CHAPTER 1

A FINANCIAL SYSTEM TESTED BY HIGHER INFLATION AND INTEREST RATES

Chapter 1 at a Glance

- Financial stability risks have increased rapidly since the October 2022 *Global Financial Stability Report* as the resilience of the global financial system has faced a number of tests. The failures of Silicon Valley Bank and Signature Bank of New York and the loss of confidence in Credit Suisse are powerful reminders of the challenges posed by the interaction between tighter monetary and financial conditions and the buildup in vulnerabilities since the global financial crisis.
- The forceful responses by policymakers to stem systemic risks reduced market anxiety. Despite some improvements of late, market sentiment remains fragile, and strains are still evident across a number of institutions and markets, as investors reassess the health of the financial system.
- While there is little doubt that the regulatory changes implemented since the global financial crisis have made the financial system generally more resilient, the fundamental question confronting market participants and policymakers is whether these recent events are a harbinger of more systemic stress, as previously hidden losses are exposed, or simply the isolated manifestation of challenges from tighter monetary and financial conditions after more than a decade of ample liquidity.
- In the banking sector, recent events in the United States have been a reminder that funding can disappear rapidly and even events at smaller banks can have systemic implications by triggering widespread loss of confidence and rapidly spreading across the financial system, amplified by technology and social media. Shifting patterns of deposits across different institutions could raise funding costs for banks, which could restrict their ability to provide credit to the economy.
- The impact of tighter monetary and financial conditions could be amplified because of financial leverage, mismatches in asset and liability liquidity, and a high degree of interconnectedness within the nonbank financial intermediation sector and with the traditional banking institutions. This raises the specter of stress in some sectors—such as venture capital, technology, and commercial real estate sectors—that have been particularly hit by the removal of ample liquidity spilling over to the rest of the financial system.
- Looking beyond financial institutions, buffers accumulated by households and corporations during the pandemic have boosted their shock-absorption capacity, but these buffers are deteriorating, leaving them more vulnerable to default risk.
- Large emerging markets have so far avoided adverse spillovers, as many commenced monetary tightening early. If financial stresses intensify, a significant pullback from global risk taking could trigger capital outflows. Smaller and riskier emerging market economies continue to confront worsening debt sustainability trends, with many already facing strains and funding challenges.
- The prospect of inflation and interest rates being higher for longer after more than a decade of subdued inflation, low rates, and ample liquidity has profound implications for asset prices, asset allocations, and the resolution of vulnerabilities that have recently emerged. Poor liquidity in bond markets could sharply amplify asset price moves and shocks.

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- The emergence of stress in financial markets complicates the task of central banks at a time when inflationary pressures are proving to be more persistent than anticipated. Clear communication about central banks' objectives and policy functions is crucial to minimize economic and financial uncertainty. The availability of tools aimed at addressing financial stability risks should help central banks separate monetary policy objectives from financial stability goals, allowing them to continue to tighten policy to address inflationary pressures.
- If financial strains intensify significantly and threaten the health of the financial system amid high inflation, trade-offs between inflation and financial stability objectives may emerge. Clear communication about central banks' objectives and policy functions will be crucial to avoid unnecessary uncertainty. Policymakers should act swiftly to prevent any systemic event that may adversely affect market confidence in the resilience of the global financial system. Should policymakers need to adjust the stance of monetary policy to support financial stability, they should clearly communicate their continued resolve to bring inflation back to target as soon as possible once financial stress lessens.
- Bank supervisors should ensure that banks have governance and risk management commensurate with their risk profile, including adequacy of capital and liquidity stress tests. Adequate minimum capital and liquidity requirements should guard against hidden losses that materialize abruptly when there are liquidity shocks. Authorities should also strengthen resolution regimes and crisis management frameworks. In the nonbank financial intermediation sector, policymakers should close data gaps, incentivize proper risk management practices, set appropriate regulation, and intensify supervision.

Financial stability risks have increased rapidly since the October 2022 *Global Financial Stability Report* as the resilience of the global financial system has been severely tested.[1] In the aftermath of the global financial crisis, amid extremely low interest rates, compressed volatility, and ample liquidity, market participants increased their exposures to liquidity, duration, and credit risk, often using financial leverage to boost returns. These vulnerabilities have kept financial stability risks elevated, as flagged in previous issues of the *Global Financial Stability Report*. These vulnerabilities are being exposed in the current high-inflation environment as central banks tightened monetary policy and removed liquidity aggressively to bring inflation back to target. With the disinflationary process slower than anticipated, the rapid pace of policy tightening is causing fundamental shifts in the financial risk landscape. Asset allocations, asset prices, and market conditions are adjusting, challenging market structures, investors, and financial institutions. Numerous pressure points have emerged.

The sudden failures of Silicon Valley Bank (SVB) and Signature Bank of New York (SBNY)—two midsized banks in the United States—and the loss of market confidence in Credit Suisse, a global systemically important bank in Europe, have been a powerful reminder of the challenges posed by the interaction between tighter monetary and financial conditions and the buildup in vulnerabilities since the global financial crisis. The state-supported acquisition of Credit Suisse by UBS reduced potential risks associated with the liquidation of a global systemically important bank but also created some new risks as investors focused on possible contagion channels. Amplified by new technologies and the rapid spread of information through social media, what initially appeared to be isolated events in the US banking sector have quickly spread to banks and financial markets across the world, causing a sharp repricing of interest rate expectations and a dramatic sell-off of risk assets.

The forceful response by policymakers to stem systemic risks reduced market anxiety. In the United States, bank regulators took steps to guarantee uninsured deposits at the two failed institutions and to provide additional liquidity through a new Bank Term Funding Program. In Switzerland, the Swiss National Bank provided emergency liquidity to Credit Suisse. Despite some improvements of late, market sentiment remains fragile, and strains are still evident across a number of institutions and markets. It remains to be seen whether the measures taken so far have been sufficient to fully restore confidence in markets and institutions.

Even before the most recent episodes, a number of stress events over the past year required aggressive intervention by policymakers. In the United Kingdom, forced

[1]Unless otherwise stated, the data cutoff date is March 30, 2023.

selling by pension funds invested in liability-driven investment schemes in the fall of last year led to targeted and temporary purchases by the Bank of England to stabilize the gilt market. In Korea, authorities deployed a slew of tools, including the reactivation of COVID-era asset purchase programs, to address strains in the asset-backed commercial paper market in October 2022. Underlying all these events is a perilous combination of vulnerabilities (liquidity and maturity mismatches, financial leverage, and interconnectedness) that have been lurking under the surface of the global financial system for years. Market participants failed to adequately prepare for rate increases, possible disruptions in funding markets, and links with the rest of the financial system. While risks are obvious in hindsight, the systemic implications of the existing weaknesses were largely unanticipated by policymakers and investors alike. When the risks materialized, their systemic implications became clear, requiring immediate policy intervention, and private institutions and investors were effectively shielded from the full impact of their potential exposures.

Before the most recent events, strong liquidity and capital positions at banks, as a result of regulatory reforms after the global financial crisis, had reassured market participants that the global financial sector, despite the continued tightening of monetary conditions, was generally resilient and able to withstand shocks. However, amid significant uncertainty about the spillover effects of current financial stresses and the effect on the real economy, investors are now reassessing the health of the financial system.

The fundamental question confronting market participants and policymakers is whether these recent events are a harbinger of more systemic stress that will test the resilience of the global financial system—a canary in the coal mine—or simply the isolated manifestation of challenges from tighter monetary and financial conditions after more than a decade of ample liquidity. While there is little doubt that the regulatory changes implemented since the global financial crisis, especially at the largest banks, have made the financial system generally more resilient, concerns remain about vulnerabilities that may be hidden. Investors appear to be looking for stress points, fragilities, and links in the banking and nonbank financial intermediation (NBFI) sectors that may have been underestimated or missed. Exposures and losses can be masked for a while because of accounting rules, regulatory treatments, or other factors that do not require some assets to be held valued at market value, or because they are hidden in corners of the financial system that are more opaque and less visible. But they do not disappear. Losses resulting from such exposures need to be allocated across the financial system, and complacency in addressing them tends to amplify the market impact once losses are eventually realized.

In the banking sector, recent events in the United States have been a reminder that funding can disappear rapidly and events in smaller banks can have systemic implications by triggering widespread loss of confidence and that fears can spread quickly across the financial system, amplified by technology and social media. Shifting patterns of deposits across different institutions could raise funding costs for banks, which could restrict their ability to provide credit. Indeed, on the back of rising interest rates, banks were already tightening lending standards to avoid a deterioration in asset quality even before the recent financial stress. These concerns are particularly pertinent for US regional banks, especially those with concentrated deposit base and high exposure to duration risk, which recent events have shown can be systemic. They could face greater scrutiny with respect to their holdings and funding structures and are expected by market participants to be subject to more stringent supervision and regulation. Because regional and smaller banks in the United States account for more than one-third of total bank lending, a retrenchment from credit provision could have a material impact on economic growth and financial stability. With the recent fall in bank equity prices, lending capacity of US banks could drop by about 1 percent in the coming year, reducing real GDP by 44 basis points, all else being equal. This may allow for some recalibration of monetary policy as central banks have recently indicated. Across advanced economies, investor fears about losses on interest rate–sensitive assets have led to widespread sell-offs, particularly in banks that trade at significant discounts to their book values and long-term challenges regarding profitability and their ability to raise capital.

Emerging market banks appear to have so far avoided the pressures felt by advanced economy banks. They have much less exposure to interest rate risks because of lower share of market-to-market securities and higher share of funding through retail deposits and also rely less on short-term debt and non–interest-bearing deposits, which typically present the greatest flight risks. That said, a number of countries have low levels of deposit insurance coverage, and many sovereigns have less fiscal and monetary space to address problems in the banking sector. Emerging market banks also

generally have assets with lower credit quality than those in advanced economies, suggesting that they are not shielded from a sharp deterioration of confidence in the banking sector. Finally, emerging market banks typically play a larger role in the financial system than those in advanced economies, so the consequences of banking sector weaknesses could be more severe.

The impact of tighter monetary and financial conditions could be amplified because of financial leverage, mismatches in asset and liability liquidity, and high levels of interconnectedness within the NBFI sector and with traditional banking institutions (see Chapter 2 of this report and Chapters 1 and 3 of the October 2022 *Global Financial Stability Report*). This raises the specter of stress in some sectors that appear to have been particularly hit by the removal of ample liquidity spilling over to the rest of the financial system. For example, the deterioration of conditions in the venture capital sector and the tech sector more broadly played an important role in the events surrounding the demise of SVB in the United States, and the outlook for those sectors now appears even gloomier. In addition, SVB's spillover from the core financial sector reverberated across the crypto ecosystem and financial institutions exposed to it. Its failure resulted in a depegging of two stablecoins (Circle USDC and Dai), which held uninsured deposits in the bank, as well as the demise of Signature Bank of New York because investors became concerned about its footprint in the crypto sector. These events add to questions about the viability of digital assets and reinforce the need for appropriate regulation.

