into higher-yielding securities.

However, pension funds and insurance firms are vulnerable to a deterioration of the credit outlook and an increase in credit downgrades and corporate bond defaults. Since the global financial crisis, insurers have increased their exposure to lower-rated securities, rendering them more vulnerable to rating downgrades (see Chapter 1 of the April 2019 *Global Financial Stability Report*). Furthermore, over the past decade, insurers have also doubled their exposure to illiquid investments, including structured-credit securities (see Chapter 1 of the April 2023 *Global Financial Stability Report*). Life insurers owned by private equity firms, a fast-growing subsector, have particularly large exposure to illiquid credit investments. Their growing reliance on

[27]The rapid expansion of credit market ETFs warrants close monitoring because of their heightened potential for contagion risks. See Chapter 1 of the April 2018 *Global Financial Stability Report*.

reinsurers based in offshore jurisdictions raises additional concerns about transparency, regulatory arbitrage, and spillover effects (see Box 1.3).

Institutional investors using financial leverage could be subject to margin and collateral calls during periods of high market volatility, which, given a large footprint, may exacerbate stress in financial markets.[28] In addition, increased holdings in structured and private credit could pose challenges in liquidating portfolios, considering higher policy surrenders for insurers or forced sales triggered by higher interest rates and a deterioration of credit quality. Higher-for-longer rates may create an incentive for policyholders to lapse or surrender for financial products offering higher yields. While lapse rates rose only modestly in 2022, policyholders could surrender or lapse policies faster than expected as rates continue to rise (Figure 1.29, panel 2).[29] In response to higher yields and to mitigate lapse risk, some insurers are raising the discretionary crediting rates in their policies.[30] This may be less of a concern in jurisdictions with high surrender penalties.

Privately Traded Assets May Not Have Fully Adjusted to Higher Interest Rates

NBFIs have significant exposure to opaque private markets, where the effect of higher interest rates may be neither fully priced nor apparent. The effect of higher rates on privately traded assets may become visible only after the effect on publicly traded assets has become visible: the price-discovery mechanism may take more time to adjust because of the heterogeneity of the assets, the limited number of transactions and participants, and a reliance on relatively irregular appraisals. As a result, valuations can deviate from market values in public markets for a prolonged period, and corrections can occur long after policy rates have peaked. At the same time, a delayed correction may imply that price adjustments may be sharper and faster, once they occur, as the crystallized evidence of losses may force other investors to mark down their investments.

CRE and private credit are prominent examples of private markets susceptible to substantial corrections because of the lagged effects of higher interest rates. Vulnerabilities in these markets pose risks to banks as well as to NBFIs, which may be exposed to private markets directly or indirectly, for example, through investment vehicles (see Box 1.3). The pricing of publicly traded shares in investment vehicles that operate in these markets has deviated significantly from valuations in the underlying market. For example, share prices of exchange-traded REITs corrected sharply downward during 2022 as central banks embarked on their tightening cycle, whereas prices in privately traded real estate markets have started to adjust (Figure 1.30). Price deviations between privately and publicly traded real estate may also be explained by differences in the credit quality of underlying assets and by the use of varying degrees of leverage by REITs. Nonetheless, the potential for private credit prices to catch up abruptly is a risk for institutional investors, especially with open-ended investment funds—if investors decide to redeem their fund shares, fund managers may have to sell private market assets in short order at prices lower than marked values to meet redemptions, thereby crystallizing losses and potentially opening a feedback loop to private credit prices.

Higher interest rates have already affected business models that rely heavily on leverage, leading to a sharp decline in private equity activity. Global private equity deal flows peaked during the pandemic recovery, driven by favorable business opportunities amid low interest rates and ample liquidity. Private equity business models, particularly leveraged buyouts, typically rely on leverage to enhance the return for equity investors. With the rapid rise in interest rates, such leverage has become considerably more expensive, significantly reducing private equity volumes (Figure 1.31, panel 1).

The postpandemic wave of private equity deals has added significant floating rate debt to the corporate sector (see "The Credit Cycle Is Turning as Corporate Cash Buffers Deplete" section). Firms acquired through private equity deals often issue floating rate debt in the syndicated loan market, with private equity

[28]Chapter 2 of the April 2023 *Global Financial Stability Report* showed that among a global sample of large pension plans that disclose data on derivative exposures, which account for more than $5 trillion in assets, the average ratio of gross notional exposure of derivatives to assets has increased over the past decade. Some pension funds also actively use repurchase agreements, which can further increase financial leverage.

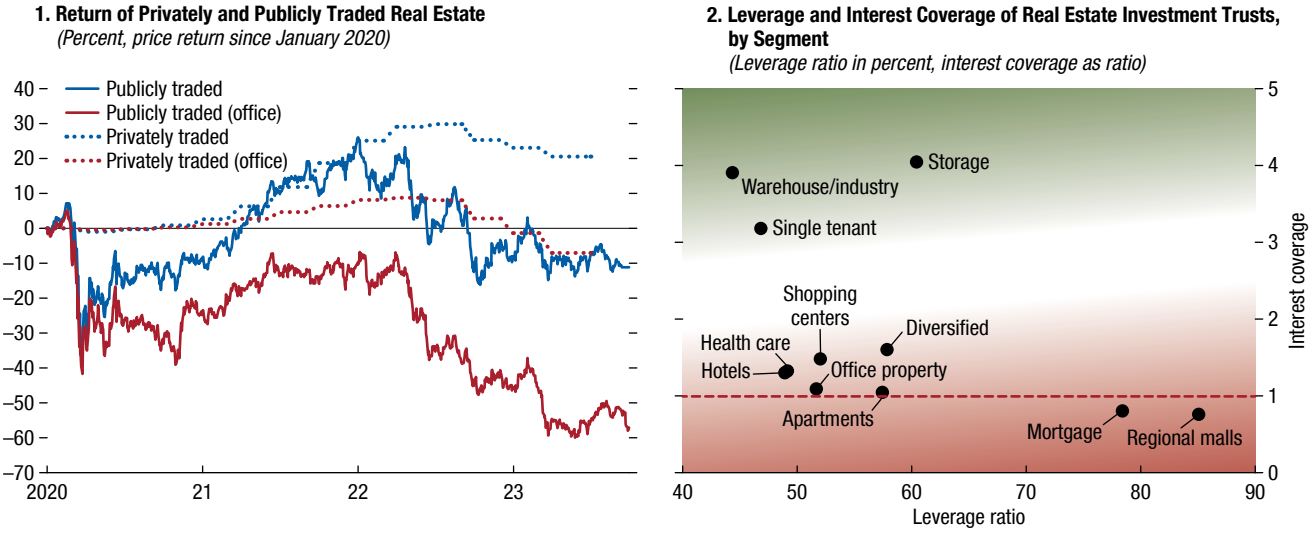
[29]Moody's Investors Service (2021) estimated that $500 billion (almost one-third of US life insurance policies) could be surrendered with low penalty. Fitch Ratings (2023) estimated that, in Italy, policy lapses and surrenders increased materially in November and December 2022. This persisted in January 2023, when total payouts were €5.6 billion, about 50 percent more than in January 2022.

[30]For example, as interest rates rose in 2022, French life insurers raised their discretionary crediting rates to an average of 2 percent, well above the minimum guaranteed rate and significantly higher than the low level seen in 2021. See Standard & Poor's Global Ratings (2023).

Figure 1.30. Pricing of Private Assets Is Lagged Compared with Publicly Traded Assets

Privately traded real estate has lagged price adjustment compared with listed real estate investment trusts ...

... while nonbank financial intermediaries such as real estate investment trusts are important players in this market, where segments have varying degrees of vulnerability.

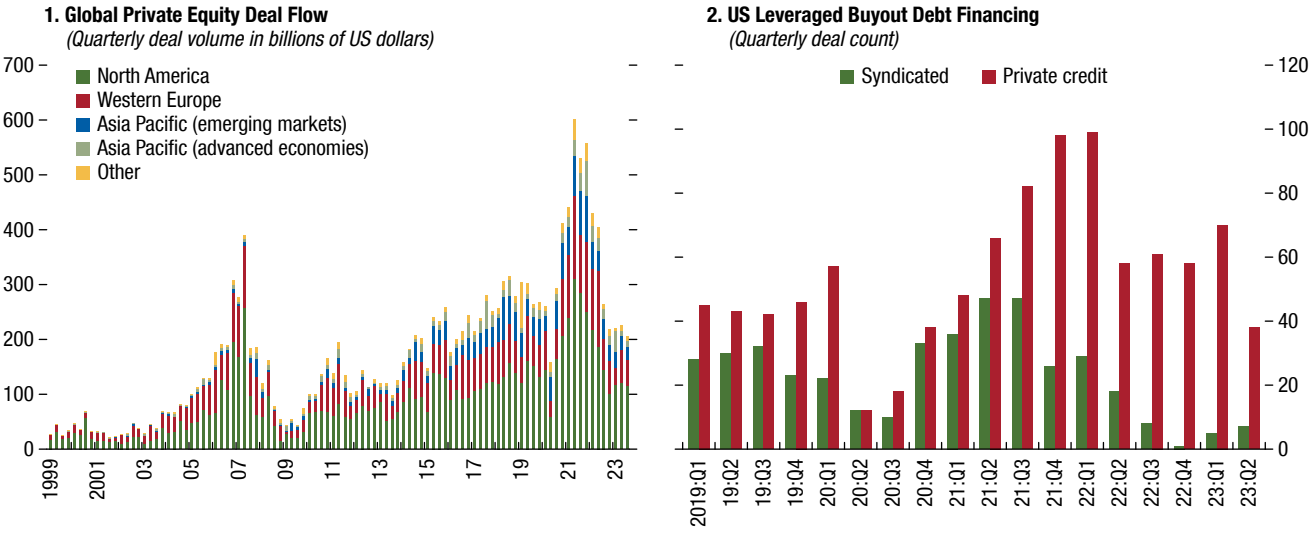


Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: In panel 2, interest coverage is calculated by dividing a trust's earnings before interest and taxes by its interest expenses, and the leverage ratio is calculated as the total debt divided by total assets. The analysis is based on a sample of 219 US exchange-traded real estate investment trusts. Although some real estate investment trusts do not focus on specific real estate segments (for example, diversified real estate investment trusts), others do. Most real estate investment trusts own and operate properties to generate distributable income, but mortgage real estate investment trusts invest in real estate by proving debt financing. Real estate investment trusts rely on various sources of debt, including corporate bond debt and mortgages on the properties owned.

Figure 1.31. Private Equity Deal Flow and Debt Financing

Private equity deal flow dropped significantly from its peak in the postpandemic recovery when interest rates were significantly lower.

Leveraged buyouts turned to private credit as leverage became more expensive.



Sources: Bloomberg Finance L.P.; S&P Global Market Intelligence; and IMF staff calculations.
Note: Q = quarter.

firms acting as sponsor. This debt is usually floating rate, meaning that interest expenses increase in tandem with benchmark interest rates. Higher-for-longer rates will weigh on interest coverage ratios and may challenge a firm's viability.

As interest rates rose over the past year and leverage (in the form of floating rate leveraged loans and high-yield bonds) became more expensive, private credit may have stepped up. After near-record issuance in 2020 and 2021, high-yield bond and leveraged loan issuance declined substantially in 2022 and, so far, in 2023. There is some evidence that private credit has become an alternative source of financing, competing with market-based instruments. For example, US leveraged buyout transactions appear to be increasingly financed with private credit (Figure 1.31, panel 2). Private credit funds hold substantial uncommitted capital, often referred to as "dry powder." Market participants have highlighted how private credit funds are now helping finance deals, with private equity firms growing the private credit side of their business.

Private credit markets could come under significant pressure if inflation were elevated for longer than currently priced in markets, forcing central banks to keep a tight policy stance for longer than expected, and the hoped-for soft landing does not materialize. A deterioration in funding conditions and a worsening outlook could have a disproportionate effect on firms that are highly leveraged and have borrowed using debt instruments with floating rates. The opacity of private credit and delays in price adjustments makes it challenging to assess in a timely manner the potential financial stability implications of a surge in losses. However, some mitigating factors exist: most investment vehicles that operate in private credit markets are closed-end or cap withdrawals over specified time periods, minimizing immediate liquidity risk. Market participants have also indicated that private credit markets use limited financial leverage. However, some leverage may be provided by banks, raising the specter of possible spillover effects to the banking sector. In addition, the investor base predominantly consists of institutional investors with relatively long investment horizons and stable capital. Furthermore, private credit investors tend to benefit from better protection mechanisms compared with syndicated loan markets and the like, in which covenant-lite structures prevail. The close relationship between lender and borrower may also allow for tailor-made restructuring with fewer points of friction. However, the effectiveness of these risk mitigants has not been thoroughly tested in a downturn, especially in light of the recent rapid growth of the private credit market. Vulnerabilities may stem from interconnections with other segments of the financial sector—for example, banks (through the provision of leverage) and entities that have particular exposure to private credit markets, such as insurers influenced by private equity firms (Box 1.3).

Policy Recommendations

Financial market pricing and investor positioning suggest investors may still be too sanguine about the speed of disinflation and the likelihood of a soft landing. Reflecting the perception of a relatively benign macroeconomic outlook and boosted by market expectations of policy rate cuts in coming quarters, financial conditions in advanced economies have eased on net since April 2023. This may complicate the task of central banks to reassert price stability.

Global core inflation remains elevated and declining only slowly, suggesting that inflation (and the risk of a resurgence) has not yet been fully tamed. With policy paths increasingly differentiated across regions and countries, monetary policy stances need to reflect the country-specific speeds of economic recovery and disinflation. In economies with still elevated and persistent inflation, a restrictive stance is needed until there are clear signs that underlying inflation is cooling. History cautions against declaring victory too soon and prematurely easing monetary policy. Progress on inflation has been pronounced in some countries, justifying a gradual move to a more neutral policy stance while signaling continued commitment to price stability. Central banks must remain determined until there is tangible evidence that inflation is sustainably moving toward targets. Communication remains crucial to convey policymakers' resolve and avoid a deanchoring of inflation expectations (see Chapter 2 of the October 2023 *World Economic Outlook*).

If financial stability is threatened, maintaining confidence is paramount—policymakers should act swiftly and provide liquidity support to prevent systemic events that may undercut the resilience of the global financial system. Should policymakers need to adjust the stance of monetary policy to prevent financial stress that may morph into a systemic crisis, they should clearly communicate their continued determination to

bring inflation back to target as soon as possible once financial stresses diminish.

The reduction of central banks' balance sheets has so far been orderly. But central banks should carefully monitor any possible market functioning issues and adjust how they implement quantitative tightening if and when needed. In the euro area, authorities should be attuned to possible fragmentation risks. Policymakers should clearly communicate the objectives and steps for removing liquidity, especially if adjustments are needed in response to the macroeconomic outlook or financial market developments.

Monetary policy can get support from continued fiscal restraint in achieving the mandated inflation objective. Given debt and deficits remain higher than before the pandemic, credible fiscal adjustment can help rebuild buffers and contain the rise in debt. The pace and composition of adjustment should depend on the strength of private demand, the inflation outlook of individual countries, and the available fiscal space. Within budget constraints, governments should reprioritize spending to protect the most vulnerable and accelerate the green transition (see the October 2023 *Fiscal Monitor*).

Progress on inflation in a number of emerging markets has been notable, but central banks should be cautious not to ease policy rates too aggressively. Countries should integrate their policies, including, where applicable, within the Integrated Policy Framework, the IMF's macrofinancial framework for countries to manage risks stemming from volatile capital flows amid uncertainty in global monetary policy and the foreign exchange environment. Optimal policy combinations depend on the nature of the shock and country-specific characteristics. Any response measures should be part of a plan that resolves underlying macroeconomic imbalances and allows for needed adjustments. In light of continued volatility in financial markets, the use of foreign exchange interventions may be appropriate in the presence of frictions, so long as reserves are sufficient and intervention does not impair the credibility of macroeconomic policies or substitute for their necessary adjustment. In case of crises or imminent crises, capital flow management measures may be an option for some countries as part of a broader policy package to lessen outflow pressures, but they should not be substitute for warranted macroeconomics adjustments.

Countries with highly vulnerable financial sectors, limited or no fiscal space, and significant external financing needs are already under pressure and could face further severe challenges in the event of a disorderly tightening of global financial conditions. Countries with credible medium-term fiscal plans, clearer policy frameworks, and stronger financing arrangements will be better positioned to manage such tightening. The need to rebuild fiscal space and buffers remains.

In China, robust policies to restore confidence in the real estate sector will be critical to limit the risk of negative spillovers to the financial sector, corporations, and local governments. Priority should be given to facilitating the completion of housing projects, which could stem the slump in homebuyer sentiment, and the timely resolution and restructuring of troubled property developers. Given weakening growth momentum and disinflation pressures, further monetary policy easing and fiscal support reoriented toward households are needed to support economic growth. Regarding financial sector risks, a comprehensive strategy to address the LGFV debt issue is needed to restore LGFVs' debt-servicing capacity and achieve sustainable local government debt, which could in turn prevent adverse spillovers to the broader economy. While authorities have mitigated systemic risks emanating from the asset management sector, further progress is needed to address risky exposures to real estate and LGFVs, as well as liquidity mismatches between their assets and liabilities. For the banking sector, maintaining adequate loss-absorbing buffers, phasing out forbearance policies that could delay loan-loss recognition, and expediting efforts to restructure weak banks are critical for mitigating financial stability risks. Contingency planning should be developed to manage potential contagion, which may require systemwide liquidity provision to contain systemic risk.

Sovereign borrowers in emerging market economies, frontier markets, and low-income countries should strengthen efforts to contain risks associated with their high debt vulnerabilities, including through dialogue with creditors, multilateral cooperation, and support from the international community. Where feasible, refinancing or liability management operations should be executed to rebuild buffers. Countries near debt distress should enhance early contact with creditors. Bilateral and private sector creditors should find ways to coordinate preemptive and orderly restructuring to avoid costly hard defaults and prolonged loss of

market access. Where applicable, a reformed and more effective version of the G20 Common Framework should be used, including in preemptive restructurings. Continued use of enhanced collective-action clauses in international sovereign bonds and the development of majority voting provisions in syndicated loans would help facilitate future debt restructurings.

Policymakers should promote the depth of local currency markets in emerging markets and foster a stable and diversified investor base. Emerging market economies with market developmental gaps should strive to (1) establish a sound legal and regulatory framework for securities, (2) develop efficient money markets, (3) improve transparency of both primary and secondary markets as well as the predictability of issuance, (4) bolster market liquidity, and (5) develop a robust market infrastructure. Sustained efforts to deepen domestic markets become more critical as interest differentials between advanced economies and emerging markets narrow further and as nonresidents leverage use of more sophisticated instruments.

Developments and risks in residential real estate markets should be carefully monitored during the ongoing cycle of monetary tightening. National authorities should deploy stringent stress tests to estimate the potential effects of (1) rising interest rates on borrowers' repayment capacity and (2) a sharp fall in residential real estate prices on household balance sheets—and ultimately on financial institutions. Policymakers in some economies had tightened macroprudential tools to address overheating conditions, such as tightening sectoral capital buffers on real estate segment exposures or limiting loan-to-value or debt-to-income ratios. They could consider whether to revisit that decision to prevent severe macroeconomic implications from a sharp tightening of financial conditions amid a drop in house prices, while preserving and encouraging sound credit origination practices.

Continued vigilance is warranted to monitor vulnerabilities in the CRE sector to minimize potential financial stability risks. To ensure resilience in banking and inform decisions regarding the adequacy of capital buffers for CRE exposures, stress-testing exercises that embed large CRE price declines should be considered. Supervisors should also review banks' CRE valuation assumptions and ensure that provisions are adequate. There is an urgent need to lessen CRE-related systemic risks stemming from nonbank financial institutions by broadening the reach of macroprudential tools and by enhancing data collection. Such tools include minimum investment periods and liquidity buffers to open-ended real estate funds.

To ensure comprehensive and timely assessment of risks in credit markets, authorities should ensure they have sufficient and reliable data to analyze vulnerabilities stemming from origination practices and chains of bank and nonbank intermediation in the corporate debt market. With private debt playing an increasingly important role in capital markets, their transparency should be improved, including through the collection of data on cross-border exposures. More comprehensive assessments should be conducted in the broader market effect of any forced selling of privately held instruments that are generally illiquid and difficult to value.

The sizable tail of weak banks in the global financial system and the risk of contagion to healthy institutions highlights the urgent need to enhance financial sector regulation and supervision (see Chapter 2). Supervisors should ensure that banks have corporate governance and risk-management processes commensurate with their risk profile, including for risk monitoring by bank boards and capital and liquidity stress tests. Adequate minimum capital and liquidity requirements, including for smaller institutions, are essential to contain financial stability risks. Authorities should be more prepared to deal with financial instability, including by ensuring banks are prepared to access and use central bank facilities, intervening early to address weaknesses of banks, and, where needed, strengthening bank resolution regimes and preparedness to deploy them. In current conditions of elevated inflation, high interest rates, and deterioration of the credit outlook, authorities should pay specific attention to bank asset classification and provisions as well as to exposures to interest rate and liquidity risks.

Countries should continue to build buffers to help guard against future losses and to support the provision of credit through periods of stress. For example, authorities may raise countercyclical capital buffers or sectoral systemic risk buffers, should circumstances allow. Such buffers could be released if stresses, such as increased defaults, were to materialize in the future. To avoid procyclical effects, the raising of buffers should be conditioned on the absence of signs that credit is already being constrained by the adequacy of banks' capital.

Further progress on strengthening implementation of the international standard for resolution is critical for dealing with the problems of weak or failing banks

without undermining financial stability. This would increase the likelihood that problems at systemic banks can be resolved without risking public funds. It is a positive development that shareholders and holders of other capital instruments incurred losses in the March 2023 banking failures, yet it remains difficult to allocate losses across the creditor hierarchy before public funds are put at risk. The international community will need to take stock of recent experiences and draw policy conclusions on the effectiveness of reforms enacted after the global financial crisis. Policymakers may consider extending the perimeter of the international resolution standards to a wider set of banks, as even smaller banks have proven to be systemic at times of wider stress. In addition, as noted by the Financial Stability Board (2022), resolution regimes for systemic NBFIs, including central counterparties and insurers, should be strengthened or introduced where currently absent. It is also necessary to dismantle obstacles (legal, regulatory, and operational) to cross-border funding in resolution, including the ability to mobilize collateral across borders.

Comprehensive systemic risk assessments of NBFIs, including stress testing NBFI sectors that pose high systemic risks or could lead to severe market dysfunction, should remain a priority for regulators. Increased supervisory efforts are needed to rein in excessive liquidity mismatches and reliance on leverage. Authorities should also focus on greater, more effective, and consistent use of liquidity management tools and consider leverage caps where appropriate to prevent outsized margin and collateral calls. These efforts should be the first line of defense. Should central bank intervention be needed to stem systemic crises involving NBFIs, clear communication about the pertinent financial stability objectives and the parameters of the program would be necessary, including the time frame for exit (see Chapter 2 of the April 2023 *Global Financial Stability Report*).

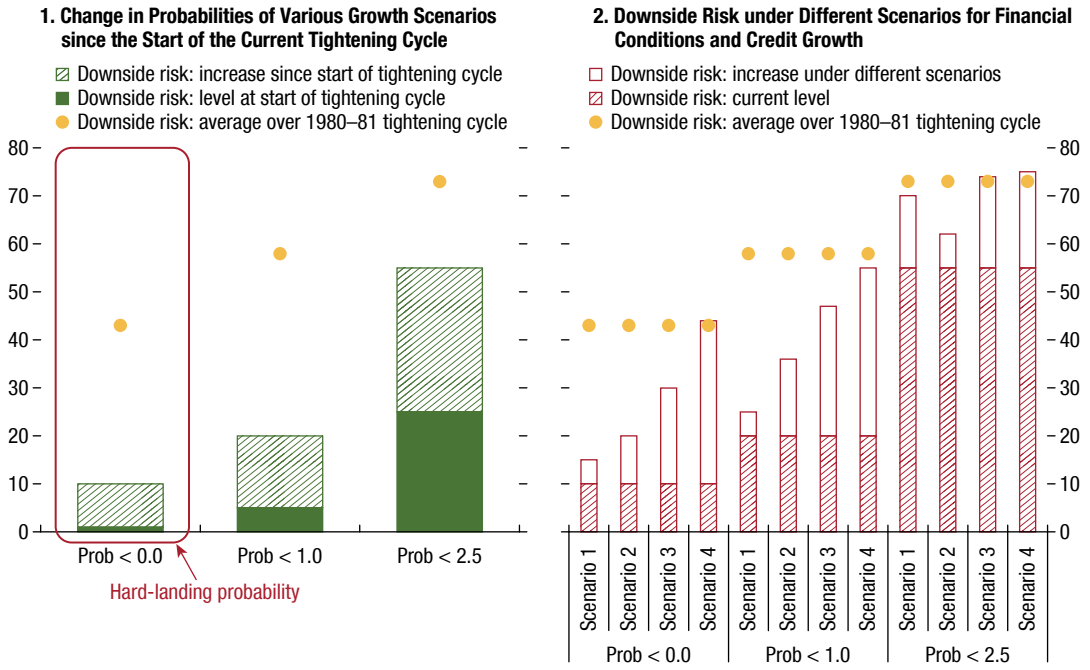
Regulatory coordination across sectors and jurisdictions is essential for both identifying risks and managing crisis situations. Internationally coordinated reforms can reduce the risks of cross-border spillovers, regulatory arbitrage, and market fragmentation. Jurisdictions should ensure that their data-sharing arrangements allow for timely coordination to swiftly identify cross-sectoral risks and determine further action as needed.

Box 1.1. The Effect of Financial Conditions and Credit Growth on the Prospects of a Hard Landing in the United States

Since the start of the tightening cycle, financial conditions in the United States have remained fairly easy, on net, and actually eased further in 2023 despite continued policy hikes (see the "Financial Conditions Are Easing, but Lending Conditions Could Get Tighter" section). By contrast, credit conditions appear to have deteriorated amid emerging signs of tighter bank lending standards and terms (see the "Higher Rates Benefit Some NBFIs but Could Exacerbate Structural Vulnerabilities" section and Chapter 2). Using a conditional density forecasting framework (Adrian, Boyarchenko, and Giannone 2019), this box gauges the effect of varying levels of financial conditions and credit growth on downside risks to US growth over the coming year. Downside risks are examined by estimating tails of growth densities—specifically the probability of growth falling below 0 percent, 1 percent, and 2.5 percent (a long-term average growth rate). Based on this framework incorporating both capital markets (as measured by the National Financial Conditions Index) and banking conditions, downside risk has increased since the Federal Reserve tightening cycle started in March 2022: The slowdown in quarterly credit growth of about 100 basis points by the end of 2022 has increased downside risk, more than offsetting the net easing in financial conditions (Figure 1.1.1, panel 1).

To understand whether current downside risks are consistent with those of past hard- and soft-landing episodes, the tail of the growth forecast distribution is compared with average levels that prevailed over the 1980–81 tightening cycle, which is viewed as a hard

Figure 1.1.1. Growth-at-Risk Simulations



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Federal Reserve Economic Data; US Bureau of Economic Analysis; and IMF staff calculations.
Note: The conditional density forecasting model for real GDP growth used here is a function of the current level of financial conditions, current quarter growth, and current quarter credit growth. The latter corresponds to total credit to the private nonfinancial sector, as a percent of GDP (adjusted for breaks), sourced from the Bank of International Settlements. Financial conditions are measured by the Federal Reserve Bank of Chicago's National Financial Conditions Index. The current level of downside risks is estimated holding credit growth as of the fourth quarter of 2022. The forecast horizon for growth is one year ahead. Prob = probability.

This box was prepared by Harrison Kraus and Sheheryar Malik.

Box 1.1 *(continued)*

landing (Blinder 2023). More specifically, from July 1980 to January 1981, the federal funds rate rose by 1,000 basis points, resulting in a real GDP growth decline of –2.1 percent, peak to trough, by August 1981. Had the forecasting framework been applied to that episode, the probability of growth falling below 0 percent, 1 percent, and 2.5 percent would be about 45 percent, 60 percent, and 75 percent, respectively (the yellow dots in Figure 1.1.1, panel 1). At present, the probability of growth falling below 2.5 percent is slightly less than during the 1980 cycle (the sum of the green solid and shaded bars in Figure 1.1.1, panel 1). But the probability of growth falling below 0 percent—a harbinger for a hard landing—is significantly lower at present than during the 1980 cycle.

Next, several downside risk scenarios—permutations of severe but plausible tightening of financial conditions and slowdowns in credit growth—are examined (Figure 1.1.1, panel 2):

- Scenario 1: Credit growth contracts by one-third of the magnitude of trough decline seen during the global financial crisis; financial conditions are unchanged from current levels.
- Scenario 2: Credit growth is held at the end of 2022 level; financial conditions tighten by one-third of the magnitude of peak tightening during the global financial crisis.
- Scenario 3: Credit growth contracts as in Scenario 1; financial conditions tighten as in Scenario 2.
- Scenario 4: Credit growth contracts to half of the magnitude of trough decline during the global financial crisis; financial conditions tighten by half of the magnitude of peak tightening during the global financial crisis.

In Scenarios 1 and 2, levels of credit growth and financial conditions are "shocked" separately. The probability of growth falling below 2.5 percent is more sensitive to a credit contraction than a tightening in financial conditions. Further into the left tail of growth—where growth falls below 0 or 1 percent—a tightening in financial conditions appears to bite more. Scenario 3 (which combines Scenarios 1 and 2) reveals that a tightening in financial conditions in conjunction with credit contraction increases downside risks to levels comparable with but not as big as those during the 1980 cycle. Scenario 4 best matches the 1980s cycle, showing that at present, and holding all other factors steady, both credit growth and financial conditions would need to worsen to levels half as bad as those during the height of the global financial crisis to generate almost-equivalent downside risk estimates.

Box 1.2. Refinancing Risks in Commercial Real Estate

The commercial real estate (CRE) sector has come under intense pressure as interest rates rise and transaction volumes and property valuations decline significantly across regions. Given the large size of the sector and its interconnectedness with the broader financial system—including both banks and nonbank financial intermediaries—and the real economy, further stress in the sector could have significant macrofinancial stability implications (see Chapter 2 of the April 2023 *Global Financial Stability Report*). This box takes stock of financing conditions in the CRE sector and the risks looming in a high-interest-rate environment.

As a share of GDP, CRE-related debt equals nearly 12 percent in Europe and 18 percent in the United States (Figure 1.2.1, panel 1). Banks are the primary lenders to the CRE sector, but nonbank financial intermediaries have become increasingly important in some jurisdictions (for example, Luxembourg and the United States). Whereas banks are exposed to the sector mainly through credit risk on CRE loans and changes in the value of CRE collateral, many nonbanks are exposed directly to CRE price changes through their investments. Institutional investors, particularly closed- and open-ended investment funds, hold more than 40 percent of CRE equity investments in the United States, amounting to about 30 percent of GDP.

Amid a rise in interest rates, borrowing costs on CRE mortgages and commercial mortgage-backed securities markets have increased sharply since early 2022 and are expected to remain elevated in the future (Figure 1.2.1, panel 2). Lending standards have also tightened, particularly since the March banking turmoil, as smaller and regional banks with significant exposures to CRE have come under increased scrutiny and have been wary of lending too much to the sector. Whereas banks have pulled back from lending, private equity fundraising has slowed sharply and funding conditions in commercial mortgage-backed securities markets (a type of fixed-income investment product backed by mortgages on CRE) have deteriorated (Figure 1.2.1, panel 3). Alternative investors—such as real estate debt funds and insurers—that have grown in importance over the years could fill the gap and remain a source of capital,[1] but they may also become expensive and more selective in new loan acquisitions in a high-interest-rate environment.[2]

The tighter financial conditions in the CRE market pose challenges at a time when high volumes of refinancing are coming due (Figure 1.2.1, panel 4).[3] In the United States, for example, hotels have the largest share of their loans maturing in 2023 (34 percent), followed by offices (25 percent). Among sources of maturing debt, about 25 percent of loans held by investor-driven lenders, banks, and commercial mortgage-backed securities will mature in 2023. Market participants have expressed concerns about the risk of a widening funding gap—that is, a lack of new debt available to meet existing loan requirements (Figure 1.2.1, panel 4).[4]

Banks thus face heightened asset quality risks. European banks are already seeing an increase in bad loans from borrowers with aging and unfavorably located office buildings. In the first quarter of 2023, CRE accounted for as much as 30 percent of nonperforming loans in Europe.[5] Smaller and regional US banks (that is, those not among the top 25 by domestic assets) are more vulnerable to deteriorating CRE fundamentals than large banks, holding 4.8 times

This box was prepared by Andrea Deghi.

[1]Investors could fill the gap left by banks in different ways. They may buy loan portfolios directly from banks or lend to companies previously financed by banks. Small-bank CRE lending may be more difficult to replace as terms of these deals may not meet the credit standards of a larger lender.

[2]Real estate debt funds face at least two specific headwinds. First, because they employ some form of leverage, they may face liquidity pressures as the value of CRE collateral declines. Second, poor liquidity in the sector may hamper price discovery and complicate the pricing of these structures. Leverage of real estate funds increases their interconnectedness with the rest of the financial system, providing an indirect contagion channel.

[3]In general, the CRE sector is highly sensitive to financial conditions, particularly the retail, residential, and industrial segments (Deghi, Natalucci, and Qureshi 2022).

[4]To measure the debt funding gap for each origination year and sector, the fraction of loans due within five years ("maturing debt") is identified, which is then divided by the average loan-to-value ratio in the origination year to calculate the total value of CRE properties with upcoming debt expirations. The value is then adjusted to reflect an expected price correction. Based on this new value and agencies' forecasted loan-to-value ratio, the debt funding gap is then calculated against the original loan amount.

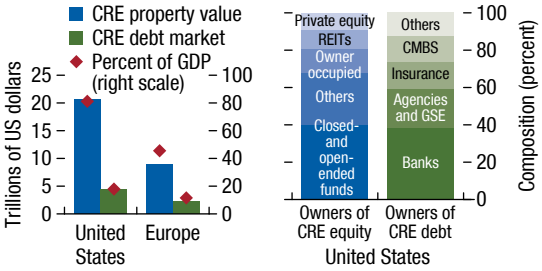
[5]Small and medium enterprises are particularly vulnerable due to their lower profitability in a high-inflation environment and greater dependence on smaller banks for credit. That said, the European banking sector (in aggregate) remains resilient due to increased profitability and sizable capital and liquidity buffers.

Box 1.2 *(continued)*

Figure 1.2.1. CRE Developments and Vulnerabilities

CRE exposures constitute a significant share of GDP and of banks' and other financial institutions' balance sheets.

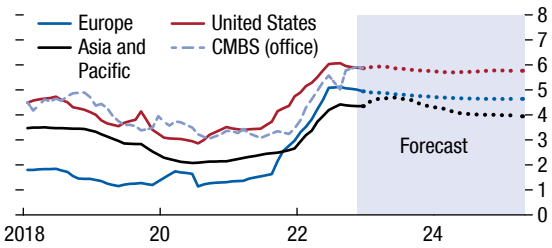
1. Estimated Size of the CRE Market and Composition of CRE Investors



Borrowing costs have increased and are expected to remain elevated, especially in the office sector.

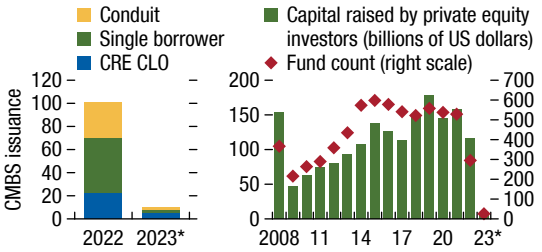
2. Senior Debt Costs for Office Assets and Note Rate at Securitization for Office CMBS Loans

(Percent)



The turmoil facing banks and CMBS has prompted some lenders to step back, leaving space for investors, but hurdles to CRE funding remain.

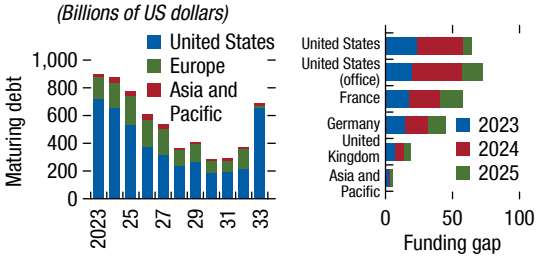
3. CMBS Issuance and Private Equity Real Estate Fundraising



A large volume of refinancing is coming due, which could drive further repricing in vulnerable markets and sectors affected by structural trends.

4. Estimated Maturing CRE Debt and Debt Funding Gap

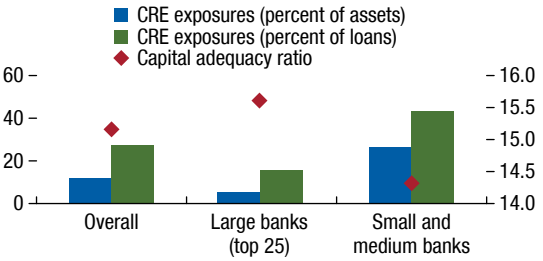
(Billions of US dollars)



In aggregate, the banking sector should be able to absorb CRE losses, but larger shocks could impact smaller and regional banks ...

5. US Banks' CRE Exposures and Capital Adequacy

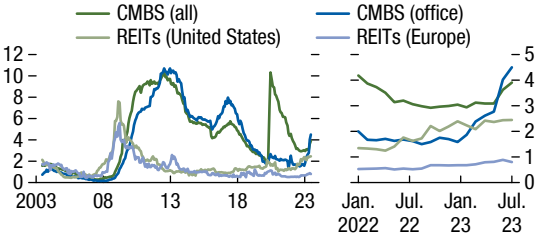
(Percent, as of 2023:Q2, left scale; ratio, right scale)



... and put pressure on REITs and CMBS, as declining demand dampens rental growth and occupancy rates while borrowing costs escalate.

6. One-Year-Ahead Expected Default Frequency of REITs and CMBS Default Rates

(Percent)



Sources: AEW Capital Management; Australian Prudential Regulation Authority; Bloomberg Finance L.P.; CBRE Group; European Public Real Estate Association; Federal Reserve; Institut de l'Epargne Immobilière et Foncière; Mortgage Bankers Association; Moody's; MSCI Real Estate; Nareit; Preqin; S&P Global; and IMF staff calculations.

Note: In panel 1, CRE debt estimates are based on the historical debt stock and the investable universe of real estate stock. Total CRE values are based on Australian Prudential Regulation Authority top-down approach for Europe and Nareit estimates for the United States. In panel 2, note rate at securitization for CMBS loans is weighted average coupon of new-issue office-backed conduit CMBS. In panel 3, the bars for 2023 with asterisks refer to the first quarter of 2023. In panel 4, the volume of estimated maturing CRE debt covers Australia, France, Germany, the United Kingdom, and the United States. The bar for 2033 refers to loan maturities from 2033 onward. In panel 5, the sample comprises US domestically chartered commercial banks. "Large banks" refers to the top 25 banks, ranked by domestic assets. "Small and medium banks" are defined as all domestically chartered commercial banks not included in the top 25. Total loans refer to "loans and leases in bank credit" as defined in the Federal Reserve H.8 data release. In panel 6, the expected default frequency measures the probability that a company will default on payments within one year by failing to honor the interest and principal payments. CLO = collateralized loan obligation; CMBS = commercial mortgage-backed security; CRE = commercial real estate; GSE = government-sponsored enterprise; REIT = real estate investment trust.

Box 1.2 *(continued)*

more exposure to US CRE loans than their peers (Figure 1.2.1, panel 5).[6]

A further retrenchment of banks from CRE lending could hamper the ability of real estate investment trust funds, which generally rely on bank lending such as revolving credit facilities and unsecured-term loans for liquidity and other funding needs, to support the sector at a time when credit quality is deteriorating. One year ahead, expected default frequency of real estate investment trust funds has increased significantly, reaching 2.5 percent in the second quarter of 2023 compared with 70 basis points in 2021 (Figure 1.2.1, panel 6). Delinquencies in commercial mortgage-backed securities for the office market have also doubled since 2021 to 4.5 percent in July 2023.

In sum, the CRE sector faces a challenging outlook, with the higher-for-longer interest rate environment and notable refinancing risks adding to structurally lower demand as consumer and worker behavior have shifted since the pandemic. The effect of tighter financial conditions is likely to vary across CRE segments, with office and retail being the most vulnerable.[7] Strains in the CRE sector could pose challenges for smaller and regional banks and nonbank financial intermediaries that have high exposure to the sector. Continued vigilance is warranted on the part of supervisors to monitor vulnerabilities in the CRE sector to minimize potential financial stability risks. Macroprudential policy must also be expanded to cover nonbank financial institutions, which are increasingly important players in CRE funding markets.

[6]A simple sensitivity analysis for the United States shows that a CRE loss rate of 10 percent could result in a loss of 12 percent of bank industry capital. This should be manageable for the largest banks, thanks to more conservative lending standards (since 2008) and stronger capital positions, but could be challenging for smaller banks with large CRE exposures.

[7]The effect may vary within the office sector, depending on property factors (such as age and property condition), geographic location, and loan terms.

Box 1.3. Private Equity and Life Insurers

Private equity firms have increased their footprint in the life insurance sector, a sector seen as increasingly important to their strategic growth (Figure 1.3.1, panel 1). Insurance companies can provide private equity firms with a stable supply of premiums that can be invested in private credit, structured credit, real estate, and infrastructure funds arranged and controlled by the private equity firms themselves.

Private equity–influenced life insurers appear to have significantly more exposure to less liquid investments than other insurers (Figure 1.3.1, panel 2). These exposures include structured-credit assets such as collateralized loan obligations, mortgage loans, and private commercial and residential mortgage-backed securities. These investments increase valuation uncertainty, credit risk, and liquidity risk through mismatches between assets and liabilities for life insurers (see the "Higher Rates Benefit Some NBFIs but Could Exacerbate Structural Vulnerabilities" section in this chapter). Risks are further aggravated by the embedded leverage in structured-credit investments.

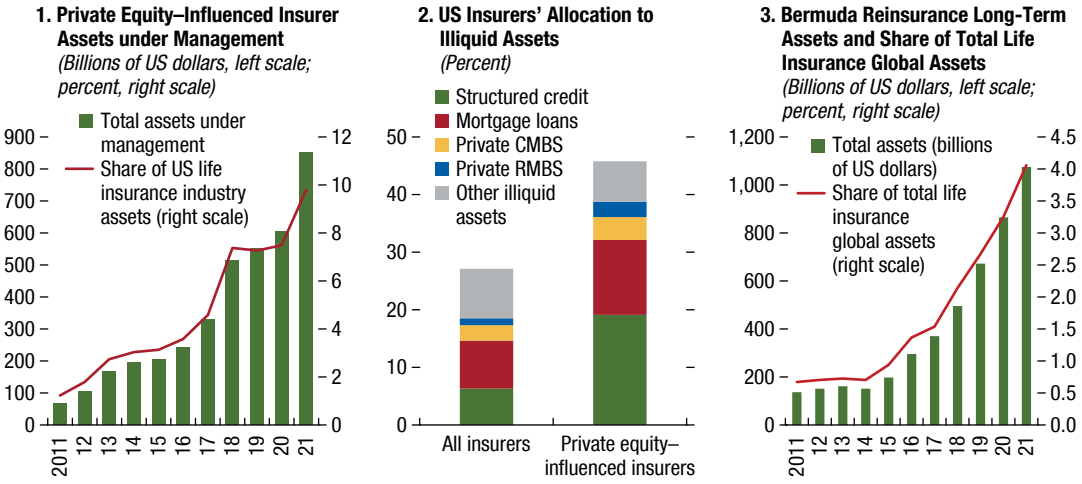
Some private equity firms have recently established offshore reinsurers, taking advantage of regulatory arbitrage at the cost of reduced transparency compared with onshore life insurers. Private equity firms have used their offshore reinsurers to reinsure life insurance and annuity businesses from their own life insurers and from third-party life insurers, as well as to take over life and annuity companies using their offshore reinsurers as holding companies. This arrangement allows private equity firms to issue insurance products, reinsure them, and manage the premiums while limiting the ability of regulators to monitor them. Private equity–influenced reinsurers have contributed to the strong growth in offshore Bermuda-domiciled life reinsurance assets, which exceed over $1 trillion, about 4 percent of total life insurance assets globally (Figure 1.3.1, panel 3).

Figure 1.3.1. Vulnerabilities of Private Equity–Influenced Life Insurers

The assets of private equity–influenced insurers have grown significantly.

Private equity–influenced insurers own a significantly larger share of illiquid assets compared with other insurers.

Bermuda-domiciled life reinsurance assets have grown significantly in recent years.



Sources: A.M. Best Company Inc; Bermuda Monetary Authority; Financial Stability Board; National Association of Insurance Commissioners; and IMF staff calculations.
Note: Panel 1 is only for US insurers, for which data are available. Panel 2 is as of December 2021. CMBS = commercial mortgage-backed securities; RMBS = residential mortgage-backed securities.

This box summarizes some of the analysis and policy recommendations in Cortes, Diaby, and Windsor (forthcoming).

Box 1.3 *(continued)*

Insurance supervisors are identifying issues of concern and working on a supervisory response. The National Association of Insurance Commissioners in the United States has expressed concerns about lack of transparency and additional risks inherent in the relationships between insurance firms and private equity firms. Their concerns include related party investments, structured securities, and other complex assets that have been gaining a share of insurers' portfolios. US supervisors' concerns began with the activities of insurers influenced by private equity firms, but they have changed focus to activities undertaken by private equity–influenced life insurers and replicated by other life insurers through herding behavior.

Dealing with these risks requires a comprehensive approach. Data quality and availability is a key constraint and requires immediate attention. Opportunities for capital arbitrage should be addressed through the broad adoption of a globally consistent consolidated capital standard for the insurance sector. Valuation of uncertainty and liquidity risk requires improving supervisory monitoring, intrusive supervisory review of insurers' valuation processes, and liquidity stress testing. Supervisors should work closely with other authorities in charge of systemic risk to analyze the possible contagion to other parts of the financial system and the real economy.

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CHAPTER 2

A NEW LOOK AT GLOBAL BANKING VULNERABILITIES

Chapter 2 at a Glance

- We provide a fresh assessment of global banking vulnerabilities, emphasizing potential risks in the environment of still-elevated inflation and high interest rates. The assessment, based on publicly available data and uniform methods across regions, is meant to complement similar exercises conducted by authorities using detailed supervisory data.
- The analysis uses publicly available information and comprises (1) a global stress test that is enhanced to draw lessons from the March 2023 banking turmoil and (2) key risk indicators incorporating extensive market data and analyst forecasts for use in real-time surveillance of emerging banking vulnerabilities.
- The global stress test shows that the global banking system remains broadly resilient under the October 2023 *World Economic Outlook* baseline scenario. However, it uncovers many banks in advanced economies with the potential for significant capital losses, driven by marking to market securities and provisioning for loan losses.
- These results are consistent with the key risk indicators that currently flag banks in Europe and the United States as having the greatest levels of stress as of the end of March 2023.
- In an adverse scenario characterized by a severe stagflation, the global stress test identifies significant capital losses in a wide set of banks, including several systemically important institutions in China, Europe, and the United States.
- As of the end of December, the key risk indicators based on consensus analyst forecasts point to a substantial group of smaller banks at risk in the United States. Elsewhere, risks are concentrated in Asia, China, and Europe, where lower expected earnings and depressed price-to-book ratios point to future stress.

Policy Recommendations

- The chapter argues for sharpening analytical tools for risk assessments; closely monitoring relevant market metrics; and making stress tests more stringent and granular, including for smaller banks.
- It is also key to make supervisory practices more intrusive and to implement corrective actions in a more timely and effective manner.
- Furthermore, prudential standards for capital held against interest rate risk should be tightened.
- Banks should prepare to access central bank facilities, thereby substantially mitigating potential capital losses from selling held-to-maturity securities under stress.

Introduction

With inflation still high in many parts of the world, central banks may need to keep interest rates higher for longer than currently priced in markets, slowing economic momentum. Given the nature of their business models, banks are most immediately and directly affected by an environment of high interest rates. Higher interest rates can improve interest margins of some banks, especially those that can pass higher policy rates through to lending rates while keeping deposit funding costs low and retaining customers thanks to the value of their deposit franchises. However, extended periods of high rates can also be associated with more loan losses at banks as their corporate and household borrowers face heavier debt-servicing burdens and a less favorable economic backdrop. In addition, valuation losses on bonds due to high interest rates—especially those incurred if banks need to sell assets held at book value to meet

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liquidity needs—and increased competition to retain cheaper deposits and other core funding sources can be detrimental to bank profitability and viability.

The net impact on banks of a "higher for longer" interest rate environment is therefore uncertain. After more than two years of the current global cycle of rate increases, most banks continue to report solid earnings, strong capital, ample liquidity, and adequate provisions for loan losses. As detailed in Chapter 1 of this *Global Financial Stability Report*, deposit outflows from regional banks in the United States have stabilized since the March turmoil, and stock prices have somewhat recovered. Globally, banks have managed the situation relatively well. However, lending conditions are tightening, and loan demand is falling as both provision expenses and funding costs are rising, putting pressure on future profitability. These developments could adversely impact the financial condition of banks if a soft landing fails to materialize amid high inflation that requires central banks to hike policy rates or keep rates at high levels for longer.

The failure of a few large regional banks in the United States and the takeover of a global systemically important bank (G-SIB) with the support of the authorities in Switzerland in March of 2023 are a reminder of how fast-paced global increases in interest rates can affect the global banking system. The banking turmoil in March prompted authorities and market participants to investigate the changing nature of the stability of bank funding, notably deposits, and its sensitivity to rising rates; the interrelationships between bank funding and bank solvency; the efficacy of banking supervision and regulation; the importance of access to, and operational readiness for, central bank facilities; and the role of investors in amplifying stress in an era of high-speed technological change. Investors have focused on banks that have low market-to-book ratios, poor profitability, and concentrated lending business models. These recent failures demonstrated how a group of weak banks, even if not individually systemic, can pose financial stability risks. A systematic effort is needed—beyond assessing the health of the systemically important part of the global financial system, which is the usual focus of the *Global Financial Stability Report*—to identify at the global level a weak group of banks at risk of becoming more fragile in the present environment.

This chapter presents the IMF's assessment of banks vulnerable in the present environment. The assessment is meant as a multilateral surveillance tool using less granular publicly available data and common methods across countries. It is complementary to more granular stress tests conducted by bank supervisors and in IMF-World Bank Financial Sector Assessment Programs (FSAPs). First, it conducts an enhanced version of the IMF's global stress test to identify banks with potential fragility if the current high inflation–high interest rate environment worsens. The enhancements draw from lessons learned during the March 2023 banking turmoil and include refined assessments of various interest rate channels and interactions between liquidity and solvency, with and without access to central bank facilities. The chapter also expands the bank sample greatly, compared to the previous exercises, to nearly 900 banks across the world. It assesses bank resilience under both a baseline scenario of protracted higher interest rates and a severe but plausible adverse scenario in which the global economy enters a stagflationary period of heightened risks to banks. The exercise aims to provide timely first-cut surveillance results using publicly available worldwide data. It could differ from and should complement the analyses by national authorities and the FSAP using more detailed information and incorporating country specifics more comprehensively.

Although the global stress test offers an in-depth assessment of capital adequacy using detailed bank-level characteristics, delays in the release of balance sheet data inherently limit the timeliness of such an approach. This chapter also presents a second, complementary approach to produce a real-time monitor of forward-looking risks by incorporating short-term consensus analyst forecasts on future bank balance sheet, valuation, and profitability metrics for approximately 350 of the world's largest publicly traded individual banks. These metrics, or key risk indicators (KRIs), have been selected for their ability to predict financial stress of individual banks and acute stress events, such as large declines in stock prices or deposit outflows. Banks are flagged if they have outlier characteristics across multiple risk dimensions and hence at elevated risk of severe stress. As such outcomes are rare, the KRIs are not designed to predict bank failures with a high degree of certainty. Instead, they provide an important tool for tracking the overall level of stress in the global banking system over time, and for identifying banks meriting closer examination for signs of weakness. Given their reliance on high-level data, the KRIs should be viewed as a complement to, and not a substitute for, stress testing or other detailed risk analysis of individual banks. Even as early as the fourth quarter

of 2022, multiple KRIs flagged the three US regional banks and the Swiss G-SIB that failed during the March 2023 banking sector turmoil, demonstrating the forward-looking nature of the approach.

Although the methodologies of the two approaches are distinct, their results are similar. Banks that are flagged as outliers on multiple KRIs are more likely to experience large capital losses under the global stress test's adverse scenario. In addition, the two assessments point to similar risks at the current juncture. Under the baseline scenario, the global stress test results show that the global banking system remains broadly resilient, but many banks in advanced economies show significant capital losses, largely driven by mark-to-market losses on securities holdings in a higher-for-longer interest rate environment, as well as loan losses. In the United States, these losses are concentrated in regional banks, confirming the events of March 2023. This finding is consistent with the KRIs, which currently show the greatest levels of stress in the United States and Europe, in keeping with recent events and the subsequent downgrade of profitability forecasts and bank equity prices. Projections of KRIs to the end of December 2023 using analyst forecasts show that some small and regional US banks will remain under pressure, and risks are concentrated in banks in Asia, China, and Europe, as lower-than-expected earnings and depressed price-to-book ratios signal. In the adverse scenario, the global stress test shows that significant capital losses could spread to a much wider set of banks, including several systemically important ones in China, Europe, and the United States.

In addition to examining the global banking system, the chapter also assesses recent changes in depositor behavior, as well as evidence that investors tend to rapidly sour on banks with low price-to-book ratios and low profitability despite what appears to be adequate regulatory capital and liquidity. In other words, investors appear to weigh a forward-looking, economic view of bank viability more heavily than a static, balance sheet view.[1]

The chapter also outlines several policy recommendations, drawing on results from the global stress test and KRI analysis as well as insights from the IMF's in-depth analyses of banking systems conducted during recent assessments under the IMF's Financial Sector Assessment Program.

[1]Previous issues of the *Global Financial Stability Report* (see, for example, April 2010 and 2011, Chapter 1) noted that market pricing was a strong predictor of bank stress during the global financial crisis and used market valuation-based analyses to construct risk indicators and predict banking stress.

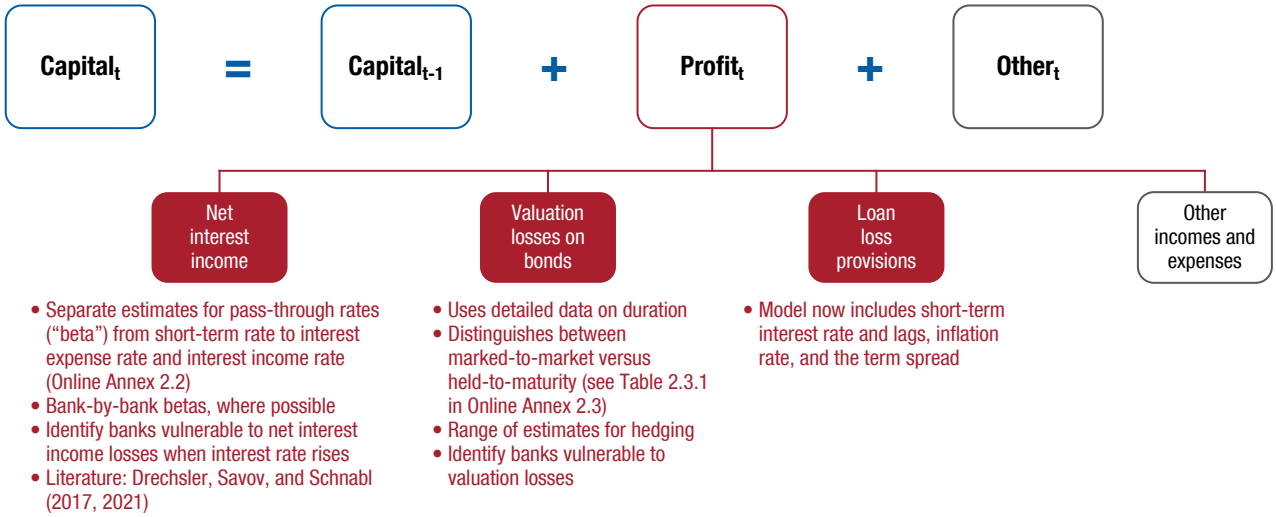
Using the Enhanced Global Stress to Identify Weak Banks

Stress testing is a forward-looking simulation tool often used to identify vulnerable banks under various macrofinancial scenarios. In the version used in this chapter, it projects banks' income and capital through the medium term, in both a baseline and an adverse scenario, using each bank's balance sheet and profit and loss data at the stress test's starting point. It also uses statistical methods to model banks' behaviors through the macrofinancial cycle over the test's projection horizon. Macrofinancial stress testing has been one of the central risk assessment approaches in the Financial Sector Assessment Program since its inception in 1999. Many countries have also adopted stress testing as a key supervisory tool. Past issues of the *Global Financial Stability Report* and other research have presented results from the global stress test (for example, Ding and others 2022; October 2022 *Global Financial Stability Report,* Chapter 1). Covering 260 banks globally using publicly available data, the previous global stress test showed that no banking system would breach the Basel minimum capital level—Common Equity Tier 1 (CET1) capital ratio of 4.5 percent—although almost 30 percent of emerging market economy banks would do so. Following sharp increases in policy rates, 2022 provides a new starting point of the stress tests with an opportunity to include additional insights on interest rate channels.