Concerns have been growing about conditions in the commercial real estate (CRE) market, which has been under pressure from a worsening of fundamentals (driven in part by structural issues and postpandemic shifts in office and retail space demand; see Chapter 3 of the April 2021 *Global Financial Stability Report*) and tighter funding costs. In the United States, banks with total assets less than $250 billion account for about three-quarters of CRE bank lending, so a deterioration in asset quality would have significant repercussions both for their profitability and lending appetite. In addition, NBFIs play an important role in the real estate investment trusts (REITs) sector and commercial mortgage-backed securities (CMBS) markets, so there are broader implications stemming from stress in CRE market both for financial stability and economic growth.

Looking beyond financial institutions, buffers held by households and corporations—thanks in part to the fiscal support and monetary easing rolled out during the pandemic—have boosted the shock-absorption capacity of the global economy. However, households are facing heavier debt-servicing burdens as interest rate rise, while firms are also confronting declining earnings, eroding their savings and cash buffers and leaving them more vulnerable to default risk—especially if the global economy slows meaningfully.

Large emerging markets have so far managed relatively smoothly the sharp tightening of monetary policy in advanced economies, in part aided by the fact that global financial conditions have not matched the extent of global monetary policy tightening. In addition to having generally stronger fundamentals and higher buffers than in the past, they have benefited from policy space created by commencing their own tightening cycles ahead of advanced economies. These countries have so far seen only limited spillovers from the latest financial strains. However, they could face significant challenges should the current situation fail to normalize and cause a pullback from global risk taking and associated capital outflows. International debt issuance has yet to recover from the extremely low levels of 2022 and could face another difficult year if financial conditions remain tight. In addition, the capital flows from banks and nonfinancial corporations that have compensated for lower portfolio investments since the onset of COVID-19 could now be under pressure.

For smaller and riskier emerging market economies, international market access has become highly challenging. Sovereign debt sustainability metrics continue to worsen around the world, especially in frontier markets and low-income countries, with many of the most vulnerable already facing severe strains.

Downside risks to the global economy, as summarized by the IMF's growth-at-risk measure, remain elevated. Beyond risks related to financial stress, there are several other possible sources of macroeconomic risks that could have important macro-financial implications. For example, an escalation of Russia's war in Ukraine or a sharp rebound in economic activity in China could spark a sharp rise in energy prices, pushing headline inflation higher again. Rising geopolitical tensions could result in financial fragmentation, causing a sudden reversal in cross-border capital flows (especially for emerging markets and developing economies), and exacerbate macro-financial volatility (see Chapter 3). The recovery in China could stall, causing further stress in the property development sector and in real estate markets, resulting in contagion to the

banking sector and local governments and ultimately creating more widespread risks to financial stability. If global financial conditions tighten sharply, refinancing risks for vulnerable emerging markets may increase further, raising the prospect of debt distress.

More broadly, the prospect of inflation and interest rates being higher for longer after more than a decade of subdued inflation, low rates, and ample liquidity has profound implications for asset prices, asset allocations, and the resolution of vulnerabilities that have recently emerged. For several years, investors have used investment strategies predicated on low volatility—reaching for yield and using of leverage—and some of them appear to be unprepared for a world of higher realized volatility, rising defaults, and falling asset prices. The risk-management failures that have been unmasked by the recent episodes are a source of concern. Lurking in the background is poor liquidity in bond markets, which could sharply amplify asset price moves and shocks. In addition, uncertainty about the resolution of the US debt ceiling impasse is adding to risks and volatility in short-term US funding markets.

The emergence of stress in financial markets is complicating the task of central banks at a time when inflationary pressures are proving more persistent than anticipated. Prior to the recent stress episodes, interest rates in advanced economies had risen sharply and were more aligned with central bank communications about the need to keep monetary policy restrictive for longer. Since then, despite the 50-basis-point hike by the European Central Bank on March 16 and the 25-basis-point increase by the Federal Reserve on March 22, investors have sharply repriced downward the expected path of monetary policy in advanced economies. They now anticipate central banks to begin easing monetary policy well in advance of what was previously priced in. Inflation, however, has remained uncomfortably well above target.

The availability of tools aimed at addressing financial stability risks should help central banks separate monetary policy objectives from financial stability goals, allowing them to continue to tighten policy to address inflationary pressures. If financial pressures intensify significantly and threaten the health of the financial system amid high inflation, trade-offs between inflation and financial stability objectives may emerge. Clear communication about central banks' objectives and policy functions will be crucial to minimize economic and financial uncertainty. Policymakers should act swiftly to prevent any systemic event that could shake investor confidence in the global financial system. Confidence is at the core of the financial sector and policymakers need to be ready to take all necessary steps to maintain it. Should policymakers need to adjust the stance of monetary policy to support financial stability, they should clearly communicate their continued resolve to bring inflation back to target as soon as possible once financial stress lessens.

Turmoil in the Banking Sector Jolted Markets

In response to persistently high inflation across countries, global central banks have raised interest rates aggressively over the past two years. In addition to traditional channels of monetary transmission, such as through higher cost of capital and credit for firms and households, the speed and magnitude of the rate hikes lowered significantly the value of financial assets, particularly bonds with fixed coupons.

After years of subdued inflation and low interest rates, there is a risk that some investors and financial institutions with concentrated holdings in long-duration assets may become complacent and fail to properly manage interest rate risks prudently, especially when they use funding sources that are not stable to finance the purchases of these assets. The failures of SVB and SBNY in early March serve as a stark reminder of this risk and of the speed at which balance sheets can become severely strained when interest rates increase at a fast pace.

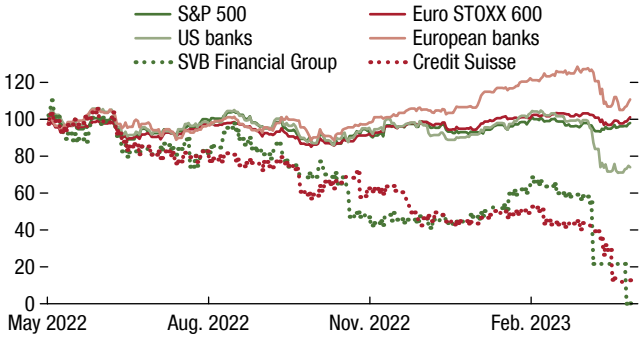
After persistent deposit outflows in recent months, SVB revealed on March 6 a $1.8 billion loss on sales of Treasuries and agency mortgage-backed securities (MBS) and announced on March 8 a plan to raise funds through a $2.25 billion stock offering. A $42 billion of deposit withdrawals followed on March 9, which led to the Federal Deposit Insurance Corporation (FDIC) taking control of SVB on March 10. After a withdrawal of 20 percent of its deposits, SBNY—a bank that focused on technology and crypto clients—suffered the same fate and was closed on March 12, with the FDIC appointed as the bank's receiver (see Box 1.1).

The collapse of SVB and SBNY has sparked concerns about other US regional banks with similar runnable deposits and interest rate–sensitive securities not priced at market value, leading to the sharpest correction in the regional bank equity index in decades (Figure 1.1, panel 1). The episode has also adversely affected technology firms, which made up much of SVB's and SBNY's deposit bases. Many technology

Figure 1.1. A Banking Turmoil Jolted Markets

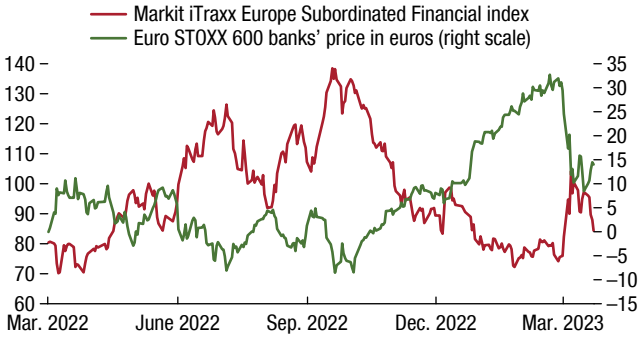
The loss of confidence and subsequent runs on Silicon Valley Bank and Credit Suisse quickly reverberated throughout the financial system.

1. Performance of Selected US and European Equity Indices and Stocks since May 2022
(Prices, indexed, May 1, 2022 = 100)



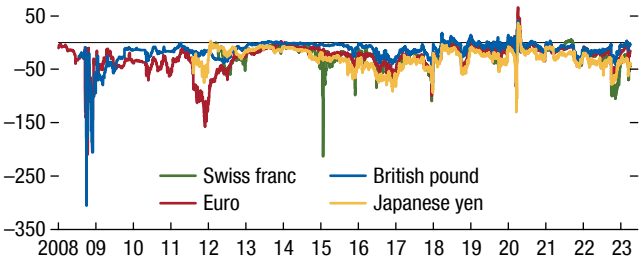
European banks have sold off dramatically on the back of the US regional and European bank turmoil.

2. European Bank CDS and Performance of Euro STOXX 600 Banks since March 2022
(Basis points, percent)



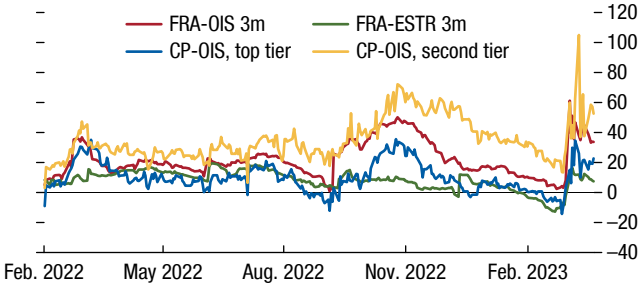
These developments have shaken international dollar funding markets ...

3. Cross-Currency Dollar Funding Spreads
(Basis points)



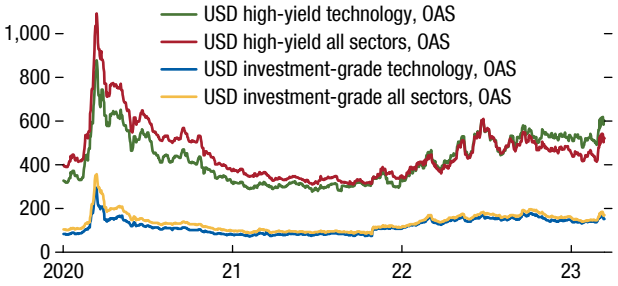
... and interbank as well as commercial paper funding markets.

4. Interbank Funding Spreads in the United States and the Euro Area
(Basis points)



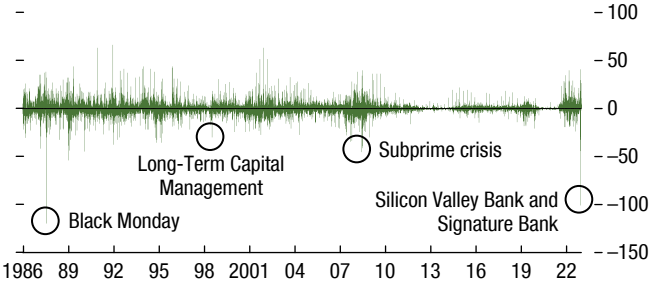
Credit markets came under some pressure.