In view of the recent bank turmoil and the current high-for-long interest environment, this chapter modifies the global stress test in several ways to identify potentially weak banks. First, it expands the sample to nearly 900 banks across 29 countries (Online Annex 2.1). Second, it modifies the methods to project the main sources of banks' net income—net interest income, fees and commissions, valuation gains or losses on fixed-income securities, and loan loss provisions—to bring out the effect of higher-for-longer interest rates on bank capital (Figure 2.1; Online Annexes 2.2 and 2.3). Third, in a bank run in which banks lose a certain share of deposits, it adds a new liquidity-to-solvency channel to the adverse macrofinancial scenario to assess the additional effect of such a run on capital (see the

Figure 2.1. Enhancement to Global Stress Test: Interest Rate Channels

Solvency channel: Direct effect of macrofinancial scenarios on banks' net income, which has an effect on retained earnings and hence, capital. The enhanced global stress test has new "satellite models": a series of econometric models that link macro scenarios to banks' income sources, including net interest income, valuation losses on bonds, and loan loss provisions. The models sum the impacts from each of these channels for the overall effect on regulatory capital. The changes to the global stress test are shown in red (see Online Annexes 2.1 through 2.3):



Liquidity-to-solvency channel: Additional capital impact for all banks, conditional on a rate of withdrawal ("run") of liabilities including deposit and margin calls, over and above the macrofinancial adverse scenario. This is based on a simulation conditional on a deposit run of 25 percent at the end of 2023 (see the "Vulnerabilities to Interactions between Liquidity and Solvency" section); banks would need to pledge securities held to maturity with the central bank at penalty rates of 150 basis points above the adverse-scenario short-term rates, under the assumption that central bank facilities are available (see Online Annex 2.4). The penalty rate usually ranges from 100 to 300 basis points above policy rates and could sometimes be zero in certain systemic stress scenarios.

Source: IMF staff compilation.

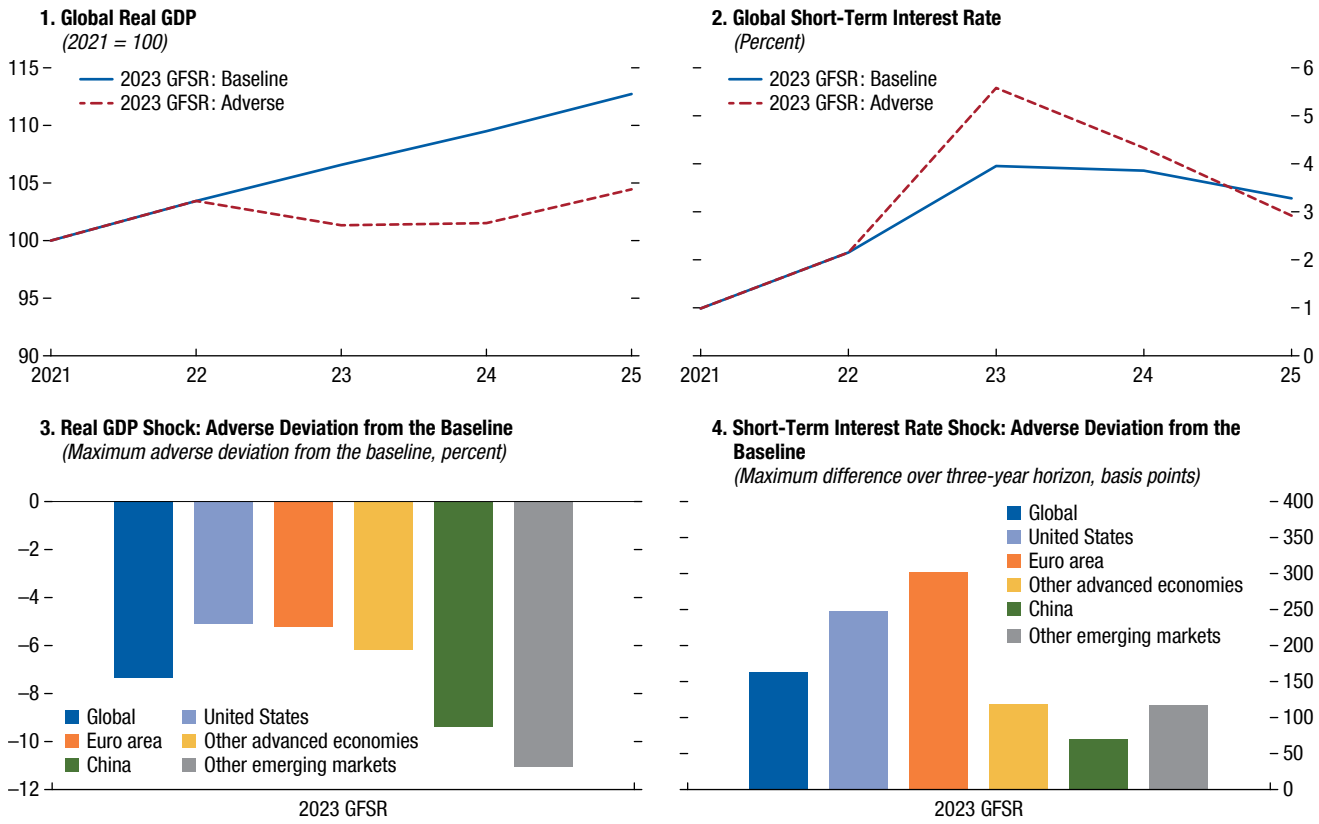
discussion later in the chapter, as well as Figure 2.1 and Online Annex 2.4).[2]

Furthermore, the analysis also identifies potentially weak banks conservatively using a change in the capital ratio in addition to a capital ratio threshold. A bank is "weak" if either (1) its CET1 ratio falls below 7 percent—the Basel minimum of 4.5 percent plus a capital conservation buffer of 2.5 percent—plus buffers for G-SIBs where applicable, or (2) its CET1 ratio at its lowest point over the stress test horizon (2023–25) represents a decrease of more than 5 percentage points from the stress test's starting point of 2022, excluding banks that are highly capitalized (with more than a 30 percent CET1 ratio). This way, banks are identified to be weak because they either breach the minimum threshold or are cyclically very sensitive to the scenarios.

The liquidity-to-solvency channel is built on an illustrative "reverse stress test" approach because it is empirically hard to relate deposit runs to bank balance sheets or pin down depositor behavior. Moreover, such behavior could differ depending on characteristics such as retail versus institutional deposits, demand versus term deposits, and deposit insurance coverage, but our data do not offer such details. The reverse stress tests apply several hypothetical deposit run-off rates to all deposit for identifying breaking points without discussing how likely they are. The business models of commercial banks rely greatly on maturity transformation, and any bank—no matter how liquid it is—would fail if it experienced a massive run (Box 2.1). The global stress test assumes that liquidity stress will affect capital differently, depending on the run rate of deposits and the presence or absence of central bank facilities (see Online Annex 2.7). Some previous solvency stress tests have incorporated the effect of liquidity on funding costs, as in assessments under the Financial Sector Assessment Program (Schmitz, Sigmund, and Valderrama 2017;

[2]Apart from a smaller sample of banks, the previous version of the global stress test excluded the Chinese banking system and had 2021 as the starting point. Moreover, the baseline scenario had a smaller interest rate rise and higher GDP growth, and the adverse stagflationary scenario featured smaller inflation and interest rate shocks, compared to the version presented in this chapter. The global stress test using publicly available data and common methods is meant to serve as a multilateral surveillance tool, complementary to supervisory or FSAP stress tests that use more granular bank-by-bank data.

Figure 2.2. Macrofinancial Scenarios



Sources: IMF, *World Economic Outlook*; Vitek 2018; and IMF staff calculations.
Note: Panels 3 and 4 show the maximum difference between adverse and baseline over the three-year stress-testing horizon. GFSR = *Global Financial Stability Report*.

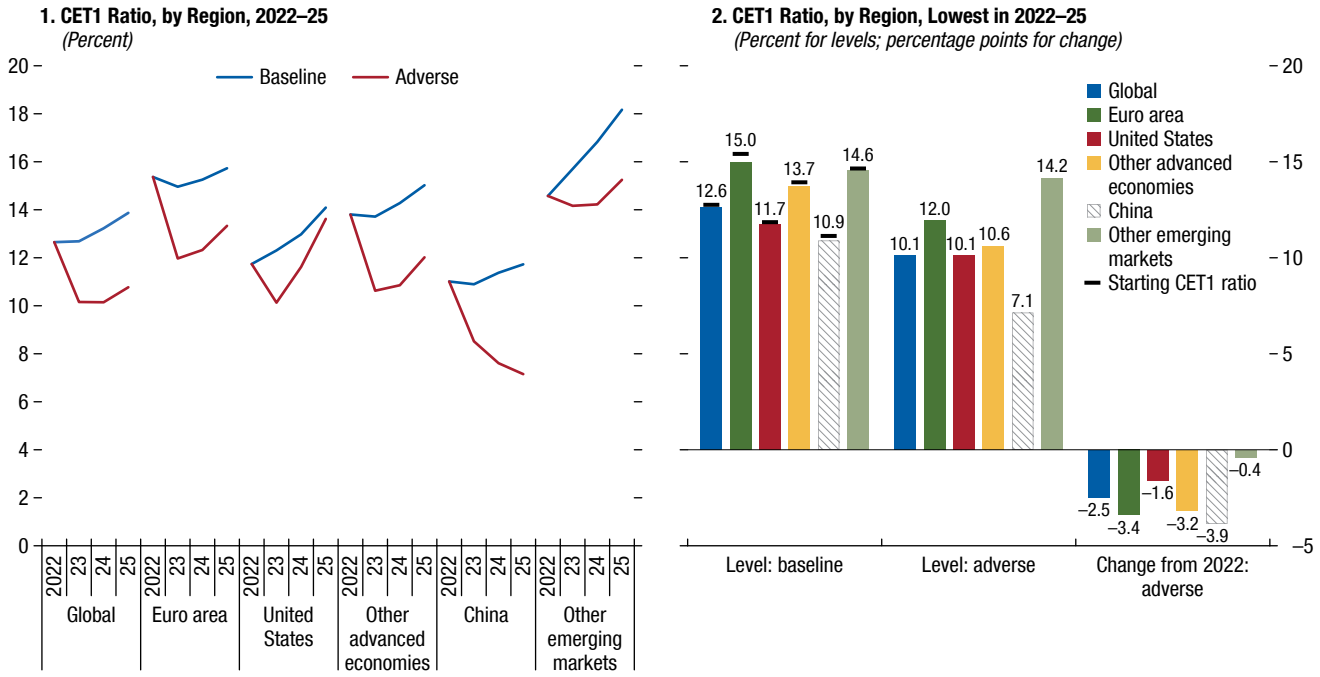
Adrian, Morsink, and Schumacher 2020) and in previous issues of the *Global Financial Stability Report* (such as Chapter 3 of the October 2013 issue), but rarely do they include an effect on capital through bank runs (exceptions are Wong and Hui 2009 and Cont, Kotlicki, and Valderrama 2020, and outside of stress tests, Copestake, Kirti, and Liu, forthcoming).

Macrofinancial Scenarios

The baseline macrofinancial scenario used in the chapter features continued gradual global growth in the baseline, following the October 2023 *World Economic Outlook*, and the adverse scenario incorporates severe stagflation. The baseline assumes that long-term inflation expectations are well anchored, monetary tightening continues but peaks, and term premiums fall across regions. In contrast, the adverse scenario—derived from a structural macrofinancial model for 33 countries (Vitek 2018; Online Annex 2.1)—assumes that inflation is more persistent, driven primarily by supply shocks, and generates stronger monetary tightening. Term premiums increase more in emerging market economies than in advanced economies. The global economy contracts by about 2 percent in the first year of the scenario (2023), with recessions across regions, including in China. The peak global policy rate shock, over the baseline, is about 160 basis points (Figure 2.2).

The two scenarios accommodate different regional dynamics (Online Annex 2.1). In both, inflationary dynamics are more subdued in China than in other economies. The euro area and the United States, in contrast, experience stronger monetary policy tightening compared with emerging markets in both scenarios. However, emerging markets experience steeper shocks to real GDP compared with those in advanced economies, owing to spillovers from policy tightening and recessions in the latter group (Figure 2.2). The adverse scenario for China features a very large but plausible correction in the housing market as well as supply shocks from labor productivity, markups, and oil prices, which are common across regions. Hence, the GDP growth shock for China is significantly larger than that used in other

Figure 2.3. Global Stress Test Results



Sources: Bloomberg Finance L.P.; Capital IQ; Fitch Analytics; Vitek 2018; October 2023 *World Economic Outlook*; and IMF staff estimates.
Note: CET1 = Common Equity Tier 1.

regions on a historically scaled basis, but comparable when scaled to deviations from the baseline (see Online Annex 2.1). Sensitivity analyses around the China adverse scenario are shown in Online Annex 2.1.

The adverse scenario further assumes bank runs at the end of 2023 resulting in liquidity-to-solvency interaction channels. This interaction is based on a simulation exercise added on to the effect on capital from the macrofinancial adverse stagflationary scenario. It is assumed that banks experience a run on customer deposits at the end of 2023 (the first year of the stress horizon), for which they pledge so-called held-to-maturity securities with the central bank, after selling their available-for-sale and held-for-trading portfolios. When central bank facilities are available (such as normal-time standing facilities or emergency liquidity assistance), the simulation assumes that banks can pledge securities with the central bank at a moderate penalty rate—taken as 150 basis points above policy rate, although it usually ranges between 100 and 300 basis points—for a year. Thus, banks will incur higher interest expenses, squeezing their net interest income and retained earnings, but they will not need to sell held-to-maturity securities at distressed prices and realize capital losses. Separate simulation exercises show the effect on capital when such facilities are not available (see the "Vulnerabilities to Interactions between Liquidity and Solvency" section). Ad hoc policies and fines—such as raising tax rates on rising net interest income or imposing penalties for frauds—are not considered in the scenarios.

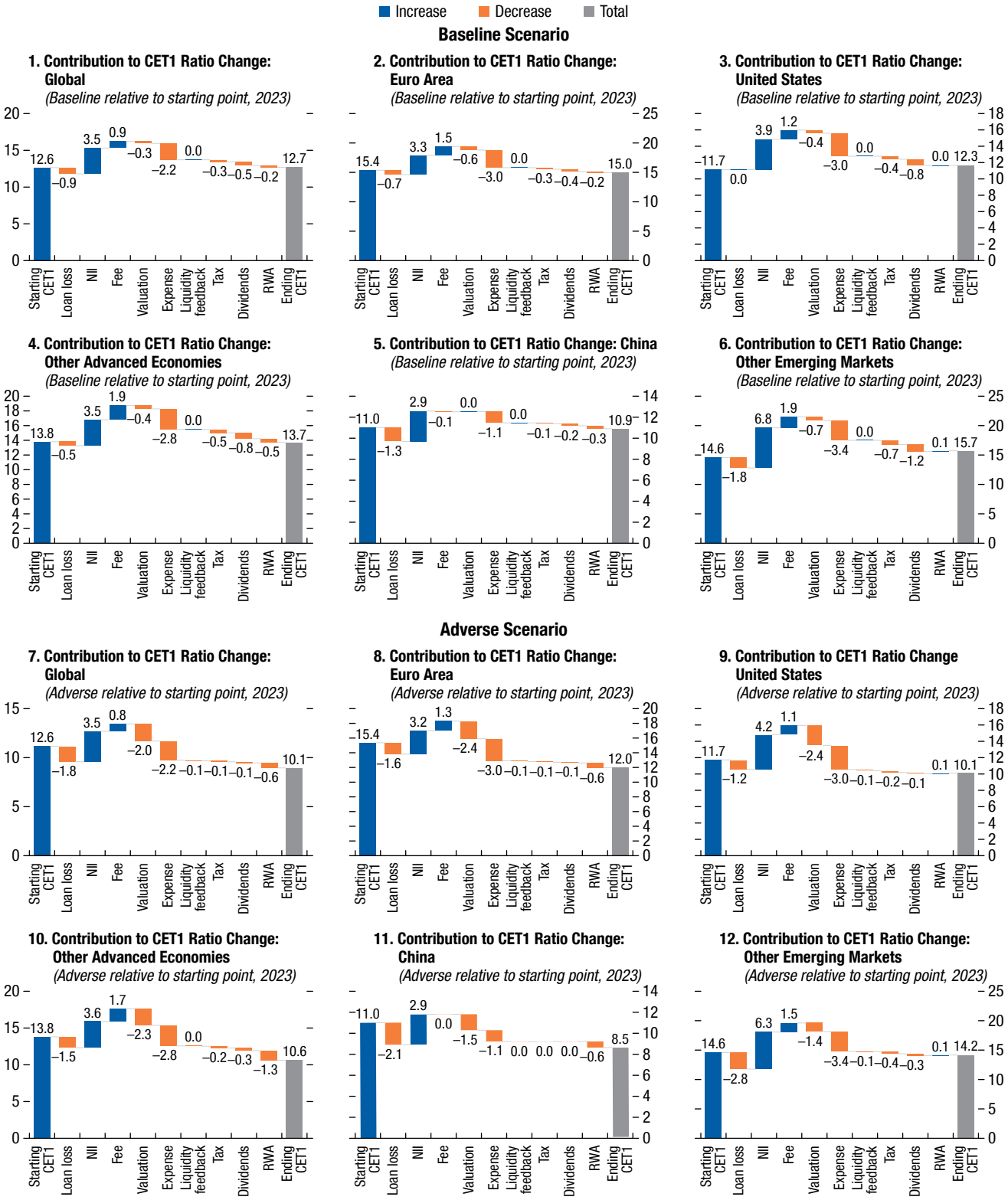
Overall Results

The global stress test results show that the global banking system remains broadly resilient in the baseline scenario. That scenario projects capital in the global banking system to remain high, at about 12.7 percent of risk-weighted assets, in 2023 when the policy rate shock peaks, and to continue to improve over the test's projection horizon (Figure 2.3). Most banks face higher loan loss provisions and valuation losses on their securities portfolios, and net interest income improves and counteracts losses in other areas. Although loan losses intensify through 2025, a reversal in valuation losses on securities and improvements in net interest income help increase capital over the stress test horizon on average.

In the adverse scenario, the capital ratio troughs in 2024 before improving to 10.8 percent in 2025, above the minimum threshold but below the starting point. Valuation losses dominate in 2023 compared with those in the baseline, contributing 1.7 percentage points to the decline in the CET1 ratio, and loan losses add nearly another percentage point (Figure 2.4). Higher loan losses

Figure 2.4. Stress Test Results: Capital Ratio in 2023 Relative to 2022

(Percentage points)



Sources: FitchSolutions, Fitch Connect; and IMF staff calculations.
Note: "Expenses" refers to operating costs, assumed to be constant over time and across scenarios as a share of risk-weighted assets. CET1 = Common Equity Tier 1; Loan loss = loan loss provisions; NII = net interest income; RWA = risk-weighted asset.

in the adverse scenario hold back improvements in net interest income from performing loans, despite higher interest margins over the baseline. The feedback from liquidity to solvency in the adverse scenario adds only 10 basis points to the capital decline overall, highlighting the relatively small cost of accessing central bank facilities during bank runs. As in the baseline, loan losses dominate in the medium term in the adverse scenario.

Regional differences in stress test results highlight the role of initial capital levels. In the adverse scenario, banks in emerging markets (other than the banking system in China, "Other emerging markets" in Figure 2.3) are particularly resilient in 2023, and over the medium term, they are helped by high initial capital ratios, robust economic growth, and sizable net interest income (Figures 2.3 and 2.4). Even in the trough year of the adverse scenario—when the capital ratio reaches the lowest point over the three years—other emerging markets see a decrease of only 40 basis points over 2022. In contrast, the banking system in China starts out with one of the lowest capital levels among the regions and ends up with the highest decline, 3.9 percentage points, and its CET1 ratio is slightly above the 7 percent minimum (Figure 2.3). Among advanced economies, the euro area experiences a relatively steep decline in capital ratio through the trough year—comparable to overall results for the European Banking Authority's (2023) stress tests for euro area banks—but ends up with a relatively high level, owing to a healthy starting point. The United States, despite a moderate level of initial capital, settles at a level similar to average global levels and average levels for other advanced economies; the modest decline over the adverse scenario for the United States is mainly due to gains on net interest income.

Reasons for the capital decline in the adverse scenario vary by region. When compared with those in the baseline scenario in 2023, valuation losses in the adverse scenario in that year dominate in advanced economies and in China, with loan losses the second-biggest contributor to the decline (Figure 2.4). Net interest income helps banking systems in the United States and in other advanced economies modestly in 2023, whereas it mildly hurts those in other regions. The adverse impact on capital in 2023 illustrates that valuation losses and loan losses would dominate any improvement in net interest income globally, even in regions in which net interest margins increase the most.

There are more weak banks in the advanced economies in the baseline, spreading to all regions in the adverse. Despite the benign outcome in the baseline, there are 55 banks with more than $5.5 trillion in assets that see their capital falling either below 7 percent or by more than 5 percentage points in 2023 (Figure 2.5). These include many banks in Europe, some G-SIBs (including Credit Suisse), and their subsidiaries, with their combined assets ranging from 5 to 10 percent of the total assets in each region (Figure 2.5). The weak banks are spread across countries and size in Europe and are concentrated in small banks in emerging markets and China. Under the adverse scenario, however, several banks in China and other emerging markets are flagged as weak, in addition to more banks in advanced economies including several G-SIBs, bringing the total number of weak banks to 215, accounting for 42 percent of global banking assets. If the criterion were limited to banks with capital falling below 7 percent, the share would still be sizeable at 36 percent of global bank assets, but the number and share of weak euro area banks would fall considerably. Sensitivity analyses around China's scenario suggests that if, for instance, the unemployment rate shock were halved in all three years, then the share of Chinese bank assets considered to be weak in the adverse scenario would fall from about 62 to 55 percent (Online Annex 2.1).

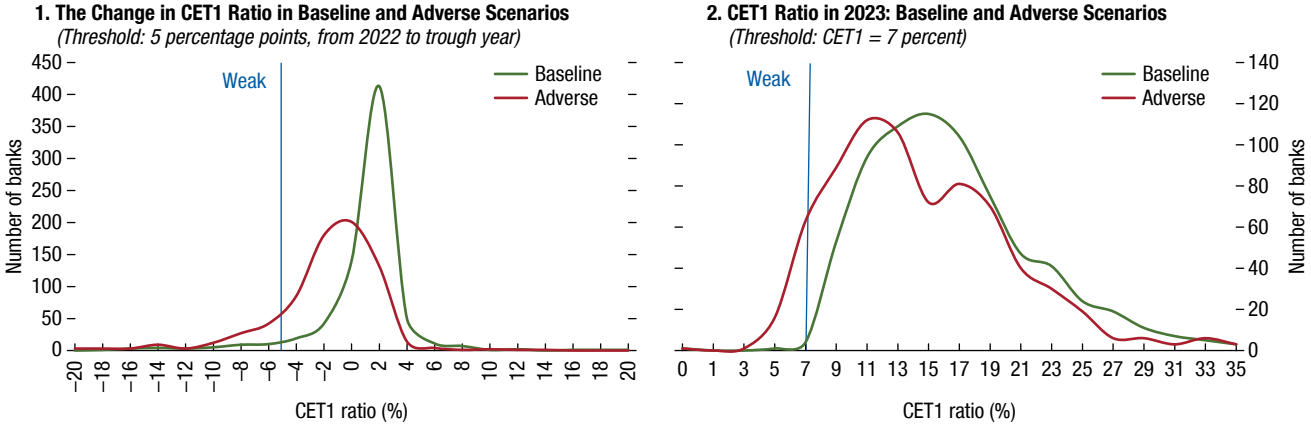
The interaction between liquidity and solvency makes a relatively small contribution to global and regional aggregates. However, in a 25 percent deposit run, the CET1 ratios of several banks in advanced economies would decline by almost one additional percentage point owing to higher expenses related to the use of central bank deposit facilities. These include at least two of the US banks that failed in March of 2023. Of course, the number of weak banks would quickly multiply if access to central bank facilities were not available in the event of deposit runs, as banks would need to sell held-to-maturity securities, taking marked-to-market losses, and deplete capital (see the "Vulnerabilities to Interactions between Liquidity and Solvency" section).

Characteristics of Weak Banks

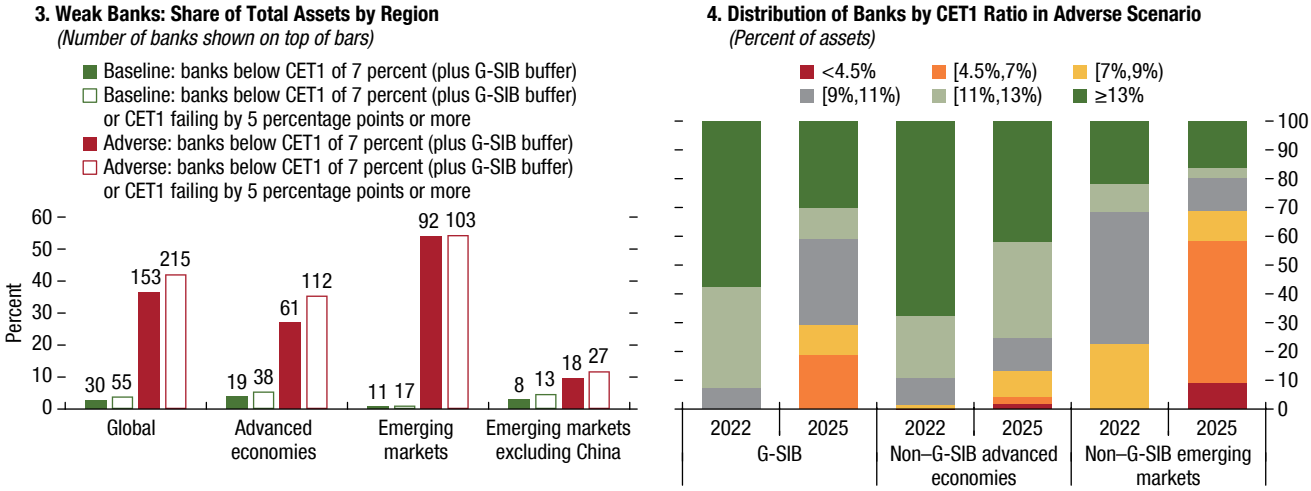
Banks that the global stress test has identified as weak share some common features. Comparison of different characteristics is presented as a spider chart (Figure 2.6), with the standardized average for weak banks (red) contrasted with those for non-weak banks (green). Larger values in the chart represent more risk. Across both the scenarios, weak banks on average are less profitable (red line for return on assets in Figure 2.6), have net interest margins that are adversely

Figure 2.5. Weak Banks, 2023

Banks that either fall below a minimum Tier 1 ratio (7 percent) or have a large (5 percentage points or greater) decline in their Tier 1 ratios are left of the vertical lines in panels 1 and 2, respectively, and are considered "weak."



Under the baseline scenario, 55 global banks representing 4 percent of global bank assets would be weak. Under the adverse scenario, 215 banks comprising 42 percent of global bank assets would be weak, mainly from advanced economies and China. A fifth of G-SIB assets would be weak by the end of the stress-testing horizon in 2025, and a considerable share of smaller banks would be weak, mainly from China.



Sources: Fitch Solutions, Fitch Connect; and IMF staff estimates.
Note: In panel 3, the number of banks are shown on top of the bars. CET1 = Common Equity Tier 1; G-SIB = global systemically important bank.

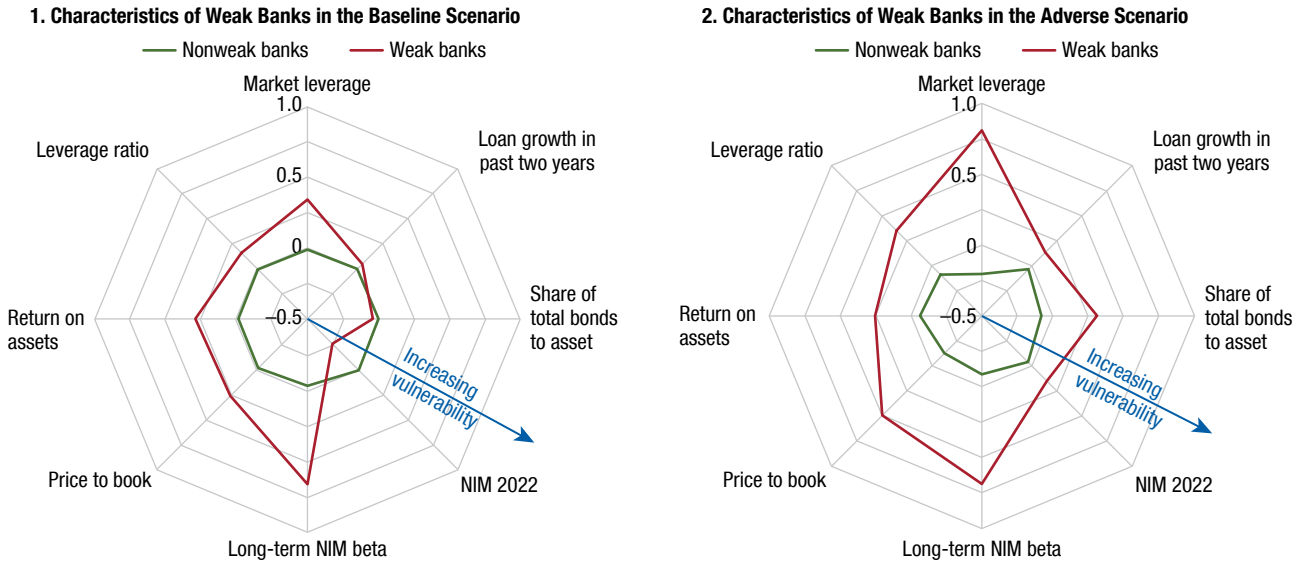
affected by higher interest rates (net interest margin [NIM] betas for weak banks are much lower than the nonweak banks), and have high loan growth in the preceding two years that enabled buildup of vulnerabilities (Figure 2.6). Moreover, they have relatively low price-to-book ratios, reflecting investor concerns about their prospects and, relatedly, very high market leverage.

In addition to the characteristics differentiating weak and non-weak banks in the baseline, there were other characteristics of banks that fare poorly in the adverse scenario. The weak banks in the latter case also had lower net interest margins in 2022, reflecting poor income generation capacity, weaker capitalization (reflected in their book leverage ratios), and a higher share of bonds in total assets. Low net interest margins and profitability together with slower pass-through of short-term rates to net interest income are major drivers for the difference between the euro area and US outcomes in the adverse scenario (see the "Vulnerabilities from Interest Margins" section and Online Annex 2.1).

In addition to those revealed by the overall results, several insights on bank-specific vulnerabilities arise from assessment of the global stress test's subcomponents of interest rate channels. These channels relate

Figure 2.6. Common Characteristics of Weak Banks across Scenarios

In the baseline scenario, weak banks had lower return on assets, high loan growth in the past, low price-to-book, low relative pass-through from policy rates to net interest income (NIM beta), and high market leverage compared to banks that are not flagged as weak. In the adverse scenario, in addition to the factors for weak banks in the baseline, low book leverage ratio and NIMs are distinguishing factors.



Sources: Bloomberg, L.P.; Fitch Solutions, Fitch Connect; and IMF staff estimates.
Note: Values in both panels are standardized; larger values along a given axis signify more risks along that characteristic. "Market leverage" refers to total assets/market capitalization; "leverage ratio" refers to Tier 1 capital/total assets; "Long-term NIM beta" refers to the differences between long-term income and expense betas (see Online Annex 2.2). The points in the figure represent the simple mean of the weak and the nonweak bank groups for each scenario, standardized by the mean and standard deviation of the whole sample. The "price-to-book ratio" and "market leverage" variables are calculated based on samples of 153 and 154 banks, respectively. "NIM beta" is based on a sample of 323 banks (see Online Annex 2.2). NIM = net interest margin.

to interest margins, bond valuations, loan losses, and liquidity-to-solvency interactions. In what follows, these components are discussed in detail. There are many other channels through which stress in one or a few banks could spread to other banks, to nonbanks and to the rest of the local or global economies, but these are not considered in the analyses.

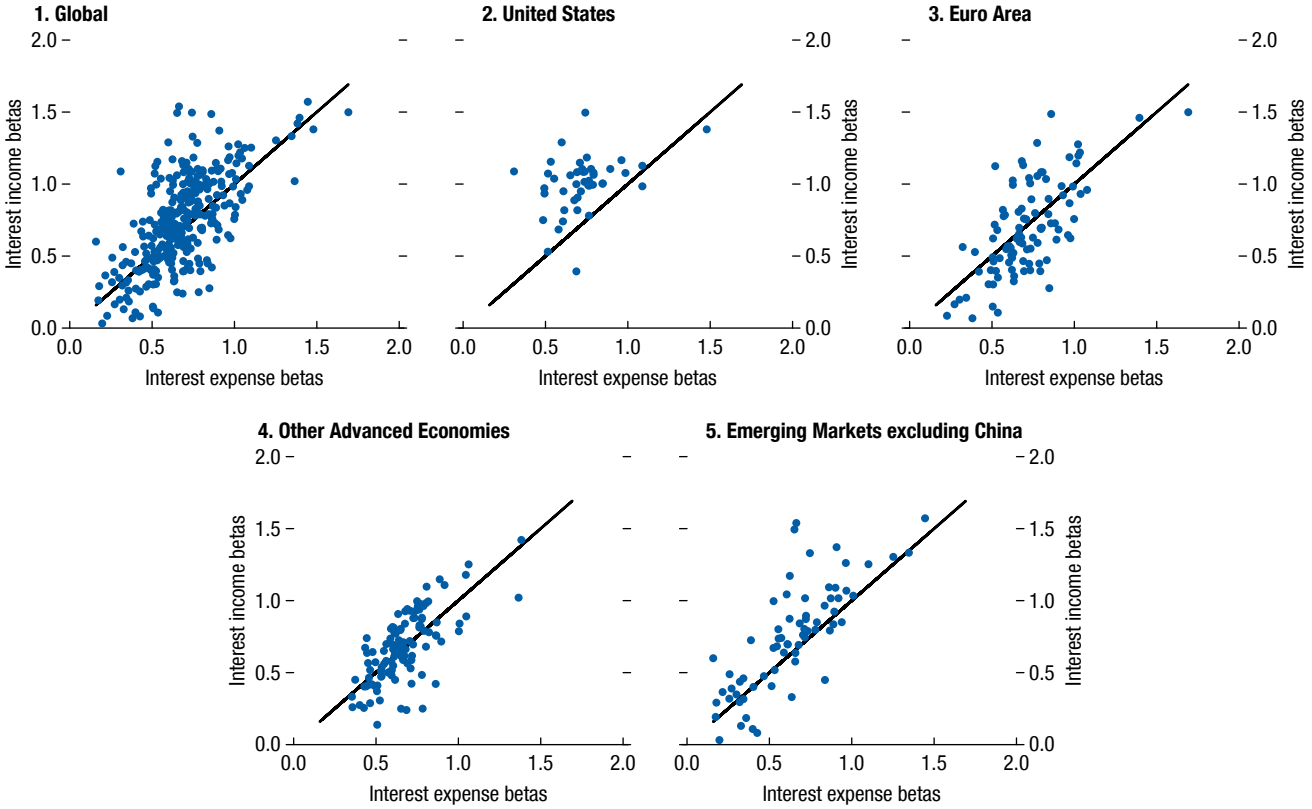
Vulnerabilities from Interest Margins

Not all banks would gain as a result of higher income from rising rates. When policy rates rise, banks whose expenses are more sensitive to rising short-term rates—that is, those that have higher "expense betas" relative to their "income betas"—stand to lose net interest income. Higher short-term rates pass through rapidly to funding costs in banks that are wholesale funded (Online Annex 2.2) or have customers moving to higher-return savings products (like certificates of deposit, bonds, or money market funds; see Online Annex 2.6). The pass-through to income, on the other hand, could be slow because of fixed-rate loans that take time to reprice or replace. The analysis here finds that the expense betas are small at first but increase over time, possibly because depositors seek higher returns within the same bank from other financial instruments like certificates of deposit. Figure 2.7 shows the long-term betas; banks below the 45-degree lines in the panels have greater sensitivity to interest rates on the expense side than on the income side, so they would be at greater risk of losing net interest income when interest rates are rising.

Globally, more than 40 percent of banks stand to lose net interest income, especially those in advanced economies outside the United States. US banks emerge as particularly strong in the current analysis because of their exceptionally high interest income betas. In contrast, banks in other advanced economies, especially euro area countries, tend to have

Figure 2.7. Long-Term Income and Expense Betas

The figure shows estimated long-term betas: rates of pass-through from a permanent increase in short-term rates to interest income and expense, two years after the initial increase. A beta value of 0.5 means borrowing interest rates rise by 50 basis points when short-term rates rise by 100 basis points.



Source: IMF staff estimates.
Note: See Online Annex 2.2. China is not included because empirical results on betas for individual Chinese banks or for the overall banking system were not robust; the net interest income was assumed to be constant as a percent of assets for the scenarios. The black line in the panels is the 45-degree line.

lower interest income betas. In emerging markets, the majority of banks have higher interest income betas than interest expense betas. Furthermore, interest rate margins in emerging markets, in excess of 5 percent in 2022, are much greater than those in advanced economies, in which they were only about 2 percent; the high margins help emerging markets absorb losses.

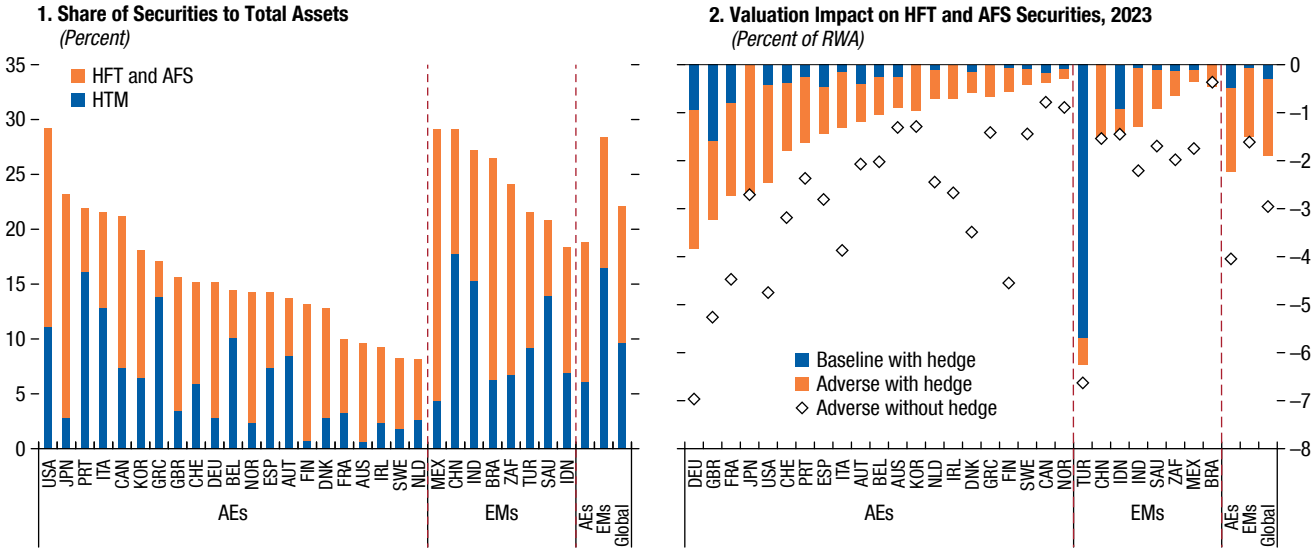
Vulnerabilities to Bond Valuation Losses

Almost one-quarter of global bank assets are invested in securities, with about half in held-to-maturity securities, amid notable cross-country differences (Figure 2.8, panel 1). Securities constitute from nearly 25 percent to about 30 percent of total bank assets in Brazil, China, India, Japan, Mexico, and the United States. In the sample used here, banks in emerging markets tend to have higher exposures to securities than those in advanced economies and keep more of their securities as held-to-maturity securities at book value, as opposed to those that are marked to market: held for trading and available for sale (Online Annex 2.3). About 40 percent of banks' positions are hedged on average (Online Annex 2.3). Even among advanced economies, non–internationally active banks in Japan and small and medium-sized banks in the United States can exclude from regulatory capital unrealized gains and losses from available-for-sale securities; this is referred to as the "available-for-sale filter" in Basel II. Online Annex Table 2.3.1 has further details.

Figure 2.8. Vulnerabilities to Bond Valuation Channel

Generally, banks in emerging markets hold more securities than those in advanced economies. Among advanced economies, exposures are higher in North America, Japan, Portugal, and Italy.

Valuation impacts are larger in advanced economies given higher rate shocks in the adverse scenario. But hedging could mitigate the loss by half.



Sources: Bank of Japan; Bloomberg Finance L.P.; European Banking Authority; FitchSolutions, Fitch Connect; and IMF staff estimates.
Note: Data for Japan exclude two specialized banks in both panels and assets such as equities and cash in panel 2. The IMF staff obtained several estimates of the hedge coverage ratio for each bank in panel 2. The staff used bank-reported ratio when available and, otherwise, used proxies estimated from comparing (1) the reported 2022 AFS valuation losses with model-based losses assuming all bond investments, including those held by foreign affiliates, are in home sovereign bonds, which could underestimate hedging in countries with lower interest rates than the global average (for example, Japan); or (2) the notional value of interest rate derivatives with interest-earning assets (see Online Annex 2.3). The analysis does not consider hedging counterparties and whether hedging is meaningful when banks are the counterparties (McPhail, Schnable, and Tuckman 2023). Data labels in the figure use International Organization for Standardization (ISO) country codes.
AEs = advanced economies; AFS = available for sale; EMs = emerging markets; HFT = held for trading; HTM = held to maturity; RWA = risk-weighted assets.

Banks' marked-to-market bond portfolios generally suffer moderate valuation losses in the baseline (Figure 2.8, panel 2). Overall, capital ratios could fall significantly for only about 2 percent of banks, which are thus deemed vulnerable to this risk propagation channel. These banks tend to have a higher share of held-for-trading and available-for-sale securities in their portfolios, with longer durations, and are subject to greater increases in their yield curves.

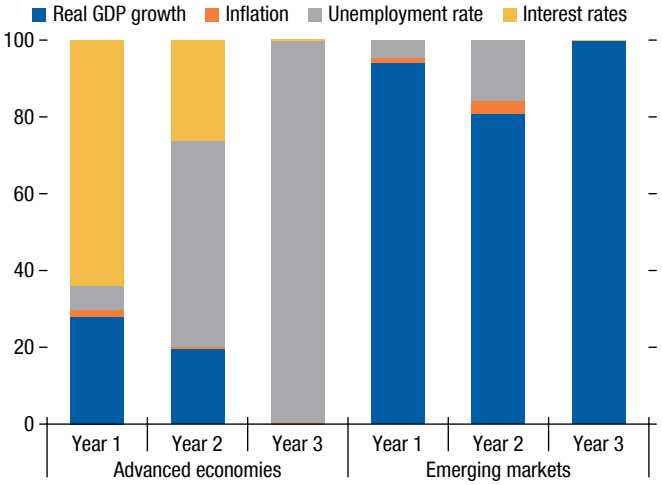
In the adverse scenario, which also considers part of banks' bond exposures to be hedged, valuation losses are significant. Although hedging mitigates the vulnerability, 11 percent of banks are vulnerable to significant declines in capital from this channel. If exposures are not considered to be hedged, however, about a quarter of the banks would be deemed vulnerable. German banks, among the most affected, have bonds with relatively longer durations and experience large policy rate shocks in the stagflationary scenario. Because of these same drivers—exposure, duration, and interest rate shocks—a higher share of banks in advanced economies than in emerging markets is also exposed to valuation losses.

Vulnerabilities to Loan Defaults

Increases in interest rates and declines in economic growth drive loan defaults (Figure 2.9). In the adverse scenario, loan loss provisions in banks in advanced economies rise initially because of increases in real interest rates; effects on unemployment rates start dominating later, as the interest rate shock wanes. In contrast, overall economic growth matters more for emerging markets. Banks in advanced economies tend to have higher shares of mortgage and consumer loans in total loans, whereas those in emerging markets tend to lend relatively more to firms. This could be the reason that the unemployment rate matters more for credit performance in banks in advanced economies, whereas GDP growth matters more for those in emerging markets.

Figure 2.9. Drivers of Loan Loss Provisions, 2023–25
(Percent)

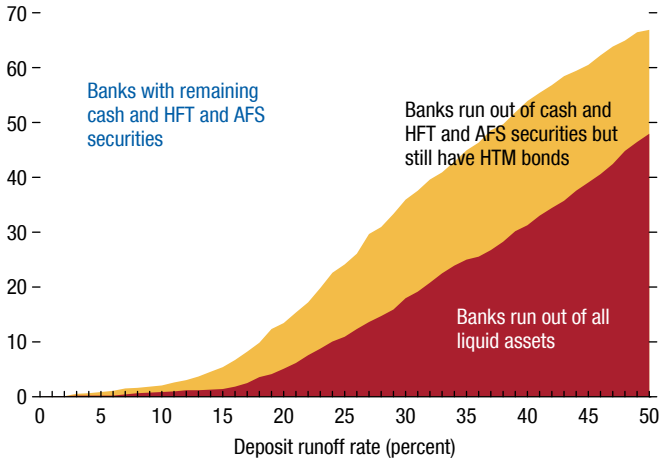
The bars show the contributions to adverse–baseline gaps of loan loss rates.



Sources: Fitch Solutions, Fitch Connect; IMF, *World Economic Outlook*; and IMF staff estimates.

Figure 2.10. Banks Vulnerable to Liquidity-to-Solvency Interaction
(Percent of total number of banks, with 2023 valuation shocks in the adverse scenario)

The liquidity-to-solvency interaction comes into play once banks run out of cash and HFT and AFS securities and start using HTM either for sales or repos.



Sources: Bloomberg Finance L.P.; European Banking Authority transparency exercise; Fitch Solutions, Fitch Connect; and IMF staff estimates.
Note: Figure depicts the share of the total number of banks with 2023 valuation shocks in the adverse scenario. AFS = available for sale; HFT = held for trading; HTM = held to maturity.

Vulnerabilities to Interactions between Liquidity and Solvency

Most banks have enough liquid assets to sustain deposit outflows of 10 percent without having to repo or sell held-to-maturity bonds (Figure 2.10). Banks in emerging markets can sustain slightly higher deposit outflows (20 percent) than those in advanced economies (5–10 percent) without needing to sell or pledge held-to-maturity securities (Online Annex 2.4). Overall, at outflows of 15–25 percent, an exponentially high share of banks would need to use held-to-maturity securities to address their liquidity needs. For a deposit runoff rate of 15 percent, the sale of held-to-maturity bonds would generate moderate losses across regions, when central bank facilities are not available (Figure 2.11, panel 1).[3] At 25 percent runoff, CET1 ratios would drop substantially in several banks, including Silicon Valley Bank and First Republic Bank, if central bank facilities are not available. These losses would multiply rapidly as deposit outflows increase from 25 to 35 percent, resonating analyses in Copestake, Kirti, and Liu (forthcoming).

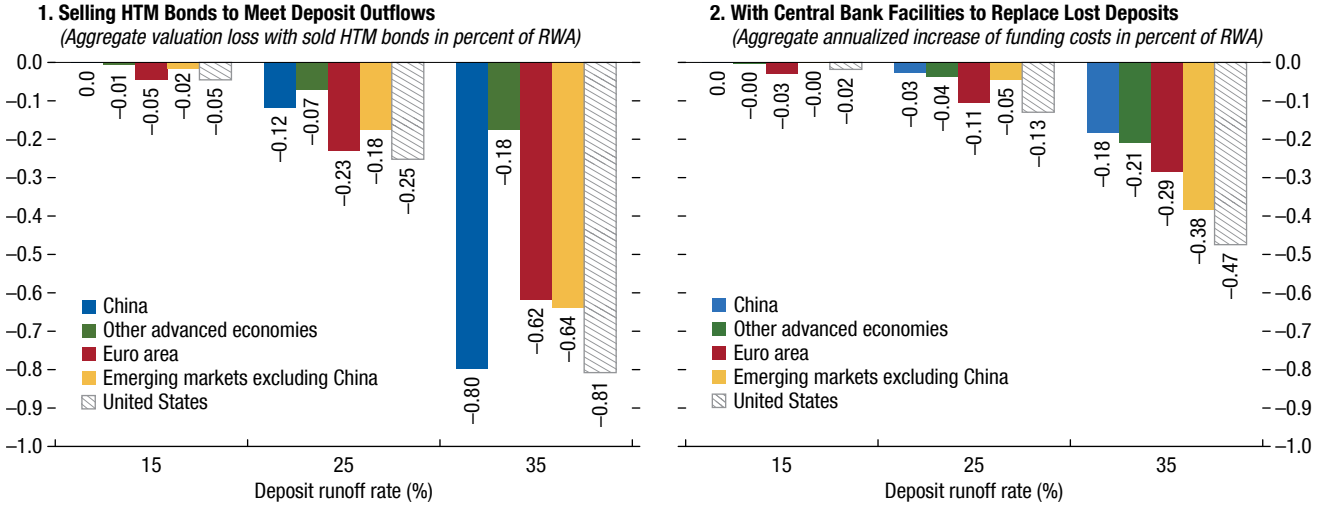
A bank run cannot be predicted well in advance, but if it happens, central bank facilities would help mitigate these losses noticeably across regions (Figure 2.11, panel 2). Under the assumption that banks can access central bank facilities, pledging held-to-maturity securities at 150 basis points over policy rates, capital losses across regions, at 25 percent deposit runs, are at most 13 basis points and take place through annualized increases in funding costs. However, results vary across banks within a region. Runoffs of 15 percent have a negligible effect on capital. At 25 percent, about 40 banks lose more than 1 percentage point CET1 ratio or more. If the cost of facilities doubles to 300 basis points, the number of banks in this scenario increases to 56. If a bank runs out of eligible collateral, the scenario assumes that central banks extend emergency liquidity assistance by expanding types of collateral accepted or, if needed, providing unsecured loans

[3]For reference, the regulatory liquidity coverage ratio assumes the following one-month runoff rates for deposits: insured retail demand deposits, 3–5 percent; less stable retail deposits, 10 percent; term deposits, 0 percent, except in the case of maturing contracts; small business deposits, 5–10 percent; and other nonfinancial firms and sovereigns, 20 percent if insured and 40 percent if not. The ratio is designed to replicate the liquidity stress observed during the global financial crisis and has higher runoff rates for wholesale funding than for customer deposits.

Figure 2.11. The Impact of Liquidity-to-Solvency Interactions on Bank Capital With and Without Central Bank Facilities: Adverse Scenario

When central bank facilities are not available, additional capital losses are contained at a regional level up to 25 basis points, with a runoff rate of 25 percent. However, several banks could lose more than 150 basis points in additional Tier 1 capital across regions because of the impact of HTM sales on capital (Online Annex 2.4).

When central bank facilities are available, additional capital losses are up to 13 basis points at a regional level at 25 percent deposit runoffs. Several banks could see losses of 75–100 basis points across regions owing to the additional cost of funding the facilities.



Sources: Bloomberg, L.P.; European Banking Authority transparency exercise; FitchSolutions, Fitch Connect; and IMF staff estimates.
Note: Figure uses end-of-2023 bond revaluation in the adverse scenario. Panel 2 shows the aggregate valuation loss with HTM bonds sold at the end of 2023, when liquidity stress hit banks, which results in valuation loss from interest rate changes in 2022 (actual) and 2023 (adverse scenario), if the book value of the HTM bonds is proxied by their valuation at the end of 2021. Once a bank runs out of securities, it is considered "failed" and incurs no additional losses (for example, through selling illiquid assets with massive haircuts). Panel 2 depicts the aggregate annualized increase in funding costs. It assumes that central banks charge 150 basis points on top of short-term interest rates under the adverse scenario. If a bank runs out of security collateral (all of which is assumed to be eligible for central bank repos at market values), the bank is presumed to obtain unsecured emergency liquidity assistance at the same interest rates. Moreover, it is assumed that central banks are able to provide liquidity in all currencies, having made swap arrangements with foreign central banks in advance. HTM = held to maturity; RWA = risk-weighted assets.

at the same interest rates, as is the practice in many central banks.[4] This exercise could be easily adapted to other situations, but the broad message stands—many banks are vulnerable at deposit run rates much below those recently observed (Box 2.1) if central bank facilities are not available.

Several caveats surround the analysis around the global stress test results. First, the adverse scenario, which is internally consistent across the 29 countries coordinated through the global dynamic stochastic general equilibrium model (Vitek 2018), is quite severe and corresponds to 3½ standard deviations from historical means of global GDP growth (Online Annex Table 2.1.5). The resulting number of weak banks is, therefore, large. The scenario is meant to be illustrative and other degrees of severity could be chosen by supervisors. However, given the experience with multiple global crises and heightened volatility since the global financial crisis, supervisors have in fact been moving to stronger assumptions in supervisory stress tests (see for example the severity of the scenarios in European Banking Authority 2023). Still, some sensitivity analyses around the severity of the scenario for the Chinese banking system (for which there is no historical precedent) is presented in Online Annex 2.1. Second, the analysis uses simplifying assumptions because of the absence of publicly available bank-level data on duration and hedging (Online Annexes 2.1 and 2.3). Supervisors, however, could have access to more detailed bank-level data and therefore avoid making such simplifying assumptions.

[4]It is assumed that a small number of banks found to be insolvent can still access the liquidity facilities, but it does not change the count of weak banks in the stress test results.

Using KRIs to Monitor Emerging Vulnerabilities

This section develops a forward-looking tool for monitoring vulnerabilities in publicly traded individual banks. The framework for the proposed tool, based on financial and aggregate consensus analyst forecasts data of KRIs, provides policymakers and practitioners with a methodology for identifying banks that are vulnerable to pressures related to solvency and liquidity and those generated by the market. Aggregate consensus analyst forecasts for the third and fourth quarters of 2023[5] are used to determine expectations for bank performance and the evolution of potential risk.[6] The framework comprises five fundamental dimensions of risk in banking that both bank supervisors and academics (in previous studies of bank stress) use. It then flags banks with outlier characteristics across a majority of key risk dimensions. The section then presents an econometric analysis to show the power of this method both in predicting previous stress events and in anticipating the potential capital shortfalls revealed by the global stress test.

Effective KRIs serve as an early warning system but have a forward-looking element; capturing this forward-looking element in such indicators, however, using public sources of data on bank balance sheets, as opposed to the real-time data available to bank supervisors, can often be challenging. To mitigate this issue, the framework used here incorporates consensus forecasts for relevant variables; it also uses market-based pricing indicators that embed information regarding expected profitability and downside risk. These forward-looking components enhance the framework's predictive capabilities and its utility as a policy instrument.

Data Summary

To enable development of a tool capable of analyzing a broad array of banks representing various geographic and economic regions, an extensive new data set encompassing more than 375 banks from 43 different jurisdictions has been compiled. The data set includes 28 of the 30 G-SIBs as identified by the Financial Stability Board.[7] The United States is overrepresented in terms of the number of banks covered due to greater data availability, but the balance improves considerably when regions are compared by total banking assets. Banks differ greatly in their structural characteristics across regions, which means that many of the KRIs used consider regional thresholds (Figure 2.12).

Selection and Calibration of KRIs

The KRIs used in this analysis are constructed by combining the CAMELS supervisory framework with market-based metrics. Bank supervisors use the CAMELS framework widely to assess the overall health of a bank and issue periodic supervisory ratings.[8] It includes six risk dimensions: capital adequacy, asset quality, management performance, earnings, liquidity, and sensitivity to market risk. In addition to the CAMELS framework, the analysis here uses the IMF's Financial Soundness Indicators, which were developed in collaboration with the international community to support the assessment of strengths and vulnerabilities of financial systems, and the quarterly Risk Dashboard metrics published by the European Banking Authority to identify core KRIs.[9] The analysis focuses on capital adequacy, asset quality, earnings, and liquidity because global quarterly data on sensitivity to market risk are scarce and have limited comparability and management performance cannot be observed directly through quantitative data. With market metrics added, this results in a total of five observable risk dimensions. These five key risk dimensions are measured using one or more key risk indicators, 12 in total (Table 2.1). These 12 indicators have been selected based on multiple criteria, including data coverage, literature review, best banking supervision practices, and econometric analysis (see Online Annex 2.5 for details on the

[5]Aggregate consensus analyst forecasts are also used for the second quarter of 2023, if second quarter of 2023 actual data were unavailable at time of data collection.