5. US Corporate Bond Spreads
(Basis points)



The banking turmoil led to a stark repricing of policy expectations that resembles moves last seen in 1987.

6. Daily Change in Near-Term Money Market Forward Rates Nine Months Ahead
(Basis points)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: In panel 2, the bubble size represents the equity market capitalization. CDS = credit default swap; CP-OIS = yield spread between commercial paper and overnight index swaps with the same maturity; FRA-ESTR = forward rate agreement–euro short-term rate; FRA-OIS = forward rate agreement–overnight index swap; Long-Term Capital Management = Long-Term Capital Management hedge fund crisis; OAS = option-adjusted spread.

companies have reportedly withdrawn deposits from other regional banks.

In Europe, Credit Suisse—a global systemically important institution subject to multiple investigations, embroiled in scandals, and under long-standing pressures on the back of large losses—lost the confidence of investors in the middle of March. European bank stock prices collapsed, and credit default swap spreads soared in the days that followed, as global banking systems' financial health became top of mind for investors (Figure 1.1, panel 2). Strains ensued in short-term funding markets, resulting in higher costs for international dollar funding, especially with respect to the Swiss franc (Figure 1.1, panel 3), and a notable widening of interbank funding spreads in both the United States and the euro area (Figure 1.1, panel 4).[2] Dollar funding conditions have similarly tightened in emerging market economies, with sovereign external debt spread over US Treasuries widening, reverting the narrowing trend since late last year. In corporate debt markets, issuance has slowed recently, particularly for sub–investment-grade firms, as corporate debt spreads widened (Figure 1.1, panel 5). Amid heightened volatility and an unwinding of levered bets that central banks would hike policy rates aggressively to tackle persistent inflation, yields of the two-year Treasury bond and the two-year Bund each collapsed by nearly 100 basis points, respectively, between March 9 and 15, as investors sought refuge in sovereign bond markets. The turmoil in the banking sector led to a significant reassessment of monetary policy rate expectations, with magnitude and scale comparable to that of Black Monday in 1987 (Figure 1.1, panel 6).

On March 19, Credit Suisse was taken over by rival UBS at a price tag of 3 billion Swiss francs (less than half of the earlier market closing price), with the support of the Swiss government. The takeover was completed in an expedited process without shareholders' approvals. In addition to liquidity support provided by the Swiss National Bank (see the next section), Swiss authorities provided a guarantee of 9 billion Swiss francs to UBS to cope with potential losses from the takeover, in case losses borne by UBS exceed 5 billion Swiss francs. In the process, the authorities completely wrote down the nominal value of all Additional Tier 1 (AT1) debt of 16 billion Swiss francs.

[2]Commercial paper issuance for lower-rated financial institutions was reportedly paralyzed from March 15 to 20.

The decision to fully write down AT1 debt while allowing equity holders to recover 3 billion Swiss francs surprised many investors, as such debt was widely viewed as senior to equity in the capital structure.[3] AT1 prices declined significantly (Figure 1.2, panel 1) after the announcement. Likely recognizing that AT1 is a material component of regulatory capital for European banks—although no major bank used it as much as Credit Suisse did—multiple authorities issued public statements reaffirming that AT1 debt is senior to bank equity in resolution to calm the market and avoid the cost of this source of bank capital from surging (Figure 1.2, panel 2). The market remained volatile in the days following the takeover, reportedly leading to losses for certain asset managers and institutional investors, before stabilizing.

Central Banks Responded Quickly, But Consequences Were Already in Motion

To cushion the failures of SVB and SBNY, the US Treasury Department, FDIC, and the Federal Reserve responded by rolling out an emergency package with two key components to restore investor and deposit confidence in the banking system: first, FDIC will protect all SVB and SBNY deposits, not just FDIC-insured ones. Second, the Federal Reserve introduced the Bank Term Funding Program to lend to any depository institutions against the par value of US Treasuries, agency debt, and MBS for up to one year at zero margins, allowing banks to generate liquidity without selling securities and crystallizing mark-to-market losses caused by higher interest rates (see Box 1.1 for details).

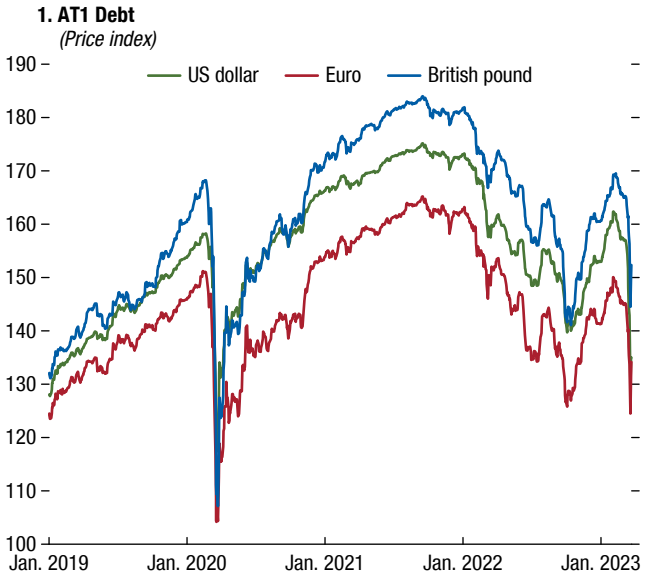
Bank borrowing from the Federal Reserve's discount window's standing Primary Credit facility surged to an all-time high of 153 billion on March 15, while the take-up at the new Bank Term Funding Program was 12 billion (Figure 1.3, panel 1). Borrowing by one regional bank reportedly accounted for the lion's share of Primary Credit loans on that day.[4] In the following weeks, usage of the BTFP increased (see red diamond in Figure 1.3, panel 1), while take-up at the discount window declined some. Banks also borrowed

[3]The contractual terms of Credit Suisse AT1 debt depart from practice in other countries, as it is written off, rather than converted to equity, when the designated capital thresholds are breached.

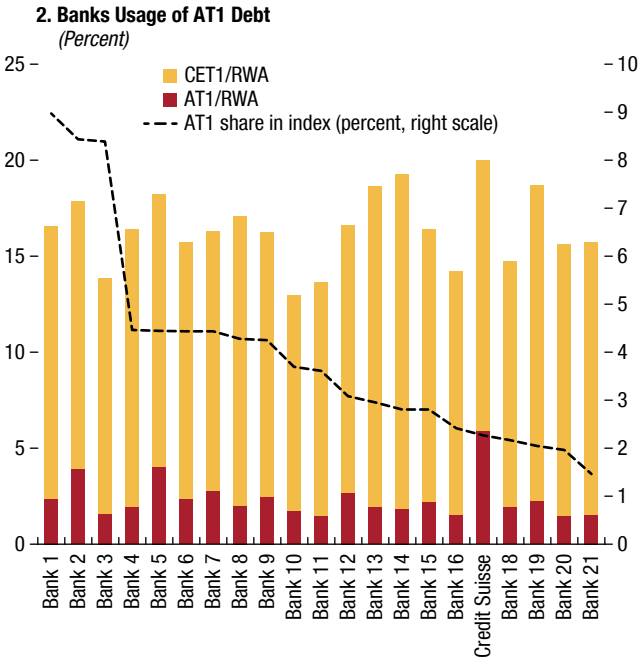
[4]The Federal Reserve also had $143 billion in loans outstanding to the two FDIC-created bridge banks as part of the resolution of SVB and SBNY.

Figure 1.2. Credit Suisse Fallout: Implications for the AT1 Debt Market

AT1 debt instruments underperformed after the Credit Suisse fallout ...



... with implications for the future viability of the AT1 debt market.



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: AT1 = Additional Tier 1; CET1 = Common Equity Tier 1 capital; RWA = risk-weighted assets.

heavily from the Federal Home Loan Banks (FHLBs) using FHLB advances against mortgages and similar assets to get short-term funding. FHLB advances, which had already risen considerably over the past year as monetary policy tightening reduced liquidity in the interbank market, surged after SVB and SBNY's collapse (Figure 1.3, panel 2). The FHLB system funds these surging advances by issuing discount notes and other debt securities and by significantly curtailing its lending in the interbank and repo markets. As a result, interest rates of FHLB discount notes and in repo markets moved up noticeably (Figure 1.3, panel 3) on the days immediately after SVB's collapse; thereafter, rates have moved back down.[5]

Money market funds (MMFs) appeared to have gained from the stress in the banking sector. MMFs witnessed strong inflows driving their assets to new record heights. Some bank deposits reportedly went to government and Treasury MMFs in the week following SVB's collapse (Figure 1.3, panel 4). At the same time, money markets continued to see strong take-up in the overnight reverse repurchase agreement (ON RRP), which increased by 270 billion on net since then. By contrast, prime MMFs saw modest outflows, concentrated at the few funds directly or indirectly exposed to SVB's operations. While deposit outflows from smaller banks appear to have stabilized, resurgence of anxiety regarding the prospects of regional banks could drive deposits into MMFs or to larger banks.

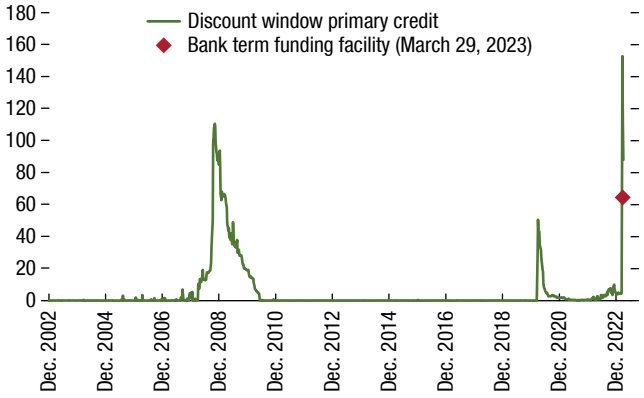
After the Credit Suisse fallout, the Swiss authorities and the Federal Reserve announced a series of new liquidity measures. The Swiss authorities announced extraordinary liquidity assistance for Credit Suisse and UBS for a total of up to 200 billion Swiss francs (an amount close to the remaining deposit base of Credit Suisse)—Credit Suisse and UBS can obtain a loan (with privileged creditor status in bankruptcy) for a total amount of up to 100 billion Swiss francs and,

[5]During the week of March 13, Treasury settlements and corporate-tax day also added to demands for cash and pressures on some interest rates. Anecdotal evidence suggests that repo rates were higher in the morning than in the afternoon, as investors were eager to secure funding early in the day. The moves were more notable in the bilateral and the interdealer markets.

Figure 1.3. Federal Reserve Facilities and US Money Markets

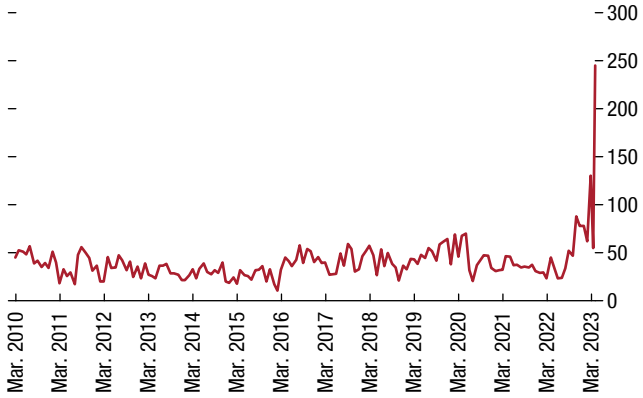
Usage at the Federal Reserve's discount window borrowing reached an all-time high, and banks also tapped the Bank Term Funding Program ...

1. Take-Up at the Discount Window and Bank Term Funding Program
(Billions)



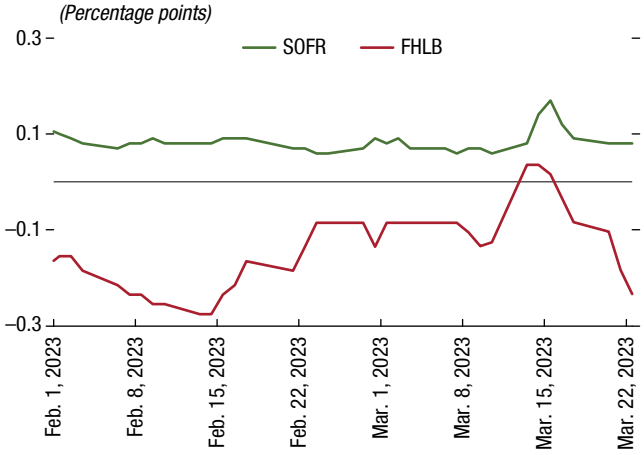
... and the FHLB system issued a record level of debt securities to provide liquidity to banks in March.

2. FHLB Debt Issuance
(Billions)



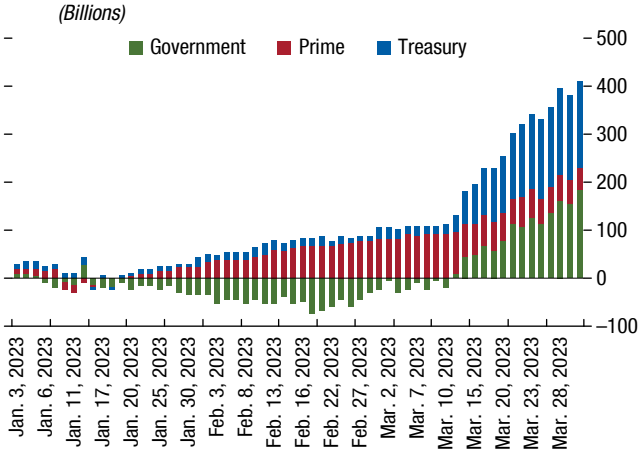
Increased supply drove overnight rates on FHLB notes above the OIS rate, while funding pressures creeped into repo markets ...

3. SOFR and FHLB Discount Note Rates to OIS
(Percentage points)



... while money market funds saw overall strong inflows.

4. Year-to-Date Money Market Fund Flows
(Billions)



Sources: Bloomberg Finance L.P.; Crane; FHLB; US Federal Reserve; and IMF staff calculations.
Note: Panel 1 shows monthly issuance as reported by FHLBs along with an estimation for March 2023 based on Bloomberg data as of March 31, 2023.
FHLB = Federal Home Loan Bank; GCR = General Collateral Rate; OIS = overnight index swaps; SOFR = Secured Overnight Financing Rate.

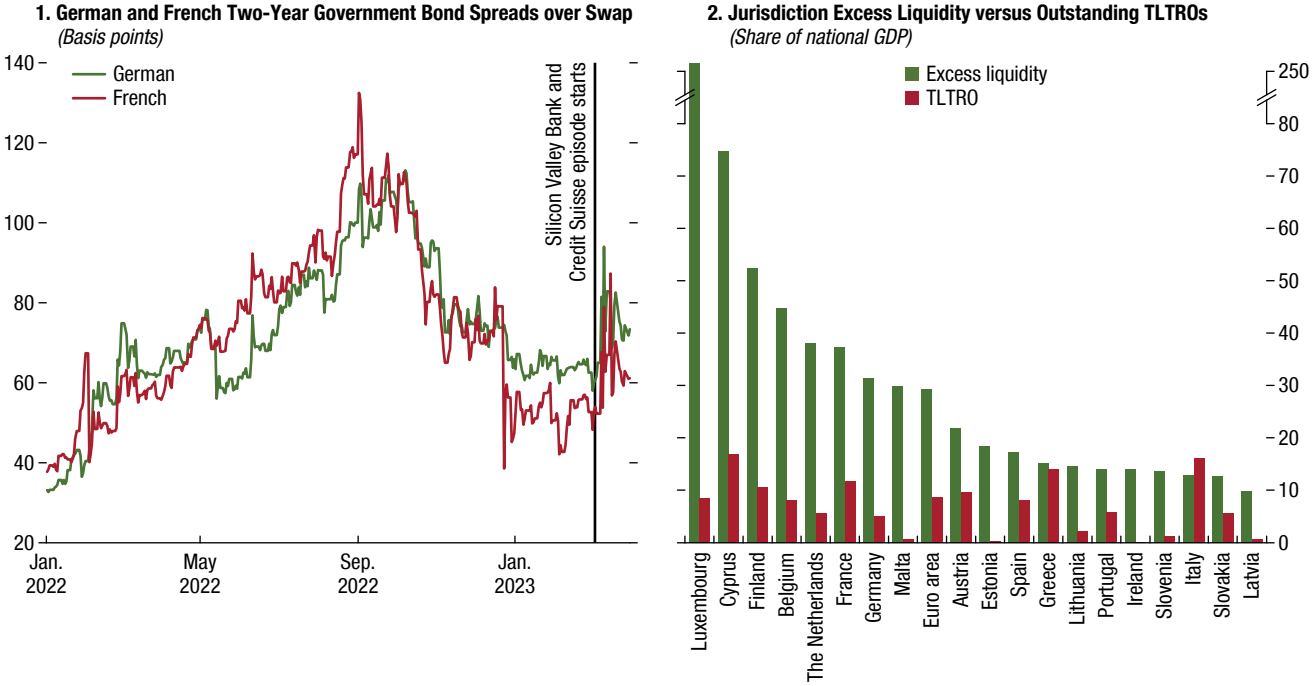
in addition, the Swiss National Bank can grant Credit Suisse another loan of up to 100 billion Swiss francs backed by a federal default guarantee.

In anticipation of potential stress in US dollar and other global funding markets, global central banks also announced on March 19 coordinated measures to increase liquidity in the international dollar funding market to increase the frequency of 7-day maturity operations from weekly to daily (Federal Reserve Board 2023). The relatively muted market reaction to this announcement reflects the fact that the cost of international financing in dollars—though rising—has remained below the levels during the global financial crisis and the European sovereign debt crisis. The backstop nature of the facility makes it comparatively more expensive than the current financing conditions of international dollar liquidity, moderating its usage.

Figure 1.4. Funding Stress Surging in European Bond Market amid Central Bank Liquidity Contraction

Spreads of sovereign bond relative to European interest rate swaps significantly widened ...

... as funding pressure reemerges while jurisdictions with lower excess liquidity may experience further strains as central bank liquidity is shrinking.



Sources: Bloomberg Finance L.P.; European Central Bank Statistical Data Warehouse; and IMF staff calculations.
Note: Snapshot data for panel 2 correspond to February 28, 2023. TLTRO = targeted longer-term refinancing operation.

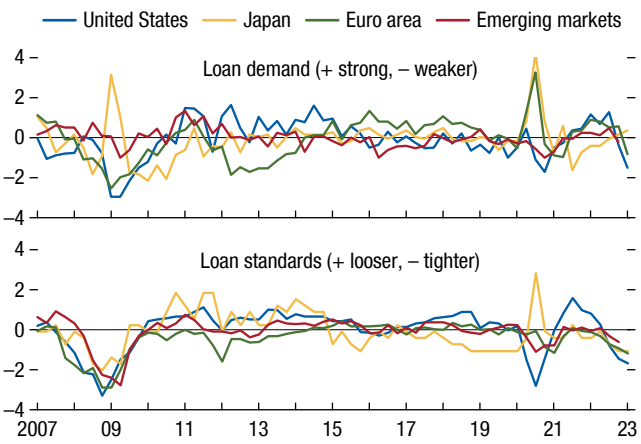
In Europe, concerns about the possible economic impact of stress in the banking sector pushed the spread of swaps over French and German short-dated bonds sharply higher (Figure 1.4, panel 1). This likely reflected investors' preference to hold high-quality cash securities in a context of a shortage of such collateral in secured funding markets. To preserve the smooth transmission of monetary policy, the European Central Bank affirmed at its March meeting that it is fully equipped to provide liquidity support to the euro area financial system if needed (European Central Bank 2023). Additional liquidity support may be needed when mandatory targeted longer-term refinancing operations (TLTRO) repayments come due in June. At the country level, looking at the share of TLTROs maturing by June 2023 versus the excess liquidity available for repayment reveals potential fragmentation risks—banks in some southern European countries that continue to rely heavily on short-term TLTROs tend also be the same ones that do not have enough excess liquidity to repay (Figure 1.4, panel 2). While the European Central Bank has commenced its quantitative tightening on March 1, the contraction of liquidity coupled with higher funding needs in 2023 has led to concerns over the possibility of fragmentation resurfacing. To address these risks, the European Central Bank established the Transmission Protection Instrument last year to ensure that its monetary policy stance is transmitted smoothly across all euro area countries (European Central Bank 2022).

Beyond the immediate market impact, stress in the banking sector will likely weigh on broader lending conditions and thus economic growth. Banks in the United States, the euro area, and emerging markets were already tightening lending standards before the failures (Figure 1.5, panel 1), on the back of rising concerns about the economic outlook, borrower risks, and bank funding conditions (Figure 1.5, panel 2). At the same time, loan demand fell sharply because

Figure 1.5. Bank Lending Standards

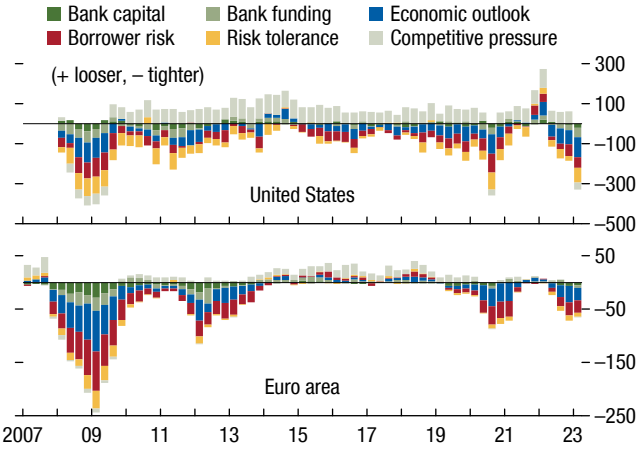
Global banks in some jurisdictions have already tightened lending standards considerably ...