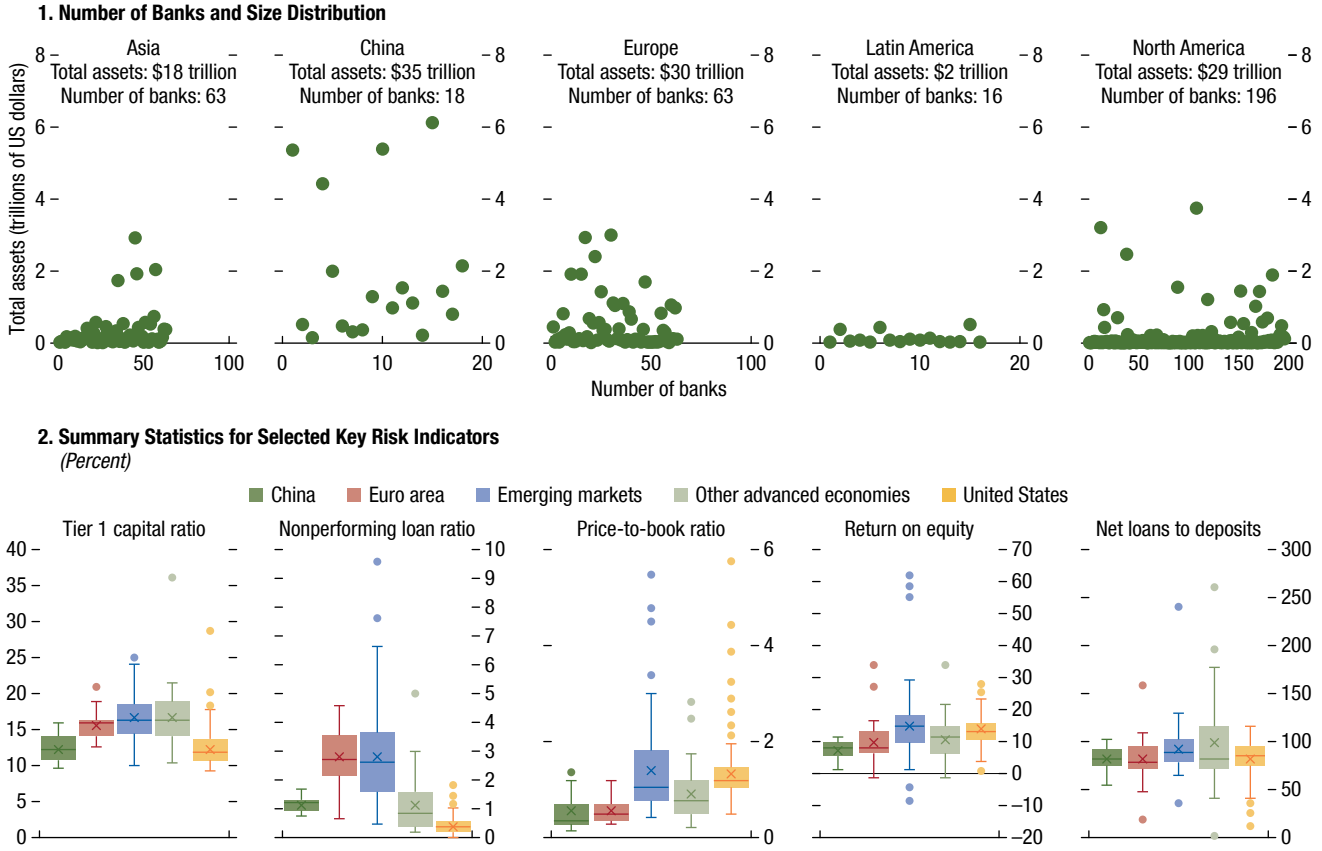
[6]The authors supplement their data with aggregate consensus forecasts of financial data and daily market pricing data from third-party proprietary sources. The third-party proprietary sources include Bloomberg Finance L.P., S&P Capital IQ, and Visible Alpha. The Visible Alpha data set includes standardized financial data and metrics that include company filings data, aggregate consensus, and revised aggregate consensus data that enable analysis across banks and geographies.

[7]Excludes one French G-SIB that is not publicly listed and one Swiss G-SIB that was acquired by another G-SIB in 2023. See Financial Stability Board 2022 List of Global Systemically Important Banks (https://www.fsb.org/wp-content/uploads/P211122.pdf).

[8]The original CAMELS framework has been adapted and/or expanded in many jurisdictions and relabeled to incorporate different risk metrics. Despite this, most supervisors continue to monitor traditional metrics related to the CAMELS framework.

[9]See IMF Financial Soundness Indicators (https://data.imf.org/?sk=51b096fa-2cd2-40c2-8d09-0699cc1764da) and European Banking Authority Risk Dashboard (https://www.eba.europa.eu/risk-analysis-and-data/risk-dashboard).

Figure 2.12. Regional Data Coverage and Summary Statistics



Sources: Bloomberg Finance L.P.; Visible Alpha; and IMF staff calculations.
Note: Panels 1 and 2 data are based on historical total assets as of 2023:Q2.

Table 2.1. Key Risk Indicators: CAMELS and Market Risk Metrics

Risk Dimension	Risks Measured or Gauged	Indicators (total: 12)
Capital adequacy	Solvency and loss absorption capacity	Ratios of equity to total assets (ETA) and Tier 1 capital to risk-weighted assets (Tier 1 capital ratio)
Asset quality	Likelihood of future credit losses	Ratio of nonperforming loans to total loans, coverage ratio, and quarterly loan growth
Earnings	Ability to increase and generate capital	Return on equity
Liquidity	Resilience to funding shocks and deposit outflows	Net loan-to-deposit ratio, ratio of total deposits to total liabilities, quarterly deposit growth
Market metrics	Overall market outlook, ability to maintain debt funding and raise equity	Dividend growth forecast, price-to-book (P/B) ratio, market leverage (Total Assets/Market Capitalization)

Source: IMF staff compilation.
Note: CAMELS = Capital, Asset Quality, Management, Earnings, Liquidity and Sensitivity to Market Risk,

construction of the data set, KRI selection, and calibration of KRI thresholds).

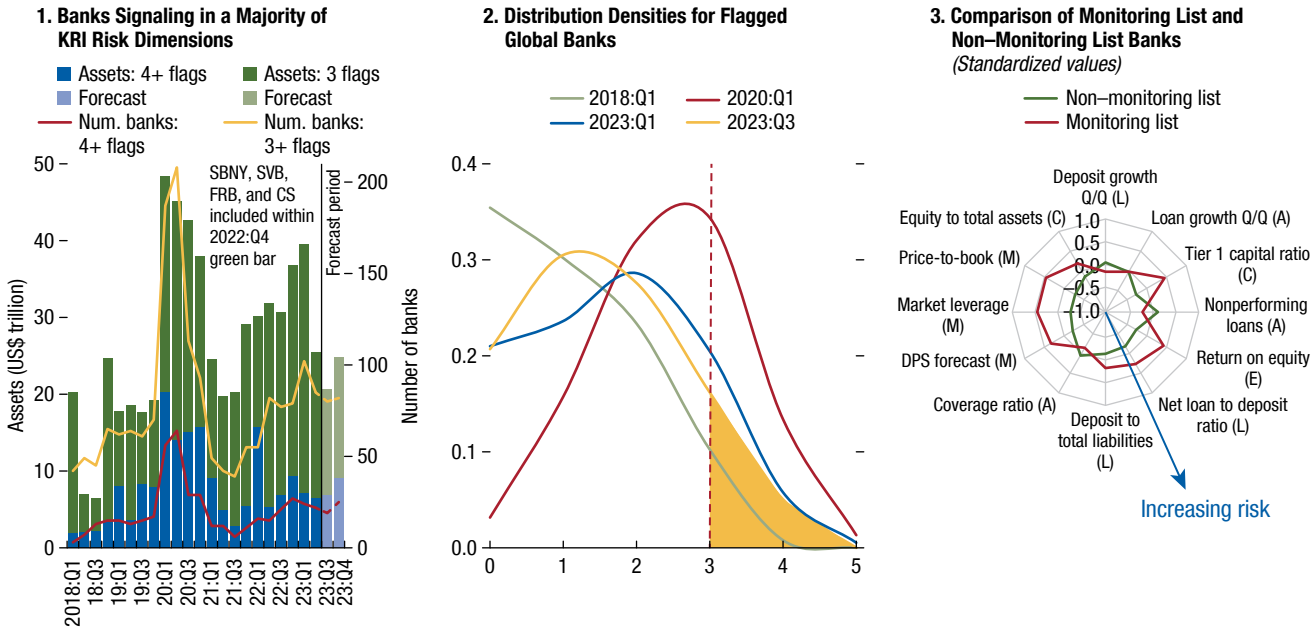
Using the KRIs, a monitoring list of potentially vulnerable banks is constructed in a two-stage process. First, for each of the risk indicators, banks' values are highlighted if they exceed defined thresholds. These thresholds have been calibrated to identify outliers among banks as well as temporal outliers while factoring in significant structural differences across regions and banking models (see Online Annex 2.5 for a discussion on how the thresholds were calculated). Second, banks are identified as potentially vulnerable within a particular risk dimension if one or more of the risk indicators in that dimension are highlighted as outliers. Finally, they are placed on the monitoring list, or "flagged," if they are identified as potentially vulnerable

Figure 2.13. Tracking Vulnerable Banks over Time Using Historical and Aggregate Forecast Data

The number of vulnerable banks on the global monitoring list remains elevated in 2023.

A weak group of global banks remains, as the number of banks flagged as vulnerable in three or more KRI risk dimensions remains elevated.

Low price-to-book ratios, low return on equity, and stretched loan-to-deposit ratios are key differentiations between monitoring list and non–monitoring list banks.



Sources: Bloomberg Finance L.P.; Visible Alpha; and IMF staff calculations.
Note: Panels 1 and 2 data include results based on historical data from the first quarter of 2018 to the second quarter of 2023, aggregate consensus forecasts for the second quarter of 2023 if actual data were not available, and aggregate consensus forecast data for the third and fourth quarters of 2023. Values in panel 3 are standardized by *z*-scores based on aggregate consensus forecast data as of the third quarter of 2023; larger values along a given axis signify more risks along that characteristic. See Online Appendix 1 for definitions of KRIs. A = assets; C = capital; CS = Credit Suisse; DPS = dividends per share; E = earnings; FRB = First Republic Bank; KRI = key risk indicator; L = liquidity; M = market; Q/Q = quarter over quarter; SBNY = Signature Bank; SVB = Silicon Valley Bank.

across a majority (that is, three or more) of the five risk dimensions, with heightened attention given to banks identified as potentially vulnerable along four or five risk dimensions. Importantly, analyst forecasts are used to track the evolution of the key risk metrics over the next two quarters as a measure of future risk.[10]

Two important econometric results demonstrate the value of the KRIs approach. First, the indicators are found to have predictive power in forecasting bank stress events (see Online Annex 2.5). Second, the stress test results and the KRIs are linked in a robust way, as the number of KRIs flagged is a quantitatively meaningful and statistically significant predictor of capital losses in the global stress tests adverse scenario (see "Similarities of Global Stress Test and KRI Frameworks").

[10]Historical data from the first quarter of 2018 to the second quarter of 2023, aggregate consensus analysts forecasts for the second quarter of 2023 if actual data were not available, and aggregate consensus analysts forecasts for the third and fourth quarters of 2023 for all KRIs are used to determine expectations for bank performance and the evolution of potential risk. In addition, to supplement their analyses, the authors also use changes in consensus forecasts on dividends throughout the sample to gauge market sentiment related to the direction of risk. Dividend forecast comprises analyst expectations of future dividends at each point in time and is therefore a forward-looking metric.

KRI Results and Construction of Bank Monitoring List

The KRI framework finds that the number of banks flagged as vulnerable in three or more of the five risk dimensions spiked dramatically with the onset of the COVID-19 pandemic, fell sharply in 2021, and then, as interest rates rose, climbed to another peak just before the March 2023 bank turmoil (Figure 2.13, panel 1). Notably, the framework flagged as vulnerable along three risk dimensions in the fourth quarter of 2022 the four banks that ultimately failed in March: Credit Suisse, Silicon Valley Bank, and Signature Bank all breached the threshold in the market KRI dimension (along with the earnings and liquidity dimensions in the case

of Credit Suisse, the capital adequacy and earnings dimensions in the case of Silicon Valley Bank, and the capital adequacy and liquidity dimensions in the case of Signature Bank), signaling that investors were becoming more concerned about these banks' prospects a quarter prior to their failure. In the case of First Republic, KRIs in the capital adequacy, asset quality, and earnings dimensions breached thresholds.

In the second quarter of 2023, 85 banks with $26 trillion in total assets were on the KRI monitoring list due to breaches of thresholds in at least three KRI risk dimensions. Many banks remain on the monitoring list for the remainder of 2023, as industry analysts project that pressures on earnings and liquidity will persist, likely as a result of economic uncertainty and higher-for-longer interest rates. Aggregate consensus analyst forecasts suggest that the number of banks flagged will decline slightly in the third quarter of 2023 to 80 with $21 trillion in assets, with the decline primarily reflecting an improvement in liquidity and earnings. However, the number of flagged banks picks up in the fourth quarter to 82 with $25 trillion in assets, driven by weaker earnings. Furthermore, in the fourth quarter, the number of banks flagged as vulnerable on four or more risk dimensions stands at 25, with $9 trillion in combined assets, with the elevated level reflecting lower price-to-book ratios and profitability challenges.

If one looks ahead at the fourth quarter of 2023, based on aggregate consensus forecast data, the number of banks flagged (area under the yellow graph line in Figure 2.13, panel 2) remains sizable, although it has shrunk since the onset of the pandemic (area under the red graph line) and the time of the March bank turmoil (area under the blue graph line).[11]

Figure 2.13, panel 3 compares risk characteristics of flagged and non-flagged banks, using standardized *z*-scores, with larger values denoting higher risk across all characteristics—for example, an outward movement along the Tier 1 capital ratio axis signifies less capital. Banks on the monitoring list (red line) score significantly worse than banks not on the monitoring list (green line) across nearly all categories, with the exception of the nonperforming loan ratio (a backward-looking indicator), coverage ratio, and quarterly deposit growth.

There are certain limitations to using analyst forecasts in the KRI framework. The consensus of analyst forecasts is presumably made under varying assumptions about the macro environment that are not revealed by the analysts. The KRI framework thus can offer only limited insights on how the monitoring list connects to expected macroeconomic developments. Not knowing the variation in the underlying assumptions made by analysts also reduces the KRI's congruence with the global stress test and suggests that these two tools should be used complementarily. That said, both aggregate consensus analyst forecasts and market variables can reflect impact on individual banks stemming from macrofinancial conditions, especially from severe tail events. For example, the monitoring list expanded sharply during the COVID-19 pandemic. Despite this, we cannot control for the divergence between predictions of the macro environment across aggregate consensus analyst forecasts going forward.

The regional distribution of banks on the monitoring list signaling in four dimensions calls attention to structural weaknesses within certain banking systems and highlights transitory stress periods (Figure 2.14, panel 1). The list of potentially vulnerable banks includes large banks in most countries, and smaller and regional banks in the United States.[12]

- In Europe, banks with low ratios of equity to total assets, low profitability, low price-to-book ratios, and higher dependency on noncore deposit funding are flagged by the KRIs. The group of flagged banks includes some of the largest banks in Europe, with estimated combined total assets of more than $8 trillion by the end of the year. Higher funding costs will remain a challenge for profitability (Figure 2.13, panel 2). The forecast-based KRIs show that European banks are expected to comprise 30 percent of the monitoring list on a total asset basis by the fourth quarter of 2023.
- In Asia, nearly all banks have low ratios of equity to total assets and face pressures on profitability resulting from rising funding costs and lower fee income. However, net interest margin compression has been smaller, reflecting in part that policy rate changes have been smaller in magnitude compared to Europe and North America. The group of flagged banks,

[11]Price-to-book and market leverage metrics for the third quarter of 2023 and the fourth quarter of 2023 used market data as of September 8, 2023, and not end-of-quarter data as for the rest of the periods.

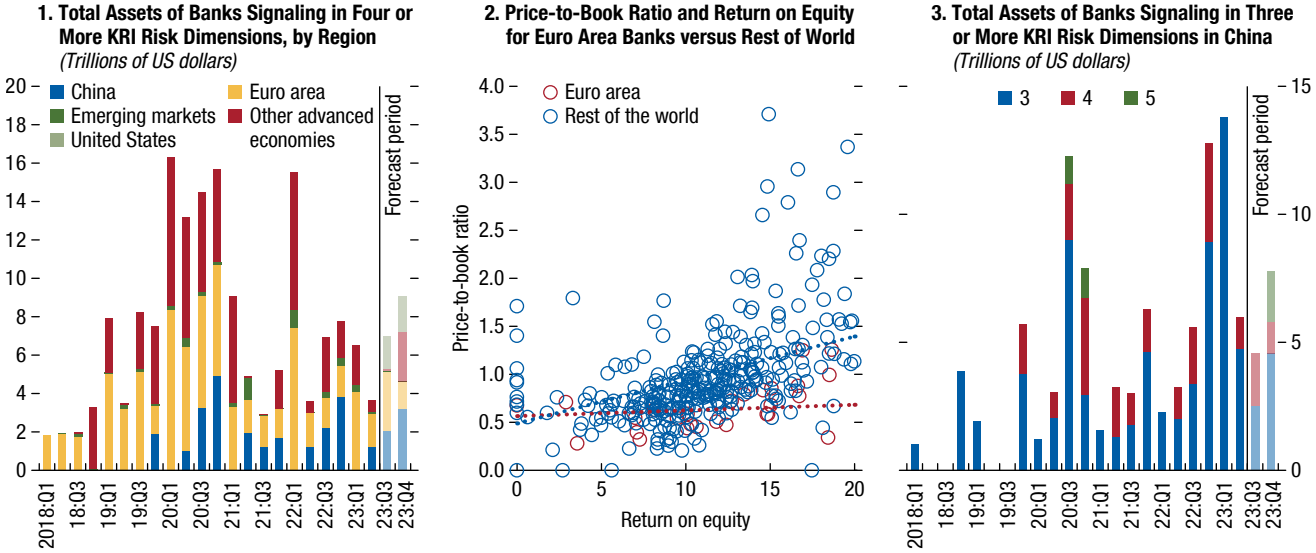
[12]Based on the Bankers Almanac Rankings by country as of August 31, 2023.

Figure 2.14. Highlighted Results from Key Risk Indicators

Regional distribution highlights structural weaknesses in the euro area, a weak tail of US banks and a geographical shift toward China throughout 2023.

Price-to-book ratios have deteriorated in banks across the globe, but the problem is more acute in the euro area.

In China, total assets of banks increasing from three to four vulnerability flags are elevated, despite aggregate vulnerabilities' falling.



Sources: Bloomberg Finance L.P.; Visible Alpha; and IMF staff calculations.
Note: Panels 1 and 3 are based on historical data from the first quarter of 2018 to the second quarter of 2023, aggregate consensus data for the second quarter of 2023 if actual data were not available, and aggregate consensus data from the third and fourth quarters of 2023. In panel 2, "Price-to-book ratio" refers to the ratio of the market price of equity to the book value of equity, and "Return on equity" to net income as a percentage of total equity as of the first quarter of 2023.

based on fourth-quarter forecasts, has combined total assets of more than $1 trillion. KRIs signal market leverage is elevated for a handful of banks in the region; price-to-book ratios are low; and profitability is expected to deteriorate by lower net interest income, higher noninterest expenses, and higher provision expenses. Consensus forecasts predict that profitability will decline as banks are also challenged by rising noninterest expenses and loan loss provision expenses. Asian banks will rise to 10 percent of monitoring list assets in the fourth quarter.

- In China, banks with lower capital ratios, low profitability, and low price-to-book ratios are flagged as vulnerable by the corresponding core KRIs. For the second half of 2023, consensus forecasts call for lower profitability arising from compression of net interest margins, as a result of the decline in the prime rate for loans and lower noninterest income. The number of flagged banks is projected to increase and rise to $4.6 trillion in assets by the fourth quarter, representing 31 percent of monitoring list total assets (Figure 2.14, panel 3).
- In Latin America, banks with low ratios of equity to total assets, higher loan-to-deposit ratios due to their higher reliance on noncore deposit funding, and low price-to-book ratios signal vulnerabilities. Fourth-quarter flagged banks include a few large banks in several countries with estimated combined total assets of more than $900 billion. Profitability is expected to improve by the third quarter of 2023, but consensus forecasts expect equity-to-total-assets and price-to-book ratios to remain low. The number of potentially vulnerable banks is projected to decline in the fourth quarter, representing just 4 percent of total assets in the monitoring list assets.
- In North America, banks face profitability challenges from rising funding costs and lower generation of fee income. Flagged banks include a few large banks and many US regional banks, with estimated combined total assets of more than $6 trillion. Small banks—specifically, those with total assets of $10 billion or less—have low profitability, stretched net loan-to-deposit ratios, and low price-to-book ratios. Medium-sized banks—those with total assets between $10 and $100 billion—are also struggling with profitability, stretched net loan-to-deposit ratios, low price-to-book ratios, and high market leverage.

Table 2.2. Key Risk Indicator Global Volatility Heat Map

Bank stress has been building gradually since as far back as March 2022.

Category	Capital		Asset Quality			Earnings	Liquidity			Market		
Variable	Equity to Total Assets	Tier 1 Capital Ratio	NPLs	Loan Growth (QoQ)	Coverage Ratio	Return on Equity	Deposit Growth (QoQ)	Net Loans to Deposits	Deposits to Liabilities	Price to Book	Dividend Growth Forecasts	Market Leverage
Threshold	Below 1st Quartile by Region	Below 12%	Above 8%	Above 3rd Quartile by Region	Below 1st Quartile by Region or Below Supervisory Threshold	Below 1st Quartile by Region	Below –5%	Above 3rd Quartile by Region	Below 1st Quartile by Region	Below 1 SD of Bank Average and/or Below 1st Quartile by Region	Below 0%	Above 90th Percentile by Region
Mar. 2018	65	90	12	38	19	67	6	92	43	32		5
June 18	60	92	9	30	21	66	44	99	43	40	8	5
Sep. 18	54	86	8	21	22	56	17	102	45	38	12	9
Dec. 18	45	81	8	30	25	86	10	101	40	74	30	20
Mar. 19	54	87	10	32	25	80	10	101	47	57	33	15
June 19	57	97	10	29	25	76	8	108	50	53	43	14
Sep. 19	56	89	9	23	22	80	25	102	48	62	48	14
Dec. 19	48	86	10	37	24	122	7	103	47	42	57	12
Mar. 20	76	104	9	35	20	239	43	97	48	315	89	89
June 20	86	96	10	141	14	224	6	73	44	293	174	85
Sep. 20	84	82	10	40	12	146	8	72	46	316	134	108
Dec. 20	80	82	7	50	11	135	10	66	44	159	64	42
Mar. 21	94	67	7	34	12	71	21	55	46	68	36	24
June 21	83	67	6	27	13	67	15	54	43	71	52	20
Sep. 21	90	69	5	22	12	73	21	49	45	73	46	19
Dec. 21	85	76	4	51	13	92	24	52	43	64	50	18
Mar. 22	118	88	4	53	13	82	21	55	42	53	53	19
June 22	140	98	3	74	7	63	68	64	41	86	64	35
Sep. 22	147	102	3	48	8	51	81	77	41	107	59	42
Dec. 22	127	101	1	90	6	63	29	86	41	81	69	34
Mar. 23	123	96	1	44	7	70	28	87	38	175	88	62
June 23	112	99	1	15	10	74	29	77	37	192	94	76
Sep. 23	105	85	1	6	10	82	16	79	36	169	86	59
Dec. 23	102	84	1	11	9	112	3	79	35	169	30	59

Sources: Bloomberg Finance L.P.; Visible Alpha; and IMF staff calculations.
Note: The heat map shows the number of banks flagged on each core key risk indicator and CAMELS component. The colors reflect ranking of low to high values across all metrics through the sample period. The count is based on historical data from the first quarter of 2018 to the second quarter of 2023, aggregate consensus forecasts for the second quarter 2023 if actual data were not available, and aggregate consensus forecast data for the third and fourth quarters of 2023.
CAMELS = Capital adequacy, Asset quality, Management performance, Earnings, Liquidity and Sensitivity to market risk; NPLs = nonperforming loans; QoQ = quarter over quarter; SD = standard deviation.

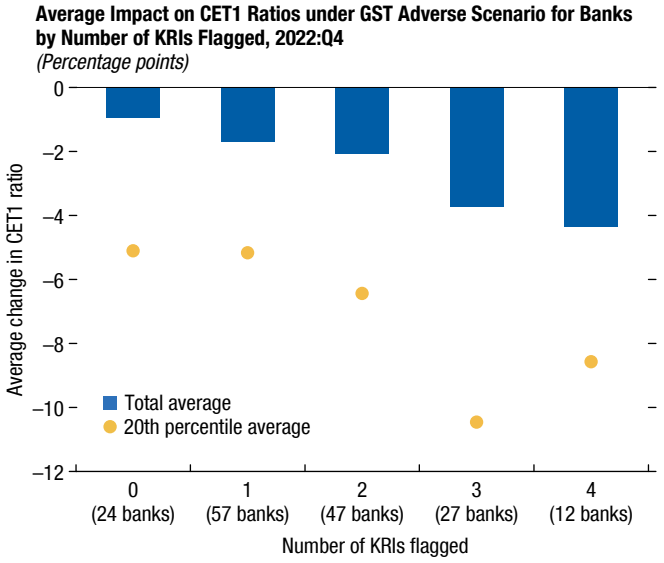
With funding costs rising, consensus forecasts expect compression of net interest margins in small and medium-sized banks to continue for the remainder of the year. Large banks—those with total assets of more than $100 billion—have low profitability, low price-to-book ratios, and high market leverage. Consensus forecasts call for their profitability to decline by the end of the year due to net interest margin compression and rising provision expenses. The number of banks is projected to increase in the fourth quarter and represent 25 percent of total monitoring list assets. Further analysis reveals that among North American banks on the monitoring list that have been flagged as vulnerable on four risk indicator dimensions, market-driven indicators such as market leverage and changes in forecasted dividend per share appear to also signal stress for those with high concentrations of commercial real estate in total loans.

A heat map (Table 2.2) compares visually the number of banks flagged as vulnerable on three or more risk dimensions included in the monitoring

list, quarter by quarter, based on historical KRI data from the first quarter of 2018 to the second quarter of 2023, aggregate consensus data for the second quarter of 2023 if actual data were not available, and aggregate consensus forecast data for the third and fourth quarters of 2023. It highlights three main observations. First, the period from the first to second quarter of 2020 shows the largest concentration of vulnerable banks, appropriately reflecting the stress related to the COVID-19 pandemic, with more than 200 banks in the monitoring list. This period represents the peak period of risk in the banking system over the time horizon of this chapter's analysis. Second, the heat map shows a gradual run-up in the number of vulnerable banks in early 2022, mainly in Europe and corresponding to the invasion of Ukraine in the first quarter of that year. Third, capital adequacy, earnings, and market KRIs capture an increasing number of banks ahead of the banking turmoil in the first quarter of 2023. The indicators suggest that liquidity stress, a key concern earlier in the year, began increasing as early as June 2022. This is evidenced by the growing number of banks experiencing deposit outflows, higher ratios of loans to deposits, and lower shares of deposits in total liabilities.

Figure 2.15. Congruence of Global Stress Test and Key Risk Indicators

Banks with higher key risk indicators register a larger negative capital impact in the global stress test.



Sources: Bloomberg Finance L.P.; Fitch Solutions, Fitch Connect; Visible Alpha; and IMF staff calculations.
Note: CET1 = Common Equity Tier 1; GST = global stress test; KRI = key risk indicator.

Similarities of Global Stress Test and KRI Frameworks

The global stress test and KRI framework complement one another in identifying banks that are still showing weakness. The global stress test finds banks struggling to stay solvent under stagflationary scenarios and suggests that many banks will suffer significant capital losses, largely driven by mark-to-market losses on securities holdings, in a higher-for-longer interest rate environment. In the United States, these losses are concentrated in smaller, regional banks, confirming what was observed in March of 2023. The KRI framework identifies banks that analysts expect to be weak in the coming quarters for various reasons, such as lower expected capital in the case of some Chinese banks, further declines in price-to-book ratios in the case of some European banks, and declining liquidity in the case of some other banks in advanced economies.

The two frameworks appear to have a high degree of congruence. Among the 168 banks that are in the samples for both the global stress test and KRI framework exercise, banks that are flagged as vulnerable on a higher number of dimensions of the KRIs have larger Tier 1 ratio declines, on average, under the global stress test's adverse scenario. For example, among the 47 banks that were flagged as vulnerable on two KRI dimensions as of the fourth quarter of 2022—the starting point of the global stress test exercise—the Tier 1 ratio declines about 2 percentage points, on average, under the adverse scenario in the global stress test; for the 12 banks that were flagged as vulnerable on four KRI dimensions, the average Tier 1 impact increases almost –4 percentage points. The two frameworks also effectively track the weaker tail of the distribution—among banks with three or four flagged KRIs, the worst quintile (in terms of the performance in the stress test) had an average decline of Tier 1 capital ratio of more than 8 percentage points (Figure 2.15).

A cross-bank regression analysis of adverse impacts on Tier 1 capital in the adverse scenario of the global stress test in the fourth quarter of 2022 confirms that this relationship is strong; the analysis yields a highly statistically significant regression coefficient of about –0.7, suggesting that every increase of one flag among the KRI dimensions is associated with a fall of 0.7 percentage point in the Tier 1 capital ratio in the global stress test.

It should be noted that the KRI framework is designed to identify banks meriting closer examination for signs of weakness, but as actual bank failures are quite rare, it will by construction have a high level of type I errors. This model should be seen as complementary to traditional distance-to-default models, which are often not well suited to the idiosyncratic nature of bank failures (Chan-Lau and Sy 2006).