1. Lending Survey: Loan Demand and Lending Standards
(Index)



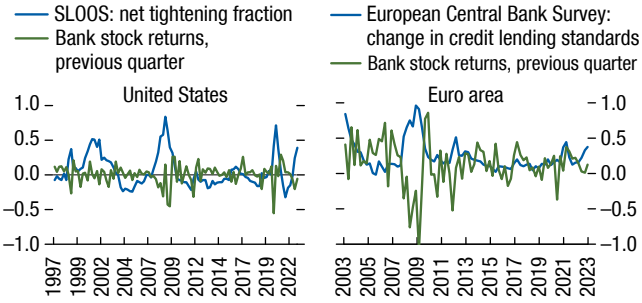
... on rising concerns about economic outlook and borrower risks.

2. Contributor Factors to Lending Standards
(Index)



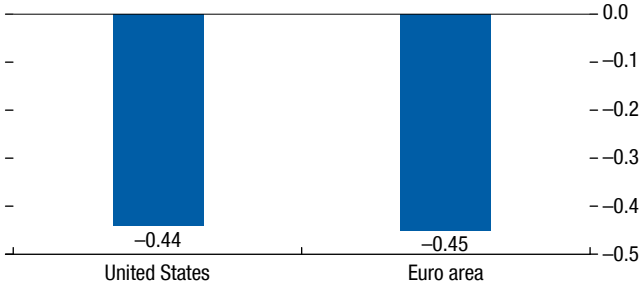
Bank stock declines could further tighten lending standards ...

3. Net Share of Banks Tightening Lending Standards and Bank Stock Returns
(Percent)



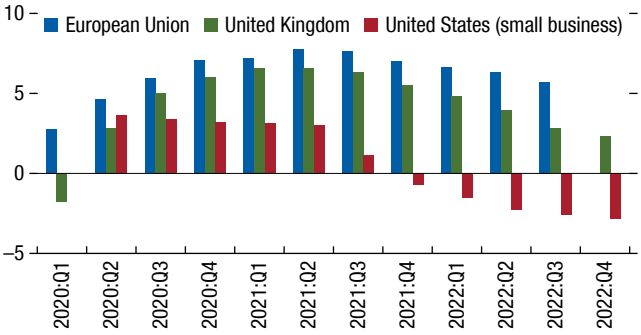
... which adversely impacts real GDP growth.

4. Impact of Bank Lending on Real GDP Level
(Percent, one year ahead)



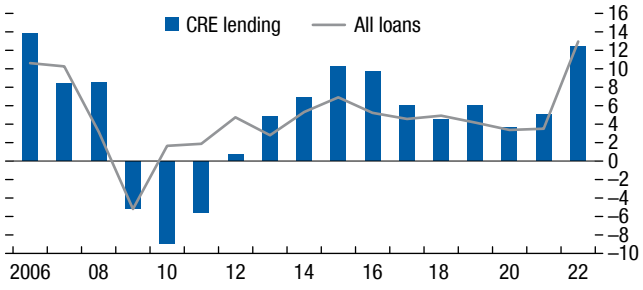
Small and medium enterprises likely affected the most ...

5. Loan Shares to Small and Medium Enterprises
(Percent of total business loans, cumulative since 2019:Q4)



... and commercial real estate, which has large booms and busts.

6. US Banks' Annual Loan Growth Rate: Total Lending versus CRE Lending
(Percent)



Sources: Bloomberg Finance L.P.; national central banks; and IMF staff calculations.
Note: In panel 1, data for emerging markets are as of the third quarter of 2022 and for other regions are as of the fourth quarter of 2022. In panel 2, a methodological change has been made so that interbank spreads are now included in corporate valuations instead of interest rates. In panel 3, US (EU) bank stock returns is calculated using the KBW Bank Index (STOXX Bank Index). In panel 4, economic impacts are calculated using the four-quarter impulse response of the level of real GDP to lending standards shocks of Basset and others (2014) for the United States and Altavilla, Darracq Paries, and Nicoletti (2019) for the euro area; these impulse responses are applied to a prediction of lending conditions based on bank stock price movements from January 1, 2023, to March 15, 2023. CRE = commercial real estate; SLOOS = Senior Loan Officer Opinion Survey.

of higher interest rates and the weakening economic outlook, particularly for CRE loans and mortgages.

The IMF staff estimates that declines in bank stock prices are statistically associated with a tightening in lending conditions in the following quarter (Figure 1.5, panel 3). The recent sharp fall in bank stock prices in the United States and euro area therefore portends even tighter lending conditions in the second quarter of this year, which, all else being equal, would lead to a decline of one-year-ahead core lending capacity by almost 1 percent and real GDP by 44 basis points in the United States and a real GDP decline of 45 basis points in the euro area (Figure 1.5, panel 4).[6] Further declines in stock prices and those of other financial assets could push down bank lending and growth even more (Box 1.3 in the April 2023 *World Economic Outlook*). Small and medium enterprises—a key engine of economic growth and employment in most countries—would likely be more affected in a lending pullback. Even before the current banking turmoil, loans to small and medium enterprises as a share of overall bank loans were already on the decline (Figure 1.5, panel 5). In the CRE market, for which nonbank funding sources like REITs and CMBS are facing their own challenges (see the "Commercial Real Estate Market under Pressure" section), a pullback in bank lending could have a disproportionate impact as CRE lending tends to have larger boom-and-bust cycles (Figure 1.5, panel 6).

In crypto markets, several stable coins came under pressure after Circle, the operator for USDC, the second-largest stable coin in the world, revealed that it held about 8 percent of its total reserves in SVB deposits. USDC and Dai (the fourth-largest stable coin, partly backed by USDC) dropped sharply from their par value to the US dollar, before recovering after the introduction of the Bank Term Funding Program and the FDIC's protection of uninsured SVB and SBNY depositors. USDC shifted its cash holdings to large, systemic banks, upending plans to expand deposits to smaller community banks.[7] Broader unease could be permeating in the digital assets market, as key infrastructure for the industry is deteriorating. Just before SVB's and SBNY's collapses, Silvergate, a bank focused on serving the crypto market, entered liquidation proceedings. These collapses likely contributed to deepening the confidence crisis in digital assets markets following the dramatic bankruptcy of FTX—at the time one of the largest crypto exchanges—last November on account of fraudulent practices and critical failures in risk management (Box 1.2).

[6]Core lending capacity in the United States is core loans plus unused loan commitments (see Bassett and others 2014).

[7]Despite the actions, USDC market capitalization remains below pre-SVB levels, with Tether capturing its share.

Higher Inflation and Tighter Monetary Policy Are Exposing Fault Lines in Banking Systems

Exposures to interest rates are often hidden until a shock—namely, a liquidity shock—appears, forcing investors or financial institutions to raise liquidity. During the pandemic, US banks accumulated large amounts of Treasury and agency MBS in their Available for Sale (AFS) and Held to Maturity (HTM) accounts as they extended the maturities of their holdings to earn higher yields in a low-rate environment (Figure 1.6, panel 1). In the United States, mark-to-market valuation changes for AFS securities do not affect bank profitability and are treated as unrealized gains and losses, although for the largest banks, these gains and losses must be reflected in regulatory capital. All other banks, including regional banks, have the option to opt out of this requirement. Valuations changes of HTM securities affect neither profitability nor capital.

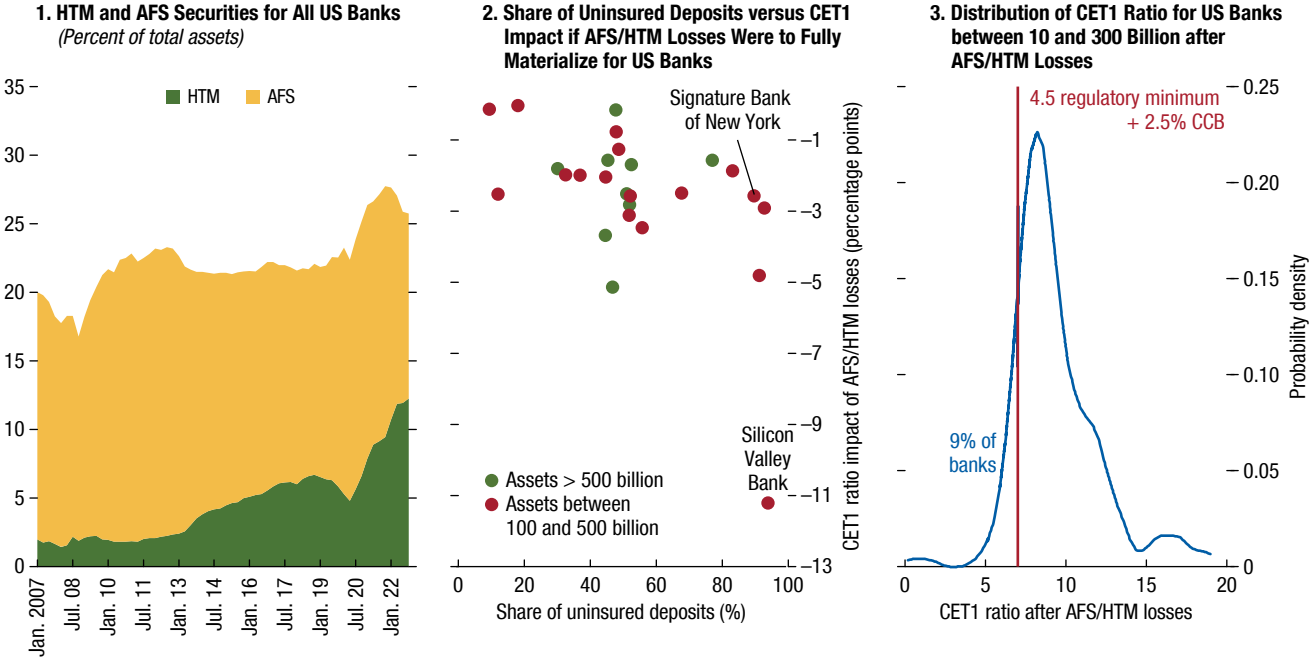
As interest rates started to rise sharply, the market values of the Treasuries and agency MBS held by banks declined substantially. For most banks, the unrealized losses sitting in their AFS and HTM portfolio would have material but manageable impact on their Common Equity Tier 1 (CET1) capital ratios if they were forced to sell their entire holdings to raise liquidity (even without accounting for any Federal Reserve liquidity support). The failed banks SVB and SBNY were among the outliers, reflecting poor internal interest rate risk management practices and presumably supervisory lapses. They were caught in a "doom loop" of runnable deposits not insured by the FDIC and sizable unrealized losses unmasked by sales needed to raise liquidity. Uninsured depositors ran from the banks out of the fear that these losses would materialize; once they started to do so, the banks had to sell the securities to meet deposit outflows, realizing the losses and thus justifying the fear

Figure 1.6. Hidden Interest Rate–Driven Losses Hurt Smaller US Banks

The rise of AFS and HTM securities ...