Policy Recommendations

The sizable group of weak banks identified in this chapter—coupled with the risk of contagion to healthy institutions through investors' forward-looking assessment of vulnerabilities—highlights the urgent need to strengthen the resilience of the banking sector. Supervisors should enhance banks' capital level to ensure all banks maintain adequate capital ratios under stress scenarios. The results also highlight the need to reinvigorate supervision and risk assessments, including through enhanced stress testing (see Adrian and others 2023; Dordevic and others 2021). Timely and consistent implementation of international standards—as well as strengthening of regulations and crisis management frameworks—is also of paramount importance.

Enhancing Risk Assessments

As the enhanced global stress test shows, expanding the sample of banks subjected to stress tests and enhancing methodologies—by, for example, incorporating interactions between funding and solvency and deposit stability—would provide sharper insights on weaknesses in the banking sector. As the "desktop" analysis also demonstrates, interest rate sensitivity of the balance sheet and hedging choices considerably influence stress test outcomes at the bank level. For instance, net interest income may appear to be insensitive to interest rates at the level of the banking system even as several individual banks may be vulnerable within the system. Making the adverse scenario more severe while choosing a plausible narrative would further help in uncovering vulnerabilities.

Although supervisory techniques have improved over time, for example, incorporating market-based metrics in their assessment and becoming more forward looking, more needs to be done. The KRIs framework shows that banks that failed during March 2023 had sharply deteriorating balance sheet and price metrics. Supervisors could further leverage more timely and granular data to achieve even better accuracy and comprehensiveness in their risk assessments, provided that they narrow gaps in data coverage and granularity (Figure 2.16, panel 1).

The March 2023 banking turmoil has provided a powerful reminder that markets can shift rapidly from a balance sheet view to a mark-to-market view of risks, in which a bank's viability is assessed based on the market value of its assets, irrespective of their accounting or regulatory values. Such a shift can cause share prices of banks to drop sharply as investors lose confidence in banks' earnings prospects and, eventually, can trigger destabilizing deposit outflows. Bank assets—and therefore equity—are inherently difficult to value because they may not be easily tradable. As accounting approaches cannot be relied on to provide timely economic valuations, it is key for supervisors to closely monitor market metrics as well and to be particularly cautious in regard to banks that exhibit persistent price-to-book ratios below 1.

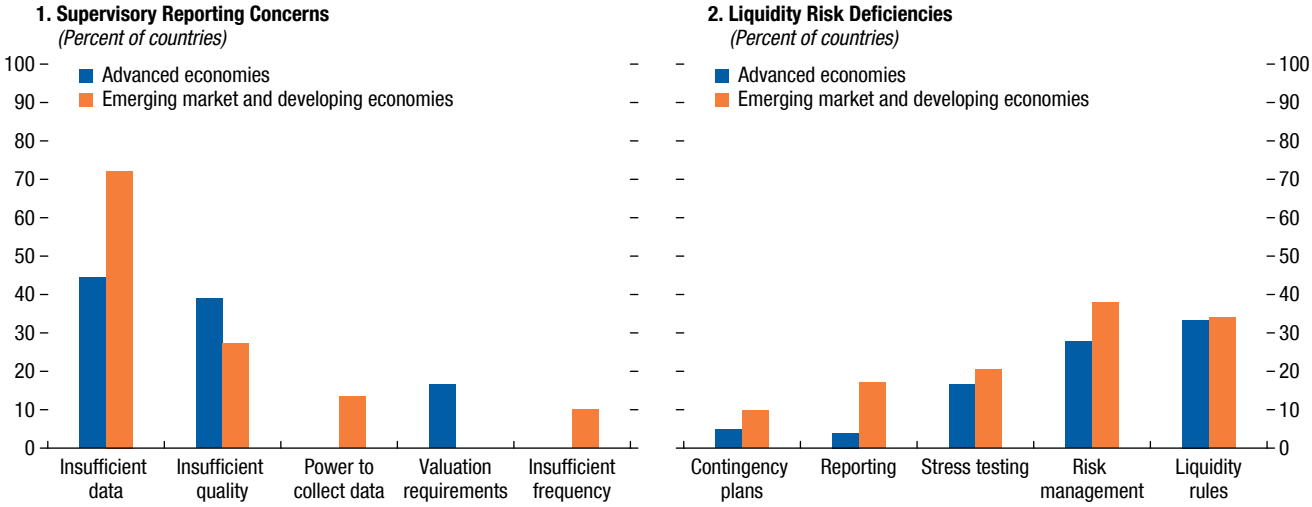
Sharpening Supervision and Regulation

Identifying vulnerable banks is just the first step. An effective prudential framework requires supervisors with both the ability and the willingness to address safety and soundness concerns promptly. However, in many countries, supervisors operate in conditions that are not conducive to effectively carrying out their responsibilities, and some even lack the necessary powers. The Financial Sector Assessment Program's assessments indicate that more than half of the jurisdictions still do not have independent bank supervisors with a clear mandate to effect financial stability, with sound internal governance, or with resources appropriate to their assigned responsibilities. The ongoing structural evolution of the financial sector, as evidenced, for example, by the growth of nonbank financial intermediation, the digitalization of finance, and climate change, adds to supervisory challenges and makes these weaknesses even more relevant. Additional efforts are also needed to make supervisory practices more intrusive, to make corrective actions more timely and conclusive, and to improve legal protection of supervisors.

Figure 2.16. Weaknesses in Bank Supervision Identified in Financial System Stability Assessments

Comprehensive and high-quality data reporting is improving in almost all jurisdictions, but gaps in coverage and granularity need to be addressed.

Some jurisdictions need to emphasize management of liquidity risk further and design better rules regarding quantitative liquidity.



Source: Dordevic and others 2021.
Note: Statistics are based on 47 assessments of Basel Core Principles conducted between 2012 and 2019.

An analysis of the enhanced global stress test results highlights interest rate and liquidity risks as issues of substantial concern. The Financial Sector Assessment Program's assessments show that quantitative and qualitative liquidity requirements can be further improved in several jurisdictions (Figure 2.16, panel 2). Despite broad success in implementing the Basel liquidity standards, recent assessments have found that nearly one-fifth of jurisdictions have weak supervisory and regulatory practices with respect to liquidity. Most of these weaknesses arise from requirements that fail to address liquidity needs in foreign currency, define liquid assets inappropriately, or are not imposed on a consolidated level. The assessments also reveal that several jurisdictions do not require banks to maintain capital against the risk of losses arising from movements of interest rates that affect assets that are not expected to be traded in the short term (that is, interest rate risk in the banking book), and more than a quarter have material deficiencies in terms of monitoring and controlling this risk (Dordevic and others 2021). Supervisory failure to determine whether banks have sound strategies, policies, and processes in place to manage liquidity and interest risk is also common. Supervisors and regulators should therefore implement prudential rules ensuring that banks hold appropriate capital against interest rate risk and guard against hidden losses that could materialize abruptly in the event of liquidity shocks.

Full, timely, and consistent implementation of internationally agreed-upon standards remains an important first step for enhancing prudential frameworks. However, despite repeated calls from the Group of Twenty, some major jurisdictions have delayed implementing the remaining elements of Basel III or have introduced deviations from it, which could undermine the effectiveness of the standard-setting process and increase regulatory fragmentation.

The March 2023 banking turmoil also suggests potential areas for improving the international framework, such as whether specific features of the current Basel III liquidity standards performed as intended. The current Pillar 2 approach for interest rate risk in the banking book also looks insufficient given that its implementation has led to variations of supervisory and regulatory practices, and in some jurisdictions, the risk is not adequately addressed. Moreover, although Basel III was developed to be applied to internationally active banks, the recent banking turmoil has shown that distress among relatively small banks can have broader systemic implications and cross-border contagion effects. The ongoing review of the Basel Core

Principles for Effective Banking Supervision offers a good opportunity to remind the international community that although the diversity of institutions requires a proportional approach to regulation, all segments of the banking sector should be subject to rigorous prudential standards (see Bank for International Settlements 2023). In particular, all banks should be required to comply with capital and liquidity standards that are broadly compatible with the Basel framework, which represents only minimum requirements. In many cases, countries and banks will need to impose higher standards than the framework implies to cover all material risks.

Fortifying Crisis Management Frameworks

The global stress test shows that in the absence of central bank liquidity facilities, interactions between solvency and liquidity triggered by adverse shocks could lead to distress among a considerable number of banks. Enhancements of commercial banks' preparedness to use eligible collateral and access central bank facilities and improved communication by authorities on the availability and usage of these facilities, including information on, for example, acceptable collateral and haircuts, are key in stemming systemic risks. The institutional arrangements for emergency liquidity provision vary widely in transparency, accessibility, collateral requirements, and time limits. All banks should be required to periodically test their access to central bank instruments. This is a common supervisory requirement in many jurisdictions. Central banks should set up their emergency liquidity assistance frameworks in normal times, anticipating that they would have to intervene in a crisis, and they should abide by a broad set of principles concerning collateralization, conditions, and state guarantees.

The March 2023 bank failures have also highlighted the need for further progress in several aspects of the too-big-to-fail reform agenda. These include the importance of effective backstops for public sector liquidity among resolution authorities and deposit insurers and authorities' preparedness to operationalize a range of resolution options and their strategies for communicating those options, as well as the role of deposit insurance in resolution in a world where digital innovation can accelerate deposit runs. The Financial Sector Assessment Program's assessments have highlighted that in many countries deposit insurers face significant weaknesses in their funding arrangements, such as, for example, weaknesses regarding backstop arrangements for funding liquidity. In addition, authorities should recognize that it is not just the largest banks whose failures can prove systemic and whose resolutions should be adequately planned for.

Box 2.1. Experience of Past Bank Runs

The March 2023 bank runs in Switzerland and the United States were unusually large and fast (see Figure 2.1.1, panel 1), with their speed and size facilitated by rapid online deposit withdrawals and the rapid spread of worries among important groups of depositors via social media and other digital channels. This has rightly prompted consideration of possible policy lessons, but the most recent runs also have important similarities with previous bank runs.

Although the runs were not as severe and fast as the run on Silicon Valley Bank, banks have experienced rapid online runs before. The 2007 deposit run on the UK bank Northern Rock took place mostly via the internet: The bank lost almost 60 percent of its retail deposits in 2007, including 20 percent over just five days (between September 13 and 17). In 2008, the UK internet banking branch of the Icelandic bank Landsbanki also suffered a rapid run amid the broader Icelandic banking crisis (Kobrin 2021).

Earlier advances in banks' use of technology triggered similar concerns about speeding up deposit withdrawals in a crisis. For example, the US Federal Deposit Insurance Corporation's official history describes that organization's rescue of Continental Illinois National Bank and Trust in 1984—the episode from which the phrase "too big to fail" originates—as resulting from a "high-speed electronic bank run" (Federal Deposit Insurance Corporation 1997).

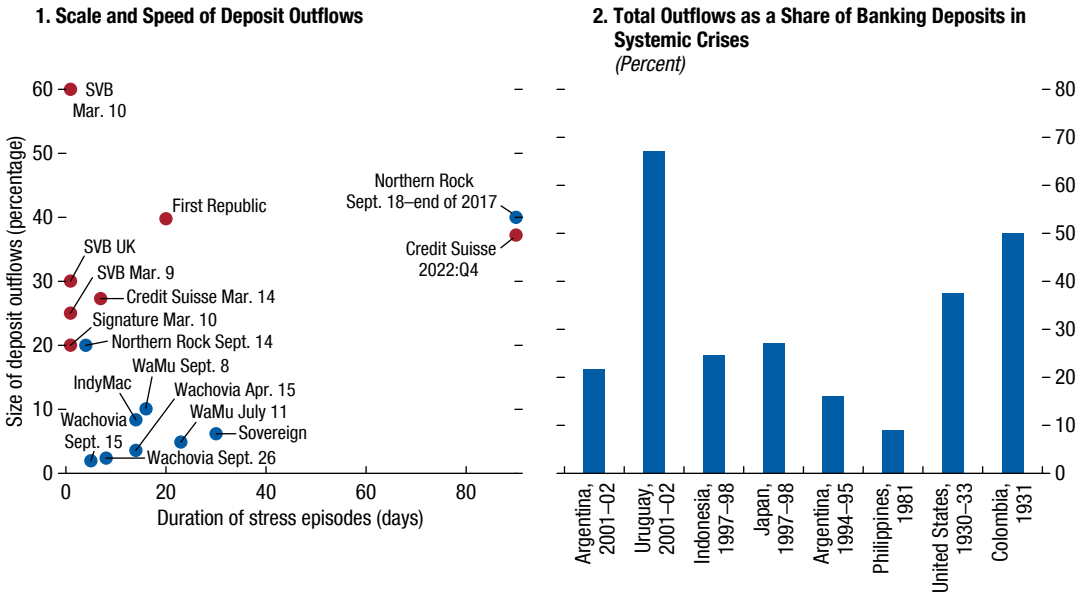
The capacity for concerns to spread rapidly within a concentrated or closely connected group of depositors has long been recognized as a potential contributor to bank runs. One of the first major bank failures of the Great Depression was the 1931 failure of Bank of the United States, whose customer base, concentrated among New York City's foreign-born population, also facilitated the rapid spread of the bank run.

Some crises that have affected the entire financial sector have matched the scale of the 2023 bank runs (Figure 2.1.1, panel 2).

Figure 2.1.1. Case Studies of Bank Runs

Recent bank runs have been unusually large and fast, but banks have experienced rapid online runs before.

Some systemic banking crises have also involved massive total deposit outflows.



Sources: Ennis and Keister 2009; Federal Deposit Insurance Corporation 1997; Federal Reserve, bank financial reports; Investigation Commission of Althing 2010; Kobrin 2021; Levy-Yeyati, Martínez Pería, and Schmukler 2010; Nakaso and Hattori 2002; Nascimento 1991; *Northern Rock Applicants v Caldwell & HM Treasury* (UKUT 408, 2011); Rose 2015; Schumacher 2000; Shin 2009; Simorangkir 2011; and IMF staff calculations.

Note: Panel 2 presents the size of systemwide deposit outflows during stress periods in each country, except in the following cases: United States, 1930–33, an average of 67 failed banks; Philippines, 1981, thrift banks; Japan, 1997–98, an average of three failed banks. IndyMac = Independent National Mortgage Corporation; SVB = Silicon Valley Bank; WaMu = Washington Mutual.

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CHAPTER 3

FINANCIAL SECTOR POLICIES TO UNLOCK PRIVATE CLIMATE FINANCE IN EMERGING MARKET AND DEVELOPING ECONOMIES

Chapter 3 at a Glance

- The International Energy Agency projects climate mitigation investment needs to increase to $2 trillion per year by 2030 in emerging market and developing economies (EMDEs). This corresponds to 12 percent of total investment in these countries, up significantly from the current 3 percent.
- We estimate that the private sector needs to cover the majority of climate mitigation investment needs in EMDEs—between 80 and 90 percent depending on whether China is included—because public investment growth is projected to be limited.
- Yet, EMDEs face significant challenges in attracting private capital. Many have sub–investment-grade credit ratings, limiting their potential investor base and resulting in high financing costs. Even investment-grade-rated EMDEs may find it difficult to attract climate private finance due to several barriers.
- The phasing out of coal is necessary to reach climate goals, yet it is challenging as many EMDEs highly depend on coal. Phasing out coal-fired power plants will require substantial private investments and public support.
- Climate policies and commitments of major banks and insurance companies are not yet aligned with net zero emission targets, curtailing the alignment of private financial flows with the climate transition.

Policy Recommendations

- A broad mix of policies is needed to create an attractive environment for private capital in EMDEs.
- Carbon pricing can be highly effective in shifting capital flows toward low-carbon investments, but policymakers need to complement it with additional policies to unlock private climate finance in EMDEs.
- Structural policies, specifically those aimed at strengthening macroeconomic fundamentals, deepening financial markets, improving policy predictability, and fostering institutional and governance frameworks, are key to lowering the cost of capital, mobilizing domestic financial resources, and improving credit ratings in EMDEs. Strong climate policies and commitments can help send an important signal to investors.
- Appropriate policies and innovative financing structures for the coal phaseout need to be tailored to country circumstances.
- Strengthening the climate information architecture—data, disclosures, and alignment approaches (including taxonomies)—is an important part of the policy mix. Investors rely on high-quality, reliable, and comparable data, which many EMDEs still lack.
- Transition taxonomies in EMDEs could be a valuable tool to align incentives and mobilize private financing including in carbon-intensive sectors.
- Disclosures and labels for sustainable investment funds should enhance market transparency, integrity, and alignment with climate objectives to achieve climate impact.
- Expanded use of guarantees by multilateral development banks and donors could be an effective instrument to reduce real and perceived risks in EMDEs.
- Blended finance structures could improve the risk–reward profile of investment opportunities and broaden the range of private sector investors, thereby helping address real and perceived risks in EMDEs.
- The IMF Resilience and Sustainability Facility, by supporting reforms, can help create an enabling investment environment and attract private capital.

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Introduction

Substantial investment in low-emissions technologies such as renewable energy is needed to reduce global greenhouse gas emissions to net zero by 2050. The International Energy Agency estimates that, by the end of 2030, climate mitigation investment needs will increase to about $2 trillion per year in emerging market and developing economies (EMDEs)—about 40 percent of global investment needs (see Online Annex 3.7 for a list of countries). This estimate implies that climate mitigation investments will have to climb to 12 percent of total investments in EMDEs by 2030—a significant increase from the current 3 percent.

The private sector will have to play a key role in financing climate mitigation investments in EMDEs, given limited fiscal space amid challenging market conditions. Our estimates suggest that the share of private finance must increase significantly.[1] By 2030, private finance will have to cover about 80 percent of the climate mitigation investment needs in EMDEs. Excluding China, the private financing share is even higher—about 90 percent.

Because more than half of global greenhouse gas emissions comes from major emerging markets, they need significant mitigation investments. But these countries have market access and, sometimes, deep domestic capital markets. Developing economies contribute less than 15 percent to global greenhouse gas emissions. They have fewer climate mitigation investment needs, but less access to global markets and less ability to attract private capital, as their financial and capital markets are less developed.

Climate investment flows have been increasing both globally and in EMDEs but remain limited (Naran and others 2022). Despite a proliferation of supportive financial sector policies and climate commitments by financial institutions, a substantive shift in financing flows from high- to low-emissions assets, in particular in EMDEs, has still not materialized.

Many EMDEs face fundamental challenges in attracting private sector capital—even before considering barriers specifically related to climate finance. About 40 percent of emerging market economies and nearly all developing economies do not reach an investment-grade rating or have no rating at all. As a result, most large institutional investors do not invest in these countries. In some EMDEs, high political risks, legal and institutional uncertainty, and implementation risks are hurdles that add to the already-high financing costs. In addition, the lack of well-structured, investable climate project pipelines is often an obstacle to the deployment of private capital. Furthermore, EMDEs still lack high-quality, reliable, and comparable climate-related data, making the assessment of risks and opportunities more complex for private investors.

Given the political hurdles of implementing carbon pricing and EMDE-specific challenges, a broad mix of policies is needed to create an attractive investment environment for private capital to support climate finance needs in EMDEs. Carbon pricing, as well as the reform of fossil fuel subsidies, can be highly effective in shifting private capital flows to low-emissions investments by providing a strong and credible price signal to investors. But carbon pricing may be politically challenging to implement and should be complemented with other policies (see Chapter 1 in the October 2023 *Fiscal Monitor*). Further structural policies are needed in EMDEs to mobilize domestic and international private climate finance, including structural reforms, strong climate policies and commitments, well-designed subsidies where fiscal space allows, and innovative financing approaches to phasing out coal.

A stronger climate information architecture—data, disclosures, and alignment approaches (including taxonomies)—is necessary to attract private investors in EMDEs. High-quality, reliable, and comparable data are a prerequisite to assess and price risks and opportunities and thus make informed investment decisions. A weak climate information architecture increases the risks of "greenwashing" (investments wrongly marketed or classified as climate-beneficial) and reduces market transparency.

Financial sector policies should refocus on fostering climate impact (such as a reduction in greenhouse gas emissions) to help mobilize private climate finance while considering EMDE-specific requirements. Current financial sector policies often

[1]The term "private finance" refers to financial flows not related to the public sector. Public sector sources are public institutions such as governments (all levels), multilateral development banks, national development banks, state-owned banks, and other state-owned entities.

focus on identifying activities and assets that are already "green." Transition taxonomies in EMDEs could help identify activities that could better align incentives and significantly reduce emissions over time, including in the most carbon-intensive sectors.[2] Transition taxonomies and other climate alignment tools should integrate measures for a managed phaseout of coal-fired power plants, given the need to leverage private finance. Disclosures and labels for sustainable investment funds should enhance market transparency, market integrity, and alignment with climate objectives to foster positive outcomes for climate impact. Climate impact scores should be constructed to better align climate outcomes with investor expectations on climate impacts.

Public–private risk sharing, including through enhancing the financial capacity and operating model of multilateral development banks (MDBs), is crucial to attract more private capital in EMDEs. Innovative financing instruments can help overcome the real and perceived hurdles to private investment in EMDEs. Blended finance, including the enhanced use of MDBs' and donors' guarantees, can greatly help to achieve derisking and broaden the investor base if designed well and used appropriately. In low-income countries, larger international public support is essential given the steep challenges in attracting private climate finance.

The IMF Resilience and Sustainability Facility (RSF) can help catalyze private capital by enhancing a country's capacity for climate investments with a combination of policy reforms, capacity development, and longer-term financing. Through its convening power, the IMF can bring together governments, MDBs, and the private sector to foster the financing of much-needed climate investments. The IMF can help strengthen public financial and climate investment management to support the development of a pipeline of investable projects and provide capacity development to support the collection of high-quality, reliable, and comparable climate-related data.

[2]Transition taxonomies aim to identify the types of activities, underlying technologies, and industrial processes that have the potential for substantial reduction in greenhouse gas emissions, allowing for a common understanding of investments conducive to a Paris-aligned transition. They differ from, say, green bond taxonomies, which typically identify technologies that are already low carbon.

The Crucial Role of Private Finance

Large volumes of climate mitigation investment are needed by 2030 (Figure 3.1, panel 1). To achieve net zero greenhouse gas emissions by 2050, global gross climate mitigation investment will need to reach about $5 trillion annually by 2030.[3] Although there are notable uncertainties around these estimates, the most widely used projections suggest that about 60 to 70 percent of investment needs are in the energy sector.

Climate mitigation investment needs in EMDEs are projected to increase to $2 trillion by 2030, which represents about 40 percent of global mitigation investment needs. This translates to about 12 percent of total investments in EMDEs in 2030, a fourfold increase from the current share of about 3 percent (Figure 3.1, panel 2).

Private capital is key for financing climate investment needs, both globally and in EMDEs. Judging from the IMF's country-by-country gross investment projections, the growth in total public investment will not cover the increasing climate investment needs by 2030. Private capital would have to account for a much larger share of climate investment needs than the current 40 percent in EMDEs (Figure 3.1, panel 3).[4] In a scenario in which the share of climate investments in total public investment increases by a factor of 1.5 from current levels, the private sector would have to cover 80 percent of climate investment needs in EMDEs by 2030 (see Online Annex 3.2 for details). When China is excluded, it is more than 90 percent. China has ample domestic financial resources, and the public sector has played a significant role in funding climate investment needs, including through state-owned entities.

Climate mitigation, however, is only one part of the challenge. Adaptation finance is also important, because EMDEs need to build resilience against the future physical effects of climate change and compensate for economic and social consequences.

[3]This projection refers to gross investment needs as estimated by the International Energy Agency. All projected investment needs reported in this chapter are adjusted for inflation and are expressed in 2020 US dollars. A large share of climate mitigation investments is expected to come from a reallocation of investment with a relatively small net increase in investment at around 1 percent of GDP (see IMF 2021). The estimate includes investments due to increasing energy demand driven, for instance, by economic development. See Online Annex 3.1 for details.

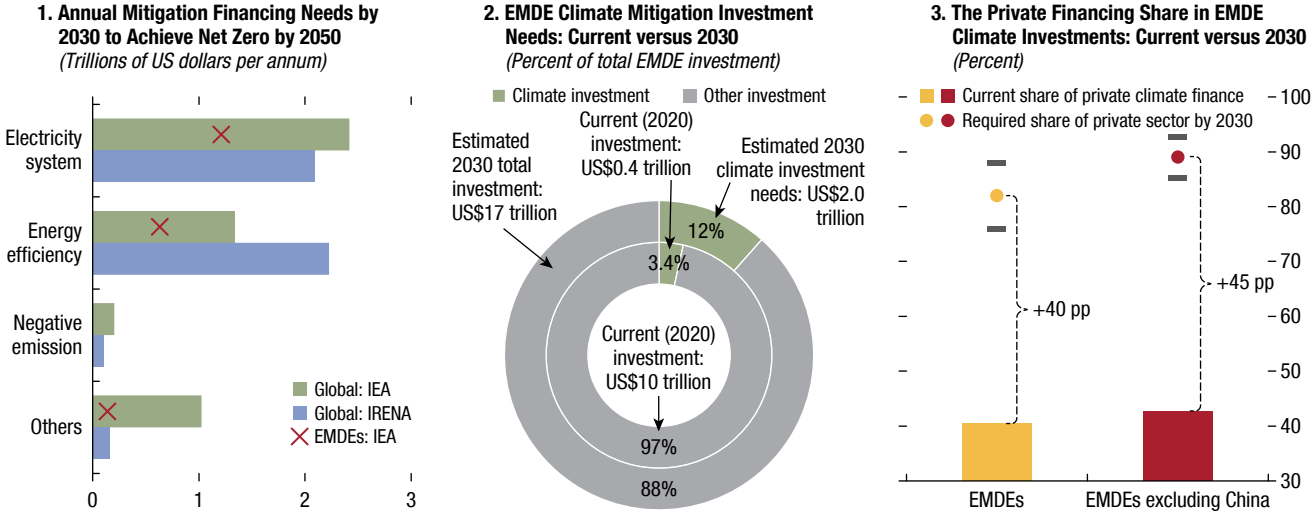
[4]The private sector share of climate finance is calculated as the residual of climate investment needs not covered by the public sector. Gross public sector investment in 2030 is based on IMF projections. See Online Annex 3.2 for details.

Figure 3.1. Estimated Climate Investment Needs and the Key Role of Private Finance

Global climate investment needs are estimated to increase to about $5 trillion per annum by 2030.

Climate mitigation investments in EMDEs need to increase to 12 percent of their total investments ...

... with private finance having to cover a major share of climate mitigation investments.



Sources: Climate Policy Initiative; International Energy Agency 2021, 2023a; International Renewable Energy Agency 2023; and IMF staff calculations.
Note: Amounts in panels 1 and 2 are inflation adjusted. In panel 1, investment needs refer to a net zero greenhouse gas emissions by 2050 scenario. In panel 3, the maximum (minimum) range refers to a scenario where the climate share of public investments stays the same (doubles) as the current level. The point estimate is based on a public climate financing share that increases by a factor of 1.5 until 2030. See Online Annexes 3.1 and 3.2 for details. EMDEs = emerging market and developing economies; IEA = International Energy Agency; IRENA = International Renewable Energy Agency; pp = percentage points.

This is especially the case in developing economies, which are often strongly affected by climate change but may not have the necessary capacity to adapt. Although current adaptation investments are small relative to mitigation investment needs, they may grow significantly if climate mitigation efforts fall short and climate hazards intensify (see Chapter 2 of the October 2022 *Global Financial Stability Report*).

Barriers to Deploying Private Climate Finance in EMDEs

A major constraint to attracting private investment is the lack of an investment-grade sovereign credit rating for many EMDEs. Only about 60 percent of emerging markets and a mere 8 percent of developing economies have an investment-grade rating.[5] The sovereign rating also serves as a benchmark for the credit rating of private entities (the "rating ceiling"). The distinction between instruments rated "investment grade" versus those rated "below investment grade" is of utmost significance in international capital markets, effectively determining the potential investor base. Many fiduciaries define their sole eligible investments as those rated "investment grade." Various banking and insurance regulations discourage, if not prohibit, regulated entities from holding non–investment-grade investments.

Current methodologies of credit rating agencies do not reward middle- and lower-income countries that implement better climate policies. Climate-related policies are highly relevant for the long-term ability of sovereigns to service their debt. Yet, middle- and low-income countries do not benefit from effective energy transition policies in terms of improved credit ratings or outlooks, despite credit rating agencies claiming to consider credit-material environmental, social, and governance (ESG) factors in their ratings (Box 3.1). As long as this practice persists, the potential benefits of climate investments for credit ratings and thereby financing costs are limited.

Supply of capital to EMDEs is strongly driven by capital allocation decisions of global financial institutions, and allocations to EMDEs are significantly below their contribution to global GDP or their growth potential. Most large institutions appear to use "top-down"

[5]Among developing economies, 58 percent have a rating below investment grade, and 34 percent have no sovereign rating at all. See Online Annex 3.3.

allocation models based on historical data. Several large investment institutions avoid EMDEs altogether. Market participants suggest that investors are concerned, among other things, about (1) the perceived risk–return profiles of investments in EMDEs not being in line with institutional investors' risk-bearing capacity; (2) difficulties in navigating EMDEs' perceived complexities; (3) reputational risk of investing in markets with inadequate governance, poor institutional capacity, and an uncertain policy environment; and (4) in particular for climate finance, increasingly stringent ESG regulations in advanced economies, which raise compliance risks and costs for EMDE investments. More specialized firms actively seeking EMDE investments typically take advantage of informational asymmetries to identify quality investment opportunities. Although these investors understand the full complexity of EMDEs and invest resources into actively developing these capabilities, their scale is still limited.

Investors who seek EMDE investment opportunities cite several constraints to deploying their capital. EMDEs lack well-structured, investable project pipelines in local markets that meet the risk–return requirements of private investors. The bankable projects in lower-income countries are driven primarily by MDBs and their own balance sheet deployment, with limited participation from the private sector. Project implementation in EMDEs often faces slow disbursements, regulatory changes, and typically long timelines well beyond those required in the private sector. Typical projects are small, apart from some large infrastructure projects. The dearth of pooled investments at scale leads to high due diligence costs and lack of diversification, foiling participation of global institutional investors.

Project execution in EMDEs is further complicated by low domestic capital market development. Lower- and lower-middle-income countries do not have established or mature capital markets.[6] Low financial and capital market development limits domestic resource mobilization and deters international investors. In addition, even EMDEs with more developed capital markets may have complex operating environments such as withholding taxes, local regulatory restrictions, and potential currency repatriation restrictions.

[6]See, for instance, the IMF's Financial Development Index Database, which summarizes how developed a country's financial markets and institutions are in terms of depth (size and liquidity), access (ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues and level of activity of capital markets).

Challenges in managing foreign exchange risk are often cited as impediments to meaningfully scaling up private climate finance in EMDEs. The management of foreign exchange risk is challenging for climate finance in EMDEs, so investors resort to climate investments with limited or no foreign exchange risk exposure. Foreign exchange risk can thus hinder cross-border investment flows and local debt market development. Commercial hedging options exist, primarily in larger EMDEs, but tend to be expensive, with limited liquidity, and incomplete, especially at the tenor and size needed to support large-scale, long-term projects. Market hedging options are virtually nonexistent in smaller emerging markets and low-income countries.

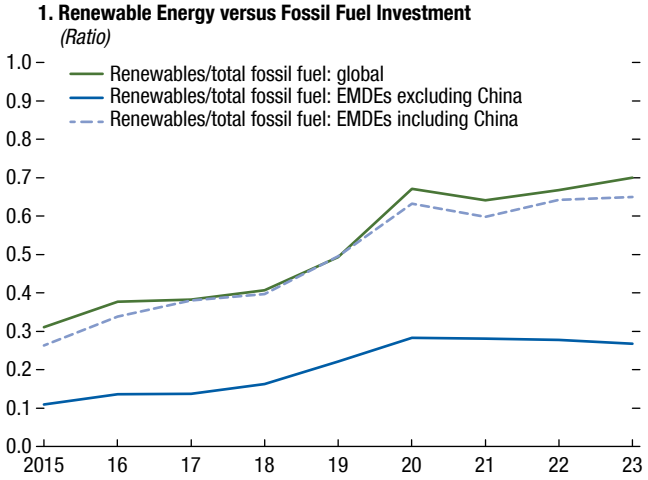
Potential Limits to the Speed of the Energy Transition in EMDEs

In addition to broad barriers to private capital, EMDEs face several hurdles specific to the transition to renewable energy while phasing out fossil fuels. Renewable energy production and distribution has high upfront fixed capital costs (for example, solar panels and electricity grids with energy storage capacity), whereas subsequent marginal costs tend to be lower. Renewable energy projects typically carry significant policy risks, especially in EMDEs—a risk that companies struggle to price and manage compared to conventional market risks. To implement these projects, a number of issues need to be addressed, such as prerequisite infrastructures, intermittency of renewables and storage capacity, supply chain issues, permits (often in multiple jurisdictions or involving multiple regulations), and integration into the electricity distribution network. Due to a combination of policy uncertainty and risk premium for EMDEs, renewable energy in EMDEs is financially less attractive than in advanced economies. In some major emerging markets, high borrowing costs more than double the cost of renewable electricity production.[7]

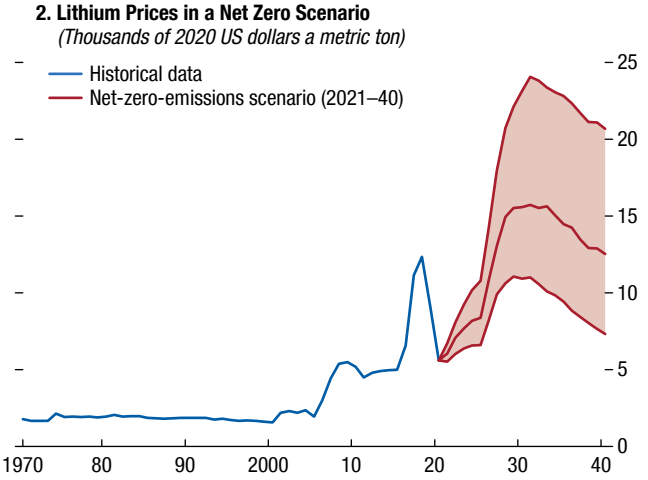
[7]A recent report by the International Energy Agency (2023a) states, "For the moment, the cost of capital for a typical utility-scale solar project can be two or three times higher in key emerging economies than in advanced economies or China, reflecting real and perceived risks at the country, sectoral and project levels. Tackling these risks and bringing down the cost of capital will require new and better ways of working between the public and private sectors." See also the International Energy Agency Cost of Capital Observatory (https://www.iea.org/reports/cost-of-capital-observatory/tools-and-analysis#abstract).

Figure 3.2. Renewable Energy Investment in EMDEs and Lithium Price Projections

Renewable energy investment in EMDEs (excluding China) is still lagging behind fossil fuels ...



... while expected increases in the prices of critical metals such as lithium could slow the renewable energy transition.



Sources: Boer, Pescatori, and Stuermer 2023; International Energy Agency 2023b; and IMF staff calculations.
Note: Bands in panel 2 show the confidence interval around price estimate. See Boer, Pescatori, and Stuermer 2023. EMDEs = emerging market and developing economies.

Despite recent improvements, investment in renewable energy in EMDEs (except for China) still lags behind investments in fossil fuel (Figure 3.2, panel 1). Estimates suggest that a target ratio of about 4:1 for renewable over fossil fuel investment is required globally throughout this decade (Bloomberg NEF 2022). In addition, total fossil fuel subsidies have surged to a record high in 2022 and are expected to increase further in EMDEs (IMF 2023).

At the same time, actions taken by advanced economies could slow the renewable energy transition in EMDEs. As advanced economies accelerate their energy transition, the supply of critical metals and minerals is projected to fall short of demand, putting upward pressure on their prices and further raising the costs of renewable energy (Figure 3.2, panel 2).

A phaseout of coal is necessary to reach climate goals, considering that coal-based energy production is the single largest source of greenhouse gas emissions globally (about 20 percent). Amid a surge in coal-fired power capacity since 2000, EMDEs now account for three-fourths of the world's 9,000 coal-fired power plants and about 90 percent of the global capital tied in coal-fired power plants (World Bank 2023). However, only about 20 percent of current coal-fired generation is covered by agreements among countries to phase out coal or stop developing new power plants (International Energy Agency 2022).

The scale and age of coal-fired power plants in EMDEs create unique challenges to phasing out coal. Across EMDEs, coal dependence differs considerably (Table 3.1). Power plants are still relatively young in EMDEs (about 40 years in the United States compared with less than 15 years in the Asia Pacific region, for example). On average, it takes about 43 years to phase out coal after a peak in coal consumption per capita has been reached (IMF 2020).

Phasing out coal-fired power plants in EMDEs implies significant costs in terms of decommissioning, retirement, and social adjustments. Net financial value of coal-fired power plants is lost when such plants are retired before their expected lifespan, as capital expenditures cannot be recovered. Yet, phasing out coal could yield considerable net economic and social gains—potentially about $85 trillion (Adrian, Bolton, and Kleinnijenhuis 2022)—especially given the availability of increasingly lower cost renewable energy alternatives.

Measures to phasing out coal need to be tailored to country characteristics, with innovative and tailored financing solutions. This includes appropriate sequencing for retirement of coal-fired power plants, involving

Table 3.1. Coal Dependence in Selected EMDEs

Categories of Coal-Using Economies	EMDE Examples
Phasing out coal	Chile, Kazakhstan, Romania
Established coal user economy	Cambodia, China, India, Morocco, Myanmar, Thailand, Türkiye, Ukraine
Expanding coal-fired capacity (large coal project pipeline)	Bangladesh, Côte d'Ivoire, Ethiopia, Kenya, Mongolia, Mozambique, Pakistan, Philippines, Sri Lanka, Tanzania, Vietnam
High export dependence on the coal extractive industry	Colombia, Indonesia, South Africa, Venezuela

Sources: Steckel and Jacob 2022; and IMF staff illustration.
Note: EMDEs = emerging market and developing economies.

public and private counterparts, regulatory reforms, and consideration of development and social priorities. Experience from the Just Energy Transition Partnerships (Indonesia, Senegal, South Africa, Vietnam) will be highly valuable in this context. Coal-exporting countries will require an economic diversification strategy, alongside socioeconomic ("just transition") considerations. A country's capacity to plan and prepare managed coal phaseouts is often a bottleneck. In addition, mobilizing global investors and using a range of financial structures (Climate Policy Initiative, Climate Bonds Initiative, and RMI 2022), including blended finance and securitization instruments to repurpose or retire coal-fired power plants, can be challenging. There are no standardized criteria for repurposing of plants, and coal phaseout plans are currently not eligible in transition finance frameworks and taxonomies.

Capital investment in the energy sector continues to flow into fossil fuels, which are responsible for 75 percent of global greenhouse gas emissions, increasing carbon lock-in risks while delaying diversification in the energy sector. Because energy security concerns may complicate the low-carbon transition in the short term, it is crucial to align investments with climate goals given the limited potential for repurposing of fossil fuel infrastructure. So far, capital expenditures in the coal industry have remained stable despite policy support for investments in clean energy (Figure 3.3, panel 1).[8]

[8]Policies include the 2022 REPowerEU and the 2023 Green Deal Industrial Plan in the European Union, the Inflation Reduction Act of 2022 in the United States, and China's 14th Five-Year Plan on Renewable Energy Development and Modern Energy System.

Such a trend is driven by strong demand and high coal prices, especially in China and the rest of the Asia Pacific region (International Energy Agency 2023b). Further investments increase the risks of coal-fired power plants continuing to operate for longer than desirable (so-called carbon lock-in).

Capital investments continue apace in the oil and gas sectors, whereas the sector's low-carbon investments remain limited. Although capital expenditures in the oil and gas sector have rebounded in 2022, their low-carbon component (for example, investments to diversify energy operations, such as in solar cells, onshore and offshore wind, and carbon capture and storage technologies) have been insufficient despite a 300 percent increase between 2020 and 2022 (see Figure 3.3, panel 2). Capital expenditure forecasts for new oil and gas fields remain high, especially in EMDEs, accounting for roughly 75 percent and 95 percent of energy industry investments by 2030 and 2050, respectively. Nonlisted companies in EMDEs account for about one-third of investment plans in new oil and gas capacity (Figure 3.3, panel 3). Nonlisted companies are typically subject to less outside pressure from shareholders and stakeholders to decarbonize their operations. Meanwhile, national oil companies have started to diversify and decarbonize because of growing pressure, as they depend heavily on international capital (Palacios 2021).

Government climate policies can help limit fossil fuel expansion, especially in oil- and gas-dependent EMDEs. Indicators of current climate policies, emission-reduction targets, and governments' nationally determined contributions under the Paris Agreement tend to be negatively correlated with capital expenditure estimates for oil and gas fields by 2030 in EMDEs (Figure 3.3, panel 4).

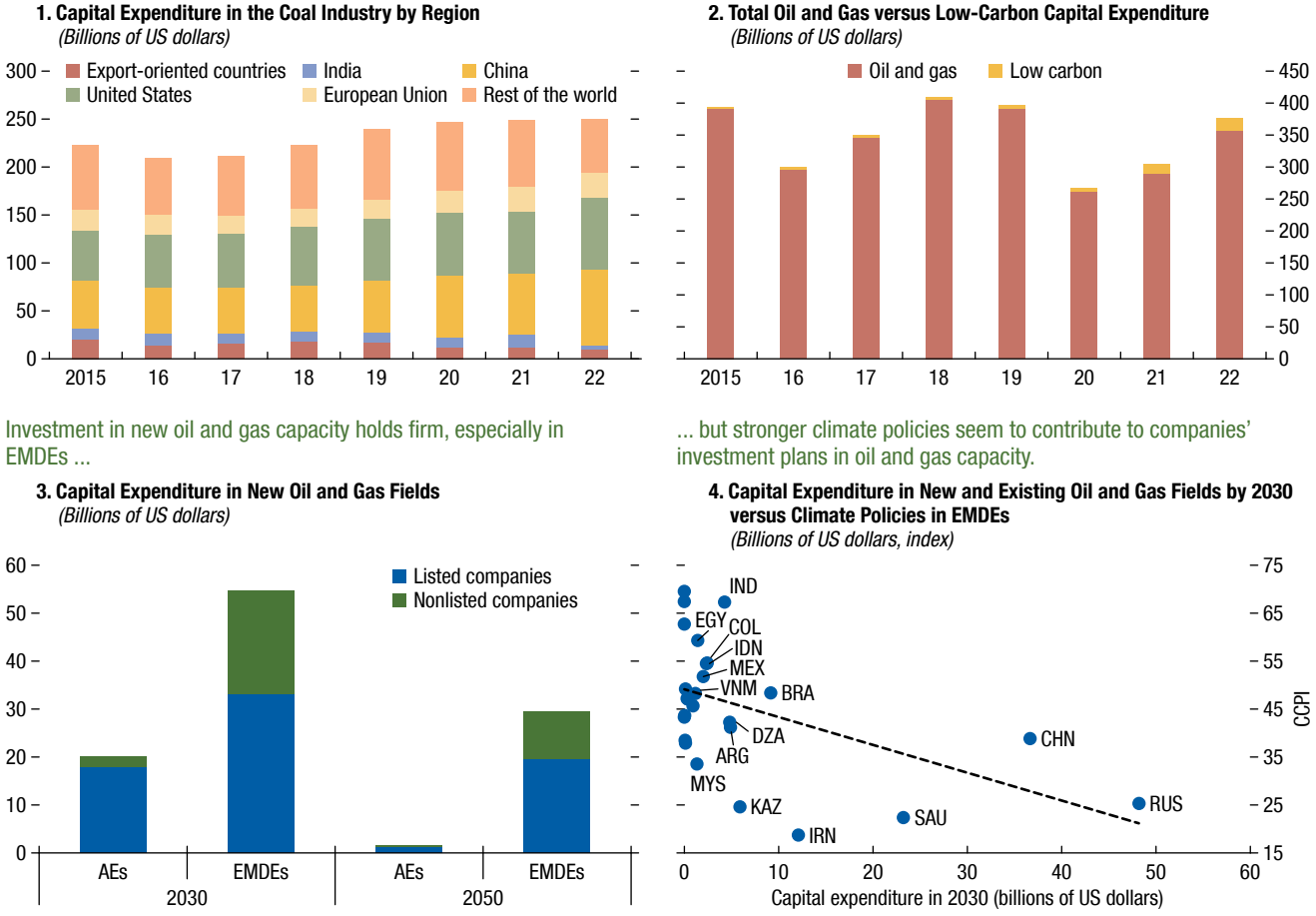
Lack of Climate Impact of Financial Institutions' Commitments and Policies

An assessment of the climate policies of 30 global systemically important banks (G-SIBs) demonstrates the need for more ambitious alignment with net zero targets. Some banks incorporate the exclusion of project finance to new greenfield coal mines and power plants in their policies related to their lending portfolios and investment activities (Figure 3.4, panel 1, "Exclusion of project finance to coal mines, plants, and infrastructure").

Figure 3.3. Fossil Fuels Investment Trends Are Not Yet Aligned with Climate Goals

Investment is holding steady in the coal industry ...

... while low-carbon investment in the oil and gas industry remains extremely limited.



Investment in new oil and gas capacity holds firm, especially in EMDEs ...

... but stronger climate policies seem to contribute to companies' investment plans in oil and gas capacity.

Sources: Bloomberg Finance L.P.; Germanwatch e.V.; International Energy Agency 2023b; Rystad; Urgewald Global Coal Exit List 2022; and IMF staff calculations.
Note: Panel 2 only includes production capital expenditure. "Low-carbon capital expenditure" refers to capital expenditure in renewable power; grids; storage; carbon capture, usage, and storage; and energy efficiency. In panel 4, data from the CCPI are as of 2021. CCPI evaluates climate change performance based on greenhouse gas emissions, renewable energy, energy use, and climate policy. Climate policy is assessed both in its design and in its effective implementation. The CCPI ranking method sets zero as the bottom cutoff, and 100 points are the maximum a country can achieve. Data labels in panel 2 use International Organization for Standardization (ISO) country codes. AEs = advanced economies; CCPI = Climate Change Performance Index; EMDEs = emerging market and developing economies.

Most of them, however, have no policy or weak criteria regarding the provision of financial services for coal expansion or net-zero-aligned coal phaseout ("Net-zero-aligned coal phaseout policy" and "Limitation of financial services to coal expansion"). Policies targeted at transition financing of the oil and gas industry are even more limited ("Net-zero-aligned oil and gas policy").

Global insurers' climate policies have also shown limited success to date in aligning underwriting and investment portfolios to net zero targets (Figure 3.4, panel 3). Major Asian and North American insurance companies have not published such policies, whereas European ones have recently adopted more restrictive criteria for coal investment and underwriting, such as the exclusion of coal expansion.

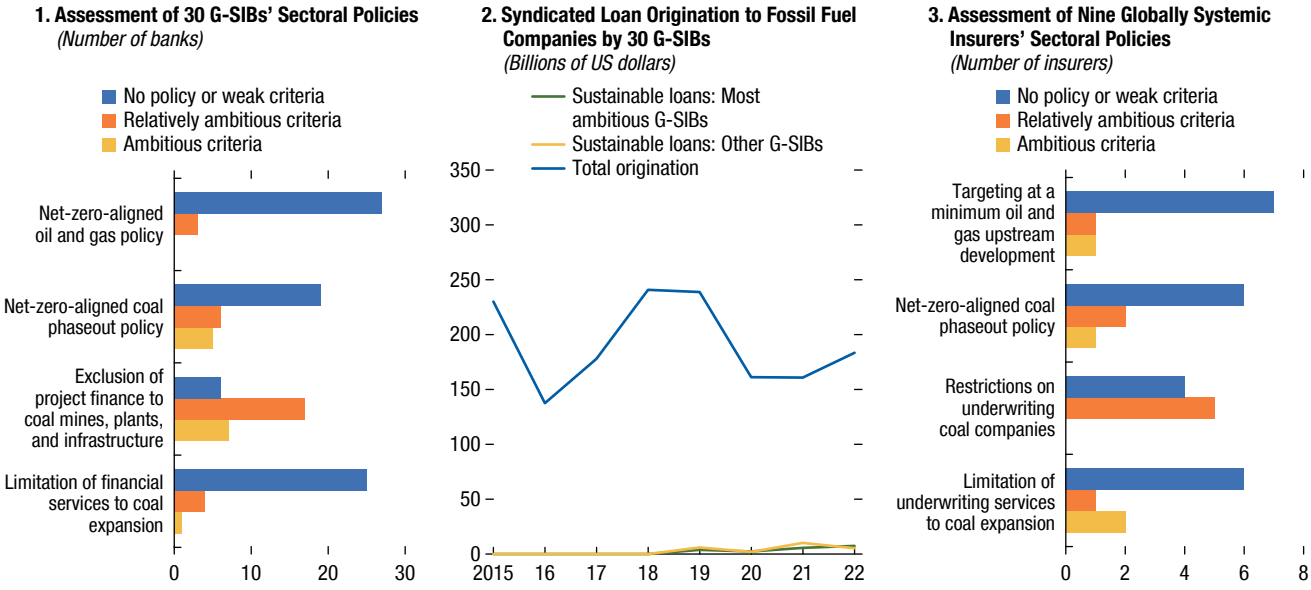
Climate policies by large banks and insurers (potential large investors in EMDEs) tend to overlook transition financing needs. Without mandatory alignment or disclosure policies and meaningful carbon pricing, banks appear to continue to provide financing to fossil fuel firms without properly pricing the risk of stranded assets (Beyene and others 2021). There is a disconnect between banks' climate

Figure 3.4. Banks' and Insurers' Climate Policies Lack Robust Alignment with Net Zero Targets, as Banks' Loan Origination to Fossil Fuel Companies Remains Strong

Major banks' policies on fossil fuels still show limited ambition ...

... which is reflected in syndicated loan originations, including for banks with more ambitious policies.

Insurers' climate policies also lack ambition.



Sources: Dealogic; and IMF staff assessment and calculations.
Note: For panels 1 and 3, the description of the assessment methodology is detailed in Online Annex 3.4. In panel 2, fossil fuel companies are classified based on Standard Industrial Classification. Syndicated loan data were used because they capture a significant part of the energy sector credit (Weyzig and others 2014). Sustainable loans include both green loans and ESG-linked loans. If one loan contains multiple lead banks, loan value is equally allocated to each lead bank. ESG = environmental, social, and governance; G-SIBs = global systemically important banks.

disclosures and their carbon-intensive lending that is not offset by a greater low-carbon lending activity (Gianetti and others 2023). G-SIB lending to fossil fuel companies has remained stable since the Paris Agreement and increased in the aftermath of the pandemic (Figure 3.4, panel 2). The share of sustainable loans to these same companies has been minimal. G-SIBs that have been assessed as most ambitious based on their sectoral policies have not seen a greater increase in sustainable loans than their less ambitious peers. Yet, research has shown the positive effect of banks adopting stricter climate policies on energy sector decarbonization. Coal-fired power plants owned by companies dependent on banks with stricter climate policies are more likely to be retired or repurposed, contributing to lower emissions (Green and Vallee 2023). In the private equity sector, limited disclosures constrain the assessment of their fossil fuel exposure as their fossil fuel investments have been increasing (Giachino and Mehta-Neugebauer 2021).

Investment Funds and Climate Impact

Investment funds have emerged as important players in mobilizing private capital for sustainable investments. Sustainable investment funds have grown considerably faster than conventional funds, especially since 2019 (Figure 3.5, panel 1).[9] Funds that incorporate ESG characteristics into their investment strategies are the largest category, whereas "sustainability-themed" funds incorporate one or more sustainability themes into their investment approach. Nonetheless, climate impact investment funds, dedicated to addressing climate change and supporting the shift toward a low-carbon economy, remain small (see Online Annex 3.5 for details).

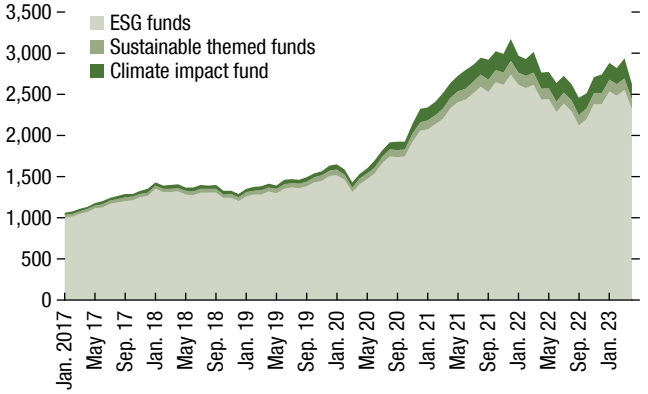
Climate impact funds allocate a larger portion of their portfolios to EMDE assets (equities and

[9]Since 2019, sustainable funds have consistently maintained positive net flows and outperformed conventional funds, except for brief instances in 2022 and 2023 (so far).

Figure 3.5. Sustainable Investment Funds Are Growing Fast, But Their Climate Benefits Are Uncertain

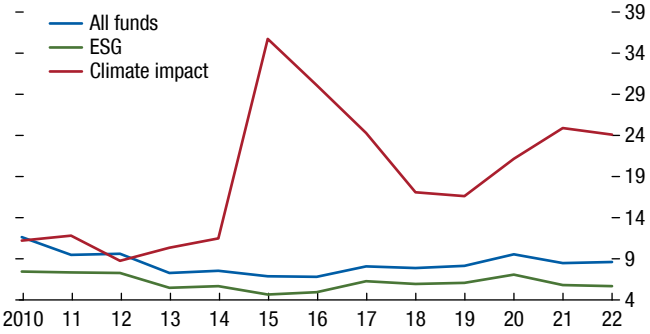
Despite the rapid growth in ESG investing, the share of funds dedicated to climate impact remains very small.

1. Assets under Management of Sustainable Investment Funds, by Fund Label
(Billions of US dollars)



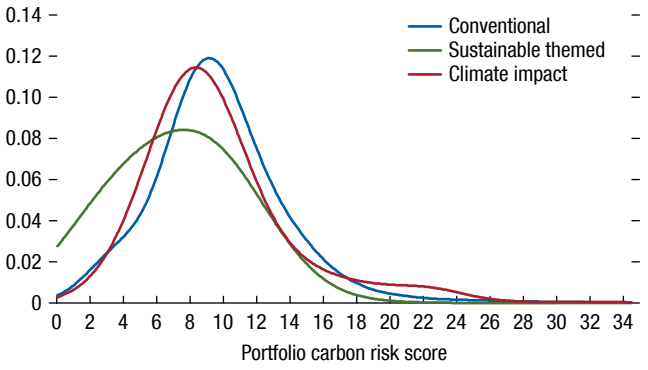
Climate impact funds tend to have high allocations to emerging market equities and bonds.

2. Funds Allocation to EMDEs, by Fund Label
(Percent of total fund size)



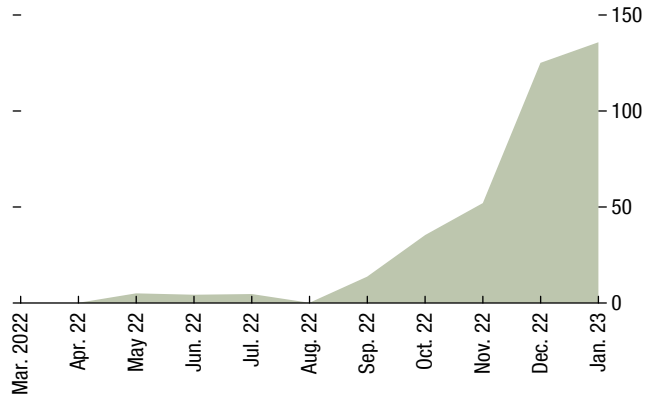
Some funds are not as "green" as the label suggests, as illustrated by the distribution of portfolio carbon risk scores.

3. Portfolio Carbon Risk Score Distribution
(Probability mass)



The SFDR in the European Union brought a wave of reclassifications from Article 9 ("dark green") to Article 8 ("light green").

4. Assets under Management for Funds Downgraded from Article 9 to Article 8
(Billions of US dollars)



Sources: Morningstar; and IMF staff calculations.
Note: Panel 1 shows the assets under management by fund labels as constructed by Morningstar (see Online Annex 3.5). EMDEs = emerging market and developing economies; ESG = environmental, social, and governance; SFDR = Sustainable Finance Disclosure Regulation.

bonds) compared with other types of funds—about one-quarter of their total assets under management. This share is considerably higher than for other investment funds (Figure 3.5, panel 2). ESG funds (a much larger category) allocate only a small share of their portfolio to EMDE assets, and this allocation is mostly concentrated in major emerging markets (see Chapter 2 of the October 2022 *Global Financial Stability Report*).

However, a significant number of climate impact funds contain assets with meaningful transition risks. Morningstar's carbon risk score and similar measures can be used to assess the transition risk of fund portfolios (see Online Annex 3.5). The carbon risk score distribution for climate impact funds closely resembles that of conventional funds, and the right tail indicates even higher transition risks for a sizable share of these funds (Figure 3.5, panel 3). Such exposure does not appear in line with their intended

purpose of directing investments toward low-carbon finance, suggesting that some of these funds might not be as green or sustainable as their label suggests.[10]

The EU Sustainable Finance Disclosure Regulation (SFDR) imposes mandatory ESG disclosure obligations for asset managers and other financial market participants. Under the SFDR disclosure requirement classification system, funds fall into one of three categories: Article 6 (no sustainability focus), Article 8 ("light green," promoting environmental characteristics), or Article 9 ("dark green," a clear objective of sustainable investment). The requirements, enacted in February 2023, apply to all funds operating in Europe and brought a wave of reclassifications from dark green to light green funds (Figure 3.5, panel 4). Initial analysis (see Online Annex 3.5) suggests that funds classified as dark green attracted higher inflows compared with Article 6 funds. This suggests that disclosure requirements such as those in the EU SFDR can enhance transparency and channel capital toward verified sustainable investments.