... helped hide losses until they are sold to meet deposit runs.

Sizeable share of banks have CET1 ratio <7% after AFS/HTM losses.



Sources: SNL Financial; US Federal Reserve; and IMF staff estimates.
Note: In panels 2 and 3, the CET1 impacts and ratios, respectively, are calculated by deducting unrealized HTM losses, for banks with no AOCI filter on capital. For banks with an AOCI filter, both unrealized AFS losses and unrealized HTM losses are deducted. AFS = Available for Sale; AOCI = accumulated other comprehensive income; CCB = capital conservation buffer; CET1 = Common Equity Tier 1 capital; HTM = Held to Maturity.

(Figure 1.6, panel 2). In all, almost 9 percent of US banks with assets between $10 billion and $300 billion would have CET1 ratios below the regulatory requirement of 7 percent (4.5 percent regulatory minimum plus 2.5 percent capital conservation buffer; Figure 1.6, panel 3) after fully accounting for unrealized losses in AFS and HTM securities. This suggests that interest rate risks could intensify for some small banks should interest rates stay higher for longer and were they forced to sell these securities to raise liquidity. While no comprehensive information is available about the use of derivatives to hedge interest rate risk, some banks with large fixed rate assets in their banking books—such as mortgages and other fixed rate loans—could also be exposed to interest rate risk.

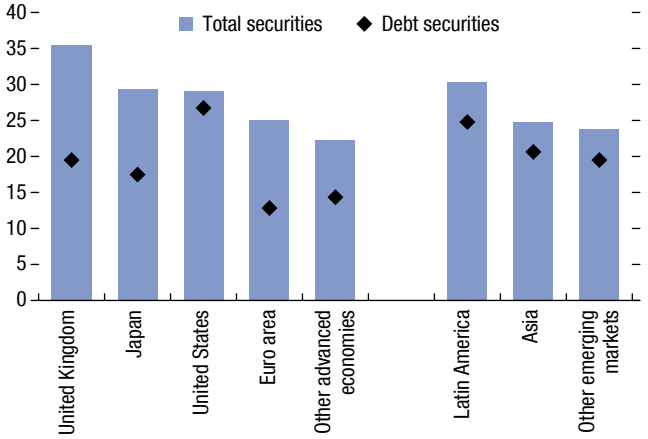
Banks in other advanced economies and emerging markets are also exposed to interest rate risk in an environment of tighter monetary policy, but they appear less vulnerable than US banks. While they also heavily invest in securities, most appear to hold less debt securities that are likely sensitive to higher interest rates than their US counterparts (Figure 1.7, panel 1). Focusing on HTM portfolios, the reported unrealized losses on these portfolios are estimated to have a modest impact on the CET1 ratio for the median bank in Europe, Japan, and emerging markets, although the impact for some banks could be material—for example, 5 percent of banks in a select sample from Europe, Japan, and emerging markets could experience impacts of more than 170 basis points, 80 basis points, and 100 basis points, respectively, should HTM losses be fully accounted for in their CET1 ratios (Figure 1.7, panel 2). The lower impact for European and Japanese banks likely reflects smaller HTM portfolios.

Turning to banks' funding structure, emerging markets banks appear less reliant on wholesale funding but more sensitive to changes in cost of deposits. Less than one percent of emerging market banks have short-term debt contributing more than 15 percent to their total liabilities, compared with

Figure 1.7. Global Banks: Interest Rate and Funding Risks

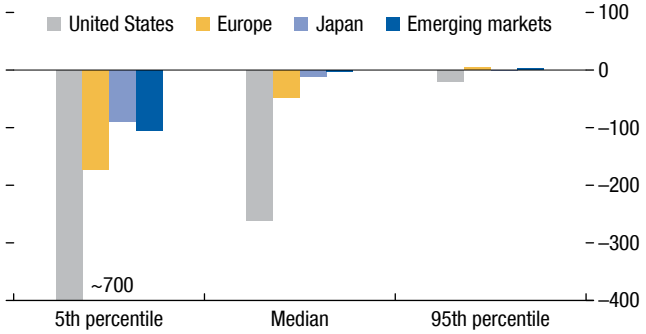
Securities holdings account for a large share of banks' assets, but US banks appear most exposed to interest rate risks.

1. Banks' Security Holdings
(Percent of total assets)



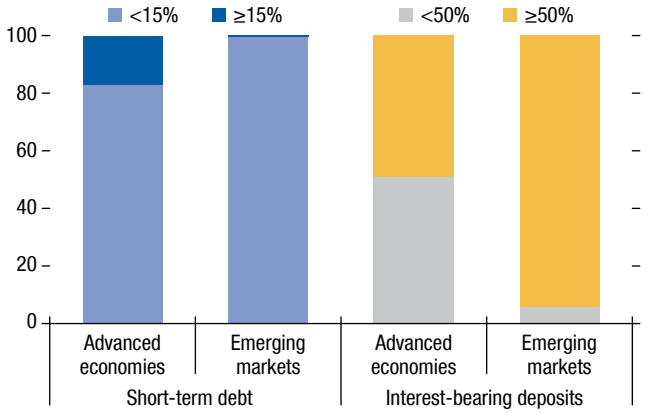
Valuation losses on securities holdings are sizable for some banks.

2. Estimated Impact to CET1 Ratio from Unrealized Gains and Losses on Held-to-Maturity Securities for a Select Sample of Banks
(Basis points)



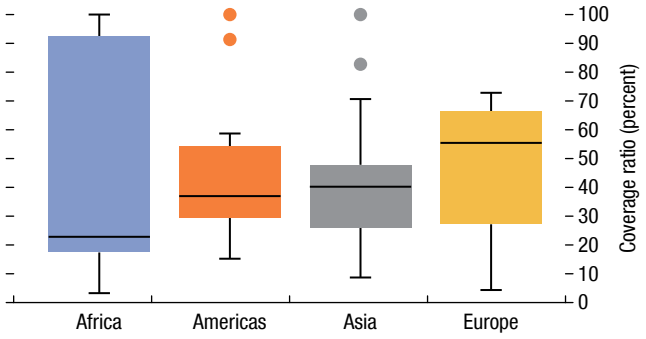
Emerging market banks are less reliant on short-term funding and nonstable deposits than advanced economy banks.

3. Banks' Funding Structure
(Percent)



The level of protection offered by deposit insurance varies significantly across countries, especially in Africa.

4. Deposit Insurance Coverage Ratio Distribution by Region in 2022
(Percent)



Sources: International Association of Deposit Insurers; national central banks; SNL Financials; and IMF staff estimates.
Note: In panel 2, the estimate is based on banks' disclosures of unrealized gains or losses on held-to-maturity security portfolios as of 2022:Q3. The analysis covers about 700 banks in the United States, 40 banks in Europe, 80 banks in Japan, and 60 banks in emerging market economies. In non-US regions, the sample consists mainly of larger banks because of data availability, which could lead to underestimate of the losses in the lower quantile distribution. Panel 3 shows short-term liabilities and interest-bearing deposits for 379 banks in 20 countries as of 2022:Q3. Panel 4 shows the minimum and maximum (the "whiskers") and the 25th percentile, median, and 75th percentile (the "box") country in terms of the percent of their median banks' deposit base covered by deposit insurance. In panel 4, the dots represent outlier countries. The sample includes 13 countries in the Africa region, 24 in the Americas (North America, Central America, South America, and the Caribbean) region, 20 in the Asia region, and 31 in the Europe region. CET1 = Common Equity Tier 1 capital.

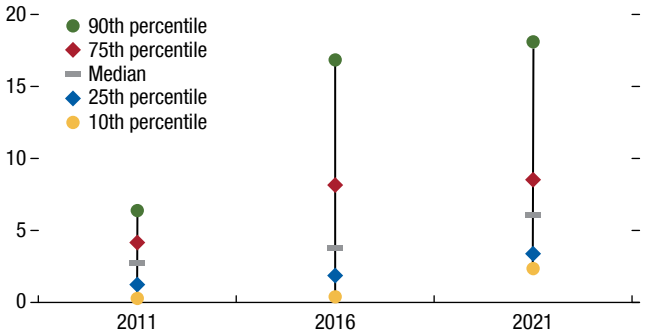
almost one-eighth in advanced economy banks. However, the share of banks that have at least half of their deposit base in interest-bearing deposits—including time deposits—is far higher in emerging markets than advanced economies (Figure 1.7, panel 3), possibly reflecting decades of high inflation and high interest rates. Looking across the globe, significant numbers of countries have low deposit insurance coverage and are potentially more prone to deposit outflows. The median countries in Africa and the Americas have a deposit insurance coverage ratio[8] of only 24 percent and 37 percent, respectively; those in Asia and Europe have coverage ratio that are somewhat higher (Figure 1.7, panel 4).

[8]Percentage of insured to total deposits in the system.

Figure 1.8. Vulnerabilities at NBFIs amid Interest Rate Rises and Tighter Financial Conditions

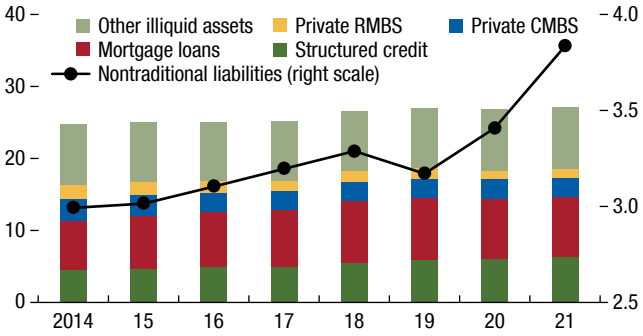
Reaching for yield, insurers have increased their exposure to illiquid credit investments over the past decade ...

1. Share of Level III Assets in Insurer Portfolios Globally
(Percent)



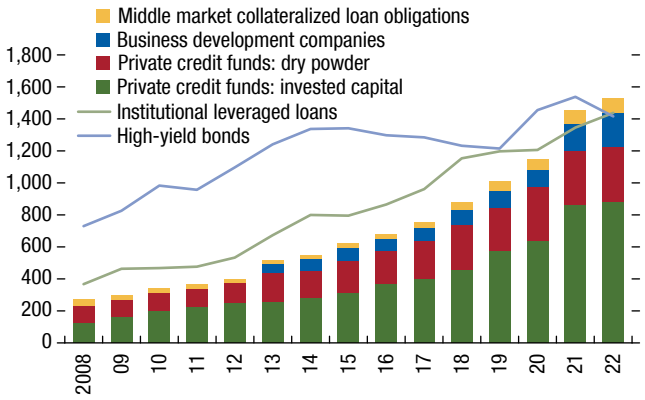
... of which a rising share is invested in structured and private credit while relying more on nontraditional liabilities.

2. US Insurers Allocation to Illiquid Assets and Share of Nontraditional Liabilities
(Percent)



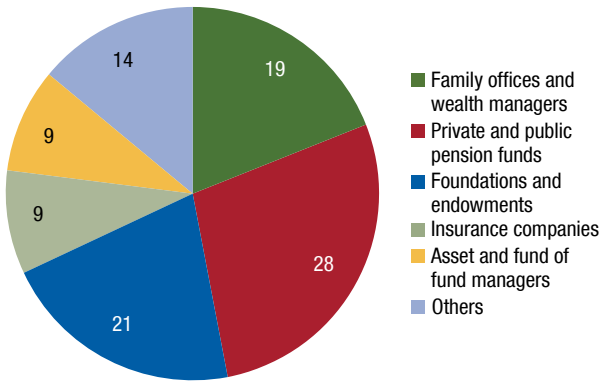
Private credit has grown significantly and has become a significant source of funding for risky firms ...

3. Private Credit Assets under Management and US Leveraged Loans and High-Yield Bonds Outstanding
(Billions of US dollars)



... with pension funds and insurance companies owning a significant share.

4. Investors in US Private Credit Funds, 2022
(Percent)



Sources: Bloomberg Finance L.P.; Goldman Sachs; Haver Analytics; ICE Bond Indices; National Association of Insurance Commissioners; PitchBook Leveraged Commentary and Data; Preqin; S&P Capital IQ; St. Louis Fed; UBS; US Flow of Funds; and IMF staff calculations.
Note: Panel 1 includes a sample of 50 selected insurance groups from 18 jurisdictions across Europe, North America, Asia, and Australia. Level III assets are those considered to be the most illiquid and hardest to value. Their values are typically estimated using a combination of complex market prices, mathematical models, and subjective assumptions. The nontraditional liabilities estimate in panel 2 is calculated as the share of total liabilities for US life insurers. They include funding agreement–backed securities, Federal Home Loan Bank advances, and cash received through repurchase agreements and securities lending transactions.
CMBS = commercial mortgage-backed securities; NBFIs = nonbank financial intermediaries; RMBS = residential mortgage-backed securities.

Nonbank Financial Intermediaries Levered Up during the Low Rate–Low Volatility Era

Although the banking sector was at the center of the recent financial turmoil, stress could also appear in other corners of the global financial system where vulnerabilities have built up over the past decade and more of extremely low rates and compressed volatility. Fragilities in the NBFI sector stem from the use of financial leverage, poor liquidity mismatches, and high levels of interconnectedness (see the case studies in Chapter 2).

In an effort to increase returns, insurance companies, one of the largest NBFI sectors, have doubled their illiquid investments over the last decade (see the share of Level III assets in Figure 1.8, panel 1), including rising exposures to structured-credit

securities with returns boosted by embedded leverage and illiquid private credit (Figure 1.8, panel 2). Life insurance companies also make use of leverage to fund illiquid assets, as shown by the increase in nontraditional liabilities such as funding-agreement-backed securities (Figure 1.8, panel 2, right scale).[9] Rising investment in structured and private credit is creating greater liquidity mismatches between assets and liabilities, which could make liquidating portfolios more challenging if facing margin calls on derivatives or repo contracts or policy surrenders should interest rates continue to rise rapidly.[10] Insurers are also more vulnerable to a potential adverse scenario of increases in corporate defaults and credit downgrades should the economy slow down owing to higher interest rates. Such a scenario could force insurers to liquidate investments when faced with increasing regulatory capital charges (see Chapter 1 of the April 2019 *Global Financial Stability Report*). The severity of such scenario could be aggravated by the embedded leverage in structured-credit investments, such as collateralized loan obligations (as discussed in more detailed in Chapter 2).

Indeed, private credit has grown rapidly over the last decade, surpassing the size of the US institutional leveraged loan market (Figure 1.8, panel 3)—a sector in which pension funds and insurance companies are significant investors (Figure 1.8, panel 4). Partly because of increased competition in private credit markets, leverage metrics on new transactions have increased alongside a deterioration in covenant quality. In addition, the tech startup firms that ran into liquidity strains and started pulling deposits from SVB were generally backed by private equity and venture capital deals and were likely beneficiaries of the strong growth in private credit markets. Cost of private credit is likely to increase for borrowers in these markets, adding to the more conservative lending posture of banks and weighing on economic activity. If access to private credit were suddenly restricted in a market stress event, borrowers could face rollover risks. Because of the low transparency and limited liquidity in private credit markets, spillovers to other markets could occur during a stress episode, as investors may be forced to sell other assets with more timely mark-to-market pricing and more liquid secondary markets in order to access cash.

[9]Funding-agreement-backed securities are financial instruments that are backed by a funding agreement, which is a deposit-type contract, issued by life insurance companies, that promises a stream of predictable fixed payments over a specified period of time. Other nontraditional liabilities include FHLB advances and cash received through repurchase agreements and securities lending transactions.

[10]Policy surrenders (or lapses) from life insurance policies are more likely to occur during periods of rapid increases in interest rates (see Chapter 1 of the October 2021 *Global Financial Stability Report*). This risk may in part be offset by better funded ratios at higher rates.

Various Other Headwinds Could Challenge Investor Sentiments

Financial conditions had eased from October 2022 through early March, reflecting elevated corporate valuations. Conditions tightened some after recent stress episodes weighed heavily on bank stocks and funding spreads despite a decline in risk-free rates (Figure 1.9, panel 1). In the days after SVB's failure, stock market volatility surged, credit spreads widened, and strains were apparent in interbank funding markets. These moves have partly retraced in subsequent weeks, although interbank funding spreads remain wide (Figure 1.9, panel 2).

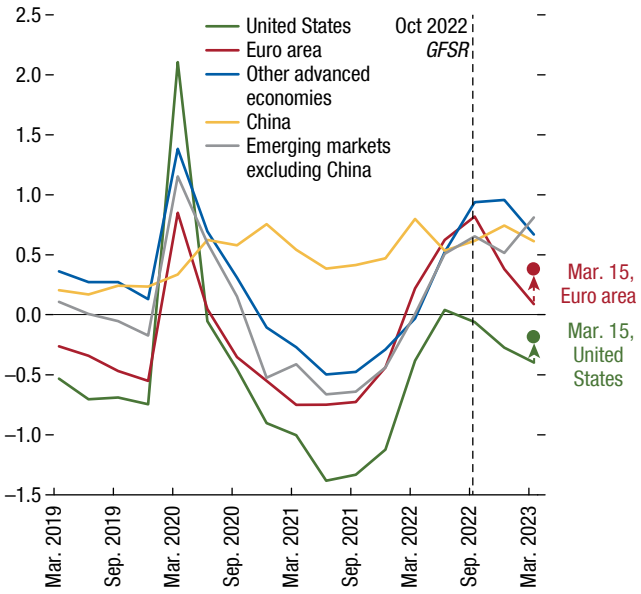
In addition to the fallout of the banking turmoil, a deteriorating corporate earnings outlook could challenge investor risk appetite. The strong performance of the S&P 500 from October last year to January of this one was largely supported by a narrowing of the equity risk premium, the compensation that investors require to bear equity risks (Figure 1.10, panel 1), while lower earnings expectations has been a drag.[11] Year to date, cyclical stocks, which are more sensitive to economic fluctuations, have outperformed defensive stocks. The outlook for equities could be challenged by the further anticipated deterioration of earnings if inflation stays high and recession risks rise. Earnings growth in the United States is already slowing more rapidly than during past tightening cycles that also featured high inflation (Figure 1.10, panel 2). The US Treasury yield curve, however, continues to be inverted—historically a harbinger for recessions (Figure 1.10, panel 3). Equity price volatility could be exacerbated by traders in the zero-day-to-expiration options market, who tend to react discretely to earnings and macroeconomic news (Box 1.3).

[11]Other equity valuation measures are similarly close to historical average levels.

Figure 1.9. Financial Conditions Indexes

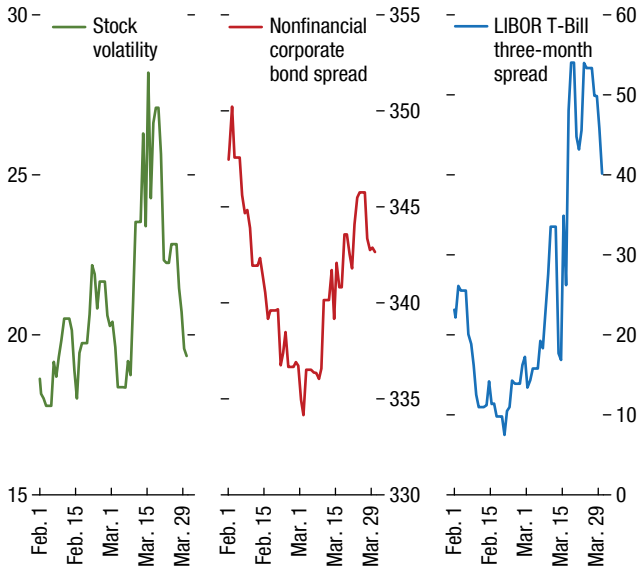
Financial conditions had broadly eased between October 2022 and early March, when the market turmoil began ...

1. IMF Staff Financial Conditions Index
(FCI, numbers of standard deviations)



... but had tightened sharply driven by higher volatility, wider credit spreads, and higher funding costs.

2. Components of FCI: Stock Market Volatility, Nonfinancial Corporate Bond Spread, and LIBOR T-Bill Three-Month Spread in the United States and the Euro Area
(Percent, basis points)



Sources: Bloomberg Finance L.P.; Haver Analytics; national data sources; and IMF staff calculations.
Note: The FCIs are calculated using the latest available variables. The emerging market sample excludes Russia, Türkiye, and Ukraine. Panels 1 show quarterly averages for 2006–19 and monthly averages for 2020–23. 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 the October 2018 *Global Financial Stability Report* Online Annex 1.1. In panel 2, all series are GDP-weighted averages of the United States and the euro area. GFSR = *Global Financial Stability Report*; FCI = financial conditions index; LIBOR = London Interbank Offered Rate.

Poor market liquidity has likely amplified recent gyrations seen in global markets. This issue is particularly evident in sovereign bond markets, likely reflecting both high levels of uncertainty and the effect of quantitative tightening in the euro area, the United States, and the United Kingdom (Figure 1.11, panel 1). Heightened uncertainties have made already-shallow market depth even shallower (Figure 1.11, panel 2). Bid-ask spreads in Treasury, Bunds, and Japanese government bond markets have widened sharply as traders have demanded larger liquidity premiums, and the yield curve has gotten significantly distorted (Figure 1.11, panel 3).