E Scores and Climate Impact: The Case for New Types of Impact Scores

Corporate ESG scores are a key ingredient of ESG-style funds. In implementing their ESG investment strategies, many investment managers use ESG scores and subscores (such as E, S, or G pillar scores), often from a several providers. The current design of corporate ESG scores, however, does not appear to steer private finance to investments with a positive climate impact (Elmalt, Kirti, and Igan 2021).

Corporate ESG scores are designed to capture nonfinancial risks and are not necessarily aligned with climate impact. The purpose of the most commonly used corporate ESG scores, and the E (environmental) pillar scores, is to capture the nonfinancial risks a firm is exposed to.[11] This is different from a firm creating a positive (or negative) climate impact. A renewable energy firm, for example, can be subject to high climate risks, even though it creates a significant positive climate impact (by reducing the carbon intensity of electricity generation).

Three construction features of corporate ESG scores reduce their ability to reflect the degree of impact:

1. ESG scores combine a multitude of data points to capture a wide range of nonfinancial risks. Only a relatively small subset of data points, however, may be related to creating ESG impact.
2. ESG scores are not necessarily proportional to ESG performance. A firm is not necessarily twice as "good" as another if its ESG score is twice as high.
3. Corporate ESG scores are industry specific. Corporate ESG scores are constructed to be relative to firms in the same industry. A firm in the materials sector with a high carbon intensity may score relatively well, as other firms in the sector tend to have high emissions as well. However, in terms of climate impact, it does not matter how this firm compares with others in its industry, but only how carbon intensive its activities are.

New types of climate impact scores can be constructed using the data corporate ESG scoring providers already collect. Online Annex 3.6 provides the details of how such a score could be constructed with data from one ESG provider.[12] The scores cover about 10,300 listed firms, of which more than 2,700 are incorporated in emerging markets.[13] The design principle of the newly constructed impact scores is twofold. First, the scores consider only data points that directly reflect climate impact (16 data points out of 64 used for the E score), capture current climate performance (for example, carbon intensity), and contain information about potential future emission reductions (for example, emission reduction targets). Second, the impact scores are calculated so that a significantly higher value maps into significantly better climate impact characteristics, independent of the industry to which a firm belongs.

Impact-oriented scores, particularly for climate impact, could be useful to asset managers and foster transparency for investors. Although corporate ESG scores focus on nonfinancial risks, investors may nevertheless expect firms with better ESG or E scores to also have lower carbon emission intensities. This correlation, however, is usually weak or even positive (firms with

[10]The results are robust to including other related transition scores such as portfolio carbon risk exposure and portfolio carbons stranded assets exposure scores.

[11]See, for example, MSCI (https://www.msci.com/our-solutions/esg-investing/esg-ratings) or Sustainalytics (https://www.sustainalytics.com/esg-ratings).

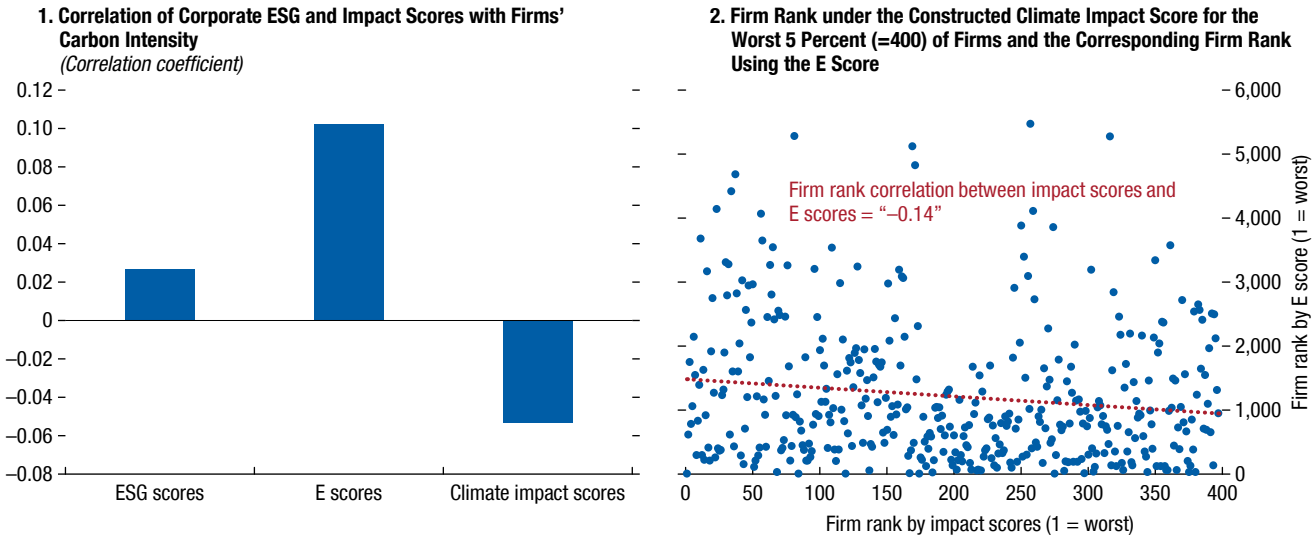
[12]Refinitiv is one of the few data providers that supplies the underlying data points of their ESG scores, as is Sustainalytics.

[13]See also Chapter 2 of the October 2022 *Global Financial Stability Report*, which provides a detailed analysis on ESG scores of EMDE firms.

Figure 3.6. Newly Constructed Impact Scores versus E Scores

Contrary to expectations, firms with higher carbon intensities can have higher ESG or E scores.

A common "negative screening" investment strategy that underweights or excludes the worst firms would affect different firms using an impact versus an E score.



Sources: Refinitiv; and IMF staff calculations.
Note: In panels 1 and 2, all correlations are statistically significant at the 1 percent level. Correlations between ESG/E scores with carbon intensity are rank (Spearman) correlations as these scores are ordinal. ESG = environmental, social, and governance.

better scores, counterintuitively, tend to have higher emission intensities). Impact scores could better reflect such investor expectations (Figure 3.6, panel 1). Impact scores could also help in the construction of portfolios at impact funds, which tend to have relatively high EMDE asset allocations (see previous discussion).

Climate impact–oriented scores would yield a substantially different ranking of firms than E scores.[14] Firms within the worst 5 percent (rank < 400) under the impact score can have a significant higher rank under the E score (Figure 3.6, panel 2). For investors that would consider using impact scores, this could significantly affect portfolio allocations. For instance, under a negative screening strategy commonly used by ESG fund managers, firms with the worst scores are excluded or underweighted. Using the impact versus the E score would produce significantly different portfolio allocations by underweighting or excluding different firms.[15] Although specific results depend on the ESG data provider, this outcome reflects the fundamental difference between scores focusing on nonfinancial risks and climate impact.[16]

Policy Recommendations

Given the political hurdles of implementing carbon pricing and EMDE-specific challenges, a broad mix of policies is needed to create an attractive investment environment and unlock private climate finance in EMDEs. Carbon pricing can be highly effective in pricing climate externalities and creating transition opportunities and can shift capital flows toward low-carbon investments. It can also increase the effectiveness of financial sector policies by providing a strong and credible price signal to investors. However, carbon pricing, which involves a range of design options influencing its distributional and social effects, may be politically challenging and needs to be complemented with other policies (see Chapter 1 of

[14]To make the scores comparable and reflect their use by investment managers, the scores are used to create a firm ranking.

[15]Portfolio allocations would also shift using a best-in-class strategy, which focuses on the best-ranked firms. See Online Annex 3.6.

[16]The underlying data points are generally different across data providers—both in the risk they aim to measure (scope) and in the indicator by which a given risk is measured (measurement). See Berg, Koelbel, and Rigobon (2022).

the October 2023 *Fiscal Monitor*). A first step is the reform of fossil fuel subsidies, which are at a record high and are projected to increase in EMDEs (IMF 2023). Strong climate policies and commitments, such as legally enshrined national commitments to achieve net zero emissions by a given date, provide a strong signal to private investors. Environmental regulation can set standards for activities or technologies and thereby spur climate innovation and financing. Green subsidies for both the adoption of existing technologies and research and development of new technologies can help accelerate the transition. But subsidies can create fiscal risks, as they can be expensive and distortionary if not designed well (Box 3.2). In some low-income countries, however, these policy options may not be feasible, and international support and policy initiatives are essential.

Authorities should strengthen the climate information architecture (data, disclosures, taxonomies). High-quality, reliable, and internationally comparable data are a prerequisite for efficient pricing of risks and opportunities and for making informed investment decisions. A strong climate information architecture can also help lower the risk of "greenwashing," thereby fostering market transparency and integrity. Yet such data are still lacking in many EMDEs. The disclosure standards proposed by the International Sustainability Standards Board will help create a global baseline and a valuable framework. To strengthen the climate information architecture, policymakers should find the right balance across geographies to reflect the local context and purpose, in particular in EMDEs given their unique challenges. They should consider factors such as the characteristics and maturity of the market, existing regulatory context, national decarbonization policy priorities, and climate financing needs.

Policymakers should implement structural reforms and policies aiming to overcome the fundamental barriers to investment in EMDEs, boost domestic resource mobilization, and attract private capital (Budina and others 2023). Cognizant of country context and circumstances, a range of long-term structural policies can help reduce capital costs and improve credit ratings—a crucial factor for international investors. These include strengthening macroeconomic fundamentals, deepening financial markets, improving policy predictability, and fostering institutional and governance frameworks. These policies also help mobilize domestic resources, key to boosting climate investments (Group of Twenty Independent Expert Group 2023). Green public investment in infrastructure can complement private innovation and investment in low-carbon technologies (see the October 2023 *Fiscal Monitor*). A predictable pipeline of quality projects that directly support a country's climate objectives is necessary to attract private investors.

Policymakers should support coal phaseout in EMDEs with innovative and tailored financing solutions. Transition taxonomies, other alignment tools, and planning frameworks should integrate measures for a managed phaseout of coal to support the commitments of corporations and financial institutions. A variety of financial instruments, including blended finance, should be used to enable the retirement and repurposing of existing coal-fired power plants. MDBs could support and accompany the development of renewable energy alternatives to new coal-fired power plants alongside country-level energy transition plans and in line with development priorities.

Just Energy Transition Partnerships can help EMDEs retire existing coal-fired power plants that would otherwise continue to operate for many years given their relatively long expected life span. With the help of public and donor financing, Just Energy Transition Partnerships can help minimize negative economic effects, supported by policies to boost renewable energy and address the social implications to ensure that workers and communities are supported (for example, through reskilling or social safety nets).

A refocusing of financial sector policies on climate impact would facilitate progress in mobilizing private capital for climate and could take account of the specific challenges faced by EMDEs. Financial sector policies, such as climate-related disclosure requirements, taxonomies, and standards for sustainable financial instruments and products should actively incentivize the transition toward and financing of a low-carbon economy. They should also cover climate adaptation, which is a core issue for EMDEs.

Regulators in EMDEs should consider developing transition taxonomies, a valuable alignment tool for mobilizing the financing of low-carbon activities. These taxonomies aim to identify activities with a potential for significant improvements in emissions over time and across sectors, including in the most carbon-intensive and hard-to-abate sectors such as steel, cement, chemicals, and heavy transportation. The emission reduction targets and criteria in transition taxonomies should be

connected to a country's nationally determined contributions, long-term strategies, and their supporting sectoral decarbonization targets. Countries should devise sectoral transition plans, particularly in the energy sector, as well as develop an investable pipeline of projects supporting the achievement of their objectives. The Activating Alignment report (Gardes-Landolfini and others 2023) identifies common principles and technical considerations to connect countries' climate plans and alignment approaches, such as taxonomies. In addition, building trust in transition finance, especially in EMDEs, involves the adoption of external independent sustainability reporting assurance standards and greater capacity building for assurers.

International climate disclosure initiatives should target the standardization of transition plans, including for financial institutions. Transition plans allow companies to communicate concrete climate-related objectives and targets, actions, and accountability mechanisms to achieve their emission reduction goals. Standardization is needed for transition plan targets and underlying metrics to allow comparisons across firms and to enhance the credibility of transition plans. Although global efforts are ongoing, interoperability remains a key objective. As emphasized by the Network for Greening the Financial System (2023), transition plans for banks could be a useful tool for microprudential authorities to develop a forward-looking view of whether the risks resulting from a financial institution's transition strategy are commensurate with its risk management framework. Climate policies and commitments by financial institutions should be more ambitious and forceful enough to mobilize sufficient private capital.

Regulators and supervisors should ensure that disclosures and labels for sustainable investment funds enhance market transparency, market integrity, and alignment with climate objectives to foster climate impact–oriented outcomes. Investment fund labels that credibly signal an alignment with greenhouse gas emissions objectives (for example, net zero emissions by 2050) are needed to promote the alignment of financial flows with climate goals. The use of sustainability labels is still lax, and regulators and supervisors should set clear rules and tighten enforcement to safeguard market transparency and integrity. This would benefit in particular EMDEs with functioning capital markets, as climate impact–oriented funds appear to have higher EMDE allocations than the much larger ESG funds.

ESG data providers should offer climate impact–oriented scores as a tool for fund managers and investors. Climate impact scores could be constructed with the data ESG rating providers already collect. Impact scores that better align climate outcomes and investor expectations could be a useful alternative metric to ESG scores. Regulators should consider evaluating the sufficiency of oversight for ESG ratings and data providers (IOSCO 2021).

Credit rating agencies and sovereign ESG methodologies need to be realigned to meet growing investor demand for sustainability and climate-aligned tools and products. These information intermediaries are critical in redirecting capital to green and sustainable investments, including in EMDEs. Many factors related to a country's long-term sustainability, such as mineral wealth, fossil fuels, and forest capital, could be material for a sovereign credit assessment but are not adequately reflected in sovereign credit ratings, especially for middle- and low-income countries. As ESG factors become relevant for investment decisions, sovereign ESG products need to evolve to better reflect climate factors and cover material differences across EMDEs in terms of exposure and opportunities related to climate change, energy and resource management, and land use and agriculture.

Public–private risk sharing is critical to foster climate private investments in EMDEs. Financing structures that allow for pooling, diversification, and credit enhancements can help reduce the cost of private capital and attract a broad range of institutional investors (see also Chapter 2 of the October 2022 *Global Financial Stability Report*). For example, blended finance structures allow the public sector (including MDBs, domestic governments, and development finance institutions), sometimes with the support of philanthropies, to improve the risk–return profile of investment opportunities and broaden the range of private investors. Technical assistance from MDBs is crucial to help build investment project pipelines and assist with project development and monitoring.

Expanded use of guarantees by MDBs and donors could be an effective instrument to reduce real and perceived risks in EMDEs and thereby broaden the potential private investor base. MDBs' ongoing discussions with the Group of Twenty and international community is an important step to enhance MDBs' financial capacity and operating models, based on recommendations made in the Capital Adequacy Framework Review

of the G20 (Group of Twenty 2023; Group of Twenty Independent Expert Group 2023). To further incentivize deployment of donors' guarantees in EMDEs, the Development Assistance Committee of the Organisation for Economic Co-operation and Development is actively engaging with members to reach a consensus on official development assistance eligibility of members' private sector instruments, treatment of loans to the private sector, as well as treatment of credit guarantees, following its decision in 2016 to pursue an enhanced enabling environment for partnerships with the private sector (OECD 2022). Policymakers should also consider whether there are regulatory barriers disincentivizing the use of MDB and donor guarantees by financial institutions such as by banks and insurance companies.

The RSF, supported by the convening power of the IMF, can act as a catalyst by bringing together governments, MDBs, and the private sector to foster the financing of climate investments. Although the total size of the Resilience and Sustainability Trust is small (about $40 billion) relative to global climate investment needs, reforms supported by the RSF can help create an enabling environment to attract private climate finance. Member countries may choose to use part of the fiscal space created by the RSF to provide risk-sharing and credit enhancement mechanisms to private investors, taking into account fiscal and debt sustainability considerations (Box 3.3). In combination with the traditional IMF programs, the RSF can also help address macroeconomic challenges in member countries, which in turn can mobilize domestic financial resources. The IMF Green Public Financial Management framework provides a holistic view of entry points and opportunities for integrating climate priorities into public financial management. The IMF Climate–Public Investment Management Assessment can help governments identify improvements in public investment institutions and processes to build low-carbon and climate-resilient infrastructure. The IMF can also provide capacity development, which may be needed particularly in low-income countries, to advance climate policies including the collection of high-quality, reliable, and comparable climate-related data.

Box 3.1. The Importance of Credit Rating Agencies and ESG Data Providers in Directing Capital Flows to Climate Investments in EMDEs

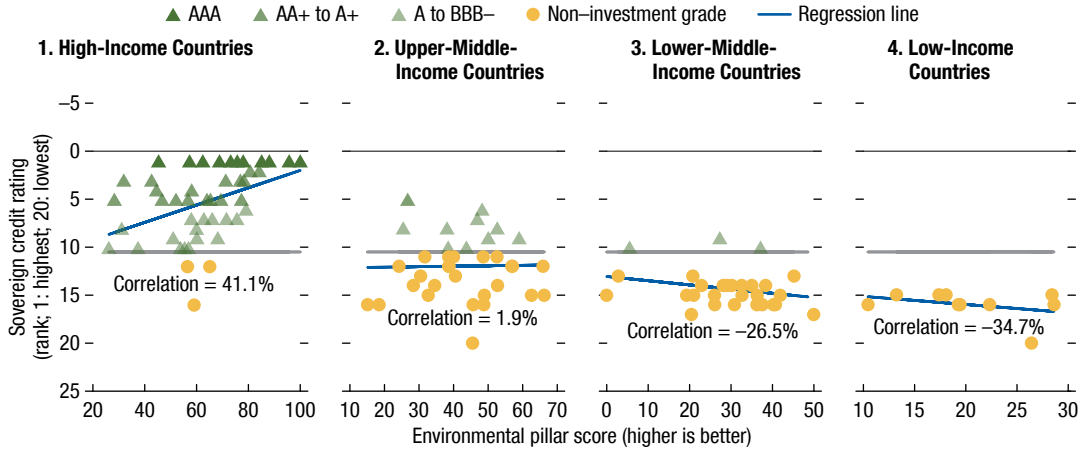
For nearly two centuries, credit rating agencies have aimed to assess the capacity and willingness of an issuer to meet its financial obligations on time and in full. Credit rating agencies have become crucial to the global financial architecture, influencing capital flows in emerging market and developing economies (EMDEs). With the increasing focus on sustainable finance, investors have sought another type of information that challenges traditional market practices regarding the key factors that determine sovereign credit risk, such as debt and fiscal risks—information that has a broader definition of sustainability and is complementary to financial and economic factors. This development has resulted in the now $7.7 billion environmental, social, and governance (ESG) industry, expected to quadruple by 2030. This industry aims to assess sovereign sustainability driven by changing societal perspectives on what constitutes investment "return."

However, the time horizon of events such as climate change or factors affecting a broader definition of a sovereign's long-term sustainability (such as mineral wealth, fossil fuels, and natural capital) poses several challenges to fully integrating these considerations in credit rating agencies' and ESG providers' sovereign methodologies. Notably, there is a disconnect between the current investment horizon considered by the financial industry and the horizon over which many ESG factors are expected to be material from a creditworthiness perspective. This significantly curtails the possibility of integrating these factors into sovereign credit assessments. Furthermore, the understanding of materiality of ESG and sustainability factors and how they will affect sovereign creditworthiness are still evolving, with notable limitations around modeling and comprehensive data (Gratcheva and others 2022).

Recent studies demonstrate how these challenges affect the industry's ability to direct capital to more sustainable investments in EMDEs. Gratcheva and others (2022) quantify how credit rating agencies' assessments of EMDEs fall short of fully reflecting these countries' preparedness for a low-carbon transition or their exposure to stranded asset risks because of these countries' dependence on the hydrocarbon sector. Furthermore, unlike high- and upper-middle-income countries, lower-middle-income and low-income countries are generally not rewarded for good E policies (Figure 3.1.1), such as climate mitigation and adaptation policies. EMDEs that

Figure 3.1.1. Sovereign Credit Ratings and ESG Risks

Better ESG scores only translate into better sovereign credit ratings for high-income countries; middle- and low-income countries do not benefit from better energy transition policies.



Source: Gratcheva and others 2022.
Note: The gray line distinguishes between investment-grade ratings (above) and non–investment-grade ratings (below).
ESG = environmental, social, and governance.

Box 3.1 *(continued)*

depend on fossil fuels and have exposure to high levels of stranded asset risks are not penalized.

Institutional investors increasingly rely on the assessment of ESG providers in making sovereign investment decisions. In contrast with the mature sovereign credit assessments by credit rating agencies, sovereign ESG methodologies are a nascent ESG segment, having emerged only in the last several years and continuing to evolve. In response to the growing focus on E factors, sovereign ESG score providers have increased the weight of the E pillar from an average of 23 percent in 2020 to 35 percent in 2023. Climate factors, however, are still not reflected by the majority of sovereign ESG scores. Furthermore, there is little agreement among sovereign ESG score providers on what constitutes good sovereign performance on environmental issues and what E factors are material (such as climate change, natural hazards, energy and resource management, and land use and agriculture) across countries with different income levels and in different regions (Gratcheva and O'Reilly Gurhy, forthcoming).

Box 3.2. Can Green Subsidies Substitute for Carbon Prices?

Recent IMF research (Capelle and others, forthcoming) highlights how policies that promote efficient production could help reduce emissions. This work draws on self-reported data on emissions for a global sample of more than 4,000 large, listed firms. Emission intensities—emissions scaled by revenues—vary dramatically in firms operating in the same industry and country. Indeed, comparing within firms that offer similar products, emissions per unit of production for the worst 10 percent of emitters are more than six times larger than those of the best 10 percent. These results hold for both emerging market and developing economies (EMDEs) and advanced economies. The heterogeneity in emission intensities is even larger within EMDEs after controlling for industry fixed effects.

In both EMDEs and advanced economies, environmental performance is driven by innovation and technology. Firms with fewer green operations use older physical capital stocks, are less knowledge-intensive and innovative, and are less productive (Figure 3.2.1, panel 1).

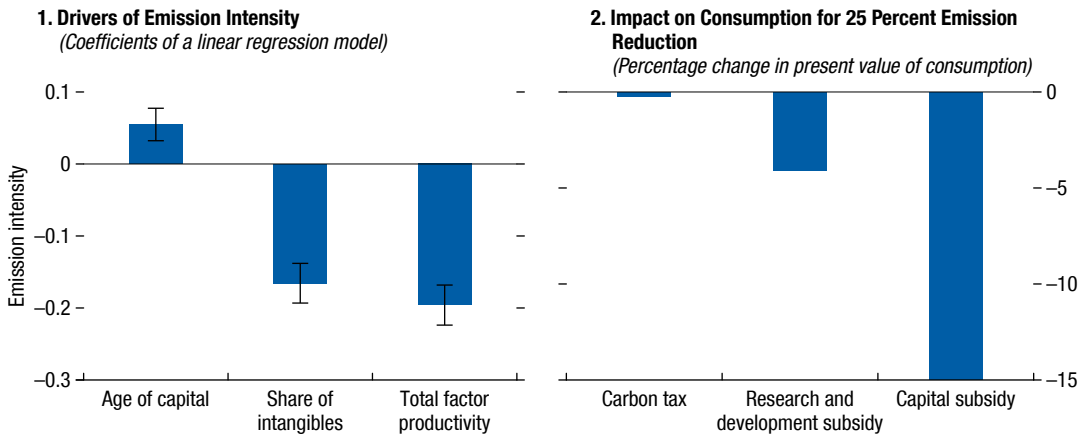
Could then subsidies that support innovation and better adoption of frontier technologies substitute for carbon pricing in cutting emissions? Capelle and others (forthcoming) present a granular general equilibrium model in which emissions are endogenously determined by choices about knowledge accumulation and capital vintage made by heterogeneous firms. The model is calibrated to match a rich set of empirical moments and can incorporate a range of policies including carbon taxation and subsidies for research and development and for adopting existing technologies.

Subsidies can help cut emissions but at significantly larger costs than carbon pricing. Figure 3.2.1, panel 2, shows the cost of reducing emissions by 25 percent through carbon taxes, subsidies targeting innovation, or subsidies targeting upgraded capital stocks in terms of the present value of consumption. Although the model is calibrated to match US data, the economic drivers are highly relevant for EMDEs, too. Two economic forces lead to higher costs for emission cuts achieved through subsidies:

- First, subsidies are comparatively weak levers to cut emissions: they do not directly incentivize lower energy consumption and can create incentives for firms to expand as they become more productive. Achieving significant emission cuts without carbon pricing requires large subsidies.
- Second, subsidies may misallocate resources in the economy, and larger subsidies induce stronger misallocation. The costs of targeting large emission cuts through subsidies alone are therefore high.

This box was prepared by Damien Capelle, Divya Kirti, Nicola Pierri, and German Villegas Bauer.

Figure 3.2.1. Firms' Emission Intensity and the Economic Cost of Subsidies



Sources: Capelle and others (forthcoming); and IMF staff calculations.
Note: Panel 1 shows the coefficients from ordinary least squares regressions of emission intensities against the age of capital, share of intangible assets, and total factor productivity. All variables are standardized to have a mean of 0 and a standard deviation of 1. Standard errors in parentheses, clustered at the country × industry × year level. Finance, public administration, and utilities are excluded. Four-digit Standard Industrial Classification codes are used. Panel 2 shows simulation results based on the multicountry, multisector, and multifirm model developed and estimated in Capelle and others (forthcoming). Each policy targets a 25 percent reduction in corporate emissions.

Box 3.3. Catalyzing the Resilience and Sustainability Facility: Early Lessons Learned

There are a number of important lessons learned from early engagement of the IMF in Bangladesh, Barbados, Costa Rica, Jamaica, and Rwanda. First, given that emerging market and developing economy (EMDE) climate financing needs are substantial and that no single institution can provide financing at the required scale, it is essential that governments, international financial institutions, and development partners work together, leveraging each institution's respective expertise to mobilize additional climate finance. Second, the required scale of climate resource mobilization necessitates coordinated actions across three pillars: climate policy reforms, capacity development, and innovative financing approaches. Using part of the fiscal space created by Resilience and Sustainability Facility (RSF) arrangements in a prudent manner could help crowd in additional financing for climate investments. Any facility that uses public resources should have appropriate governance structures. Project selection, impact reporting, monitoring, and verification processes should be in line with the highest international standards. Furthermore, any climate solution should be customized to each country's unique climate needs and economic characteristics. For example, adaptation and mitigation investments are likely to require different policy solutions and financing arrangements. Limited market size and lack of a robust pipeline of bankable projects are likely to be larger impediments in smaller economies, which may require a pooling of projects through regional approaches.

Scaling Up Climate Finance in Barbados and Rwanda

Barbados and Rwanda provide two examples of intensive collaboration across stakeholders and innovative use of financial resources to crowd in private climate investments in the context of the RSF.[1]

Barbados adopted innovative initiatives to accelerate its transition to net zero and boost climate resilience. The government of Barbados used part of the fiscal space created by the RSF as equity capital for a new Blue Green Bank which will provide lending for private sector green investments in affordable homes, hurricane-resilient roofs, and the electrification of transport, among others. The bank receives funding support from the Green Climate Fund and US Agency for International Development as well as technical support from partners, including the Development Bank of Latin America and the Caribbean and the Inter-American Development Bank. Furthermore, low-cost and long-term financing instruments and grants from development partners will support government investment in water, sanitation, and flood and coastal protection projects, among others. Partners will also support government capacity and expertise in public–private partnerships to attract private investment to build more resilient infrastructure.

Rwanda similarly adopted a new programmatic approach to supporting climate investments through its green investment facility, Ireme Invest, set up by the Rwanda Green Fund and the Development Bank of Rwanda. Under the RSF arrangement, development partners such as Agence Française de Développement and the European Investment Bank have committed to scale up climate financing with budget support, technical assistance, and long-term low-cost loans.[2] This initiative is expected to fund a pipeline of projects estimated at €400 million, including €130 million in equity contributions from private investors, highlighting the catalyzing role of the initiative. The government of Rwanda is also prepared to scale up the equity of the Development Bank, as the pipeline of projects expands further.

[1]For further information on the Resilience and Sustainability Facility for Barbados, see https://www.imf.org/en/News/Articles/2023/06/22/pr23231-barbados-forms-coalition-multilateral-banks-develop-infras-investments-building-rsf-imf.

[2]For further information on the Resilience and Sustainability Facility for Rwanda, see https://www.imf.org/en/News/Articles/2023/06/21/pr23224-rwanda-partners-euro-300m-financing-prvt-investment-climate-resilience-rsf-imf.

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