Uncertainty about the resolution of the US Debt Ceiling[12] discussions could add further bouts of volatility to Treasury and funding markets in the coming months. US Treasury Secretary Janet Yellen's January 19 letter to Congressional leadership stating that the outstanding US debt had reached its statutory limit on January 19 prompted US credit default swaps, a financial instrument aiming to protect investors against a US sovereign default, to soar to levels seen during past debt ceiling episodes (see US Department of Treasury 2023; Figure 1.12, panel 1). Extraordinary measures have since been employed allowing the US government to defer internal obligations in order to remain current on external ones. However, if Congress fails to agree on raising the debt limit as the so-called "X-date" (estimated as sometime between July to August) approaches, pressure may intensify in the Treasury market, exposing MMFs to higher liquidity, operational, and at the extreme credit risks, incentivizing them to step away from Treasury bills.

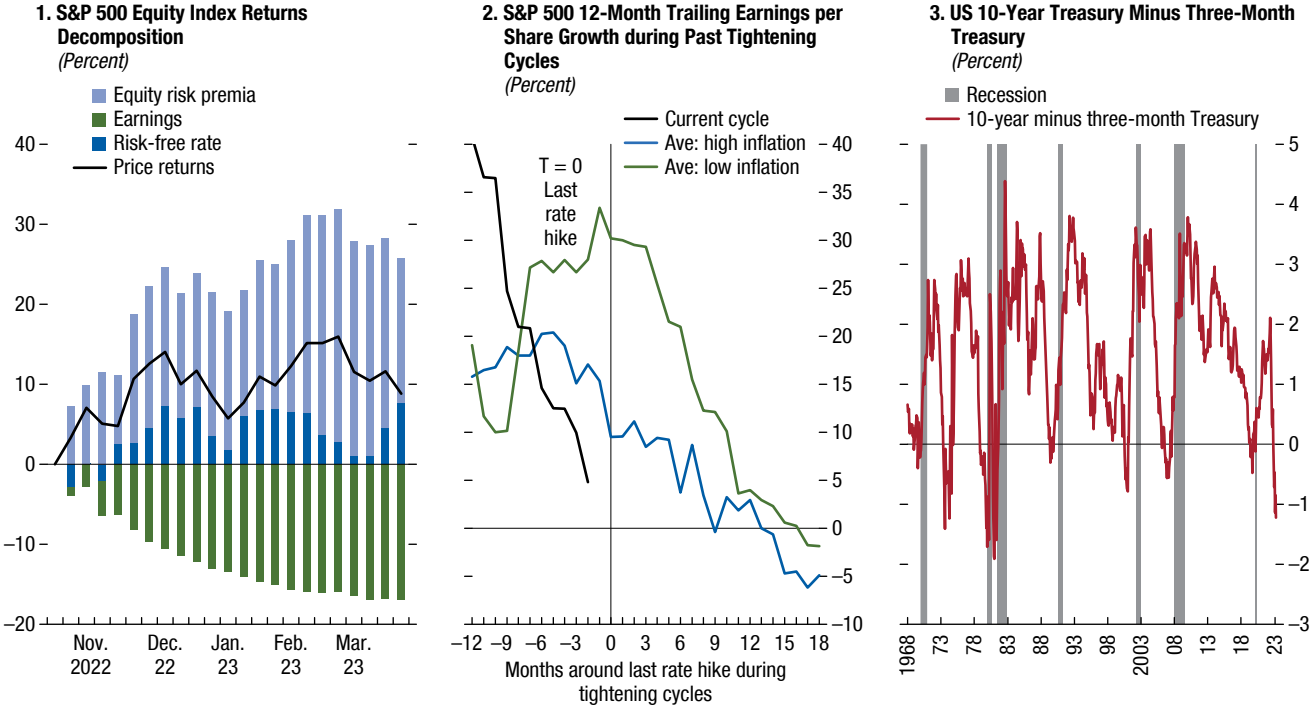
[12]The debt ceiling is the limit on the total amount of federal debt the government can hold. The debt ceiling is set at $31.4 trillion, which was reached on January 19, 2023.

Figure 1.10. Developments in US Equity and Bond Markets

The US equity rally was powered by decreasing risk premiums and interest rates, which have more than offset the weakening earnings outlook.

During past tightening cycles, corporate earnings underperformed in high-inflation episodes after the last rate hike.

The US yield curve has inverted strongly signaling recession.



Sources: Bloomberg Finance L.P.; ICE Bond Indices; PitchBook, Leveraged Commentary and Data; Refinitiv Datastream; and IMF staff calculations.
Note: In panel 1, data as of March 15, 2023. Lower equity risk premiums, lower risk-free rates, and higher earnings contribute positively to stock market returns, and vice versa. US Treasury represents constant maturity securities. In panel 2, the timing of the last hike for the current cycle is based on market expectations (more on Figure 1.15). Past tightening cycles include 1967, 1972, 1977, 1980, 1988, 1993, 1999, 2004, and 2015. High-inflation cycles are those with core Personal Consumption Expenditures Price Index above 4.5 percent. For the current cycle, the months to the last rate hike is based on current market expectations.

Indeed, investors are already demanding additional compensation for holding Treasury bills with maturities around the X-date, although the spikes remain contained so far (Figure 1.12, panel 2).[13]

In emerging markets, equities fell 4 percent on average in February through the end of March but were still up 10 percent, on net, since the October 2022 *Global Financial Stability Report*, reflecting improved risk sentiment after China's reopening. So far, spillovers from the turmoil in banking markets into emerging market banks has been contained, with equity prices of the largest banks modestly lower (Figure 1.13, panel 1). However, sovereign spreads for high-yield and frontier countries have spiked with the recent wave of financial market stress. Strong differentiation appears to persist between investment grade, for which spreads are still below historical averages, and riskier issuers, for which spreads are again near crisis levels (Figure 1.13, panel 2).

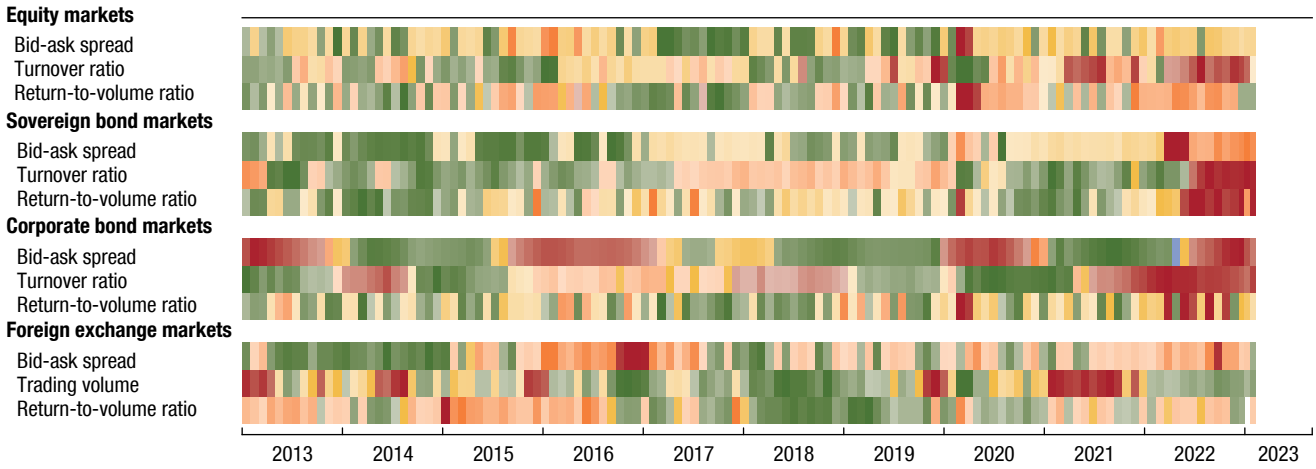
Issuance conditions for sovereign hard-currency debt have deteriorated since January, and many B-rated and lower issuers are facing serious challenges accessing the market. Eight emerging market

[13]As Treasury bills share the same characteristics apart from their maturity date, the surge in yields linked to the projected timeline for the US Treasury's depletion of cash can be viewed as compensation that investors demand for bearing the credit risk. Indeed, Treasury bill yields are pricing in an increased possibility of the United States defaulting on its external payment obligations. Nonetheless, the small magnitude of the yield spike in comparison to yields of adjacent bills suggests that money markets expect such an outcome to be highly unlikely.

Figure 1.11. Global Market Dynamics and Liquidity Conditions

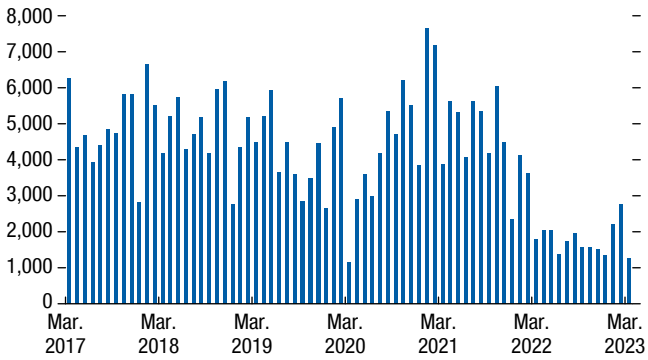
Market liquidity conditions have deteriorated in bond markets.

1. Global Liquidity Heatmap



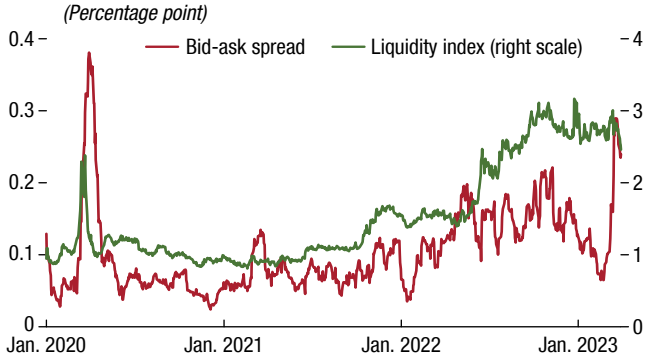
Treasury market depth became shallower ...

2. US Treasury Future Market Book Depth
(Millions of US dollars)



... bid-ask spreads widened and the term structure distorted further.

3. Advanced Economy Government Bond Bid-Ask Spread and Yield Curve Fitting Errors
(Percentage point)



Sources: Bloomberg Finance L.P.; JPMorgan Big Data and AI Strategies; JPMorgan Chase & Co.; MarketAxess; Refinitiv Datastream; and IMF staff calculations.
Note: In panel 1, red (green) cells represent the lowest (highest) liquidity levels. For panel 2, market depth is the estimated amount of trading in the US Treasury futures needed to move the price by 1 percent in a five-minute period. For panel 3, bid-ask spreads are estimated based on Corwin and Schultz (2012) for the current 10-year government bond in the United States, Germany, and Japan. The yield curve fitting errors are based on the Bloomberg government securities liquidity index (higher values of the index correspond to worse liquidity), which are the root mean square errors of the yield curve fitting model. The both indicators are 60:20:20 weighted average of the United States, Germany, and Japan.

sovereigns are currently in default, the greatest number since the global financial crisis. The number of nondefaulted, distressed issuers has risen from 11 to 12, and spreads are very high for many countries, with 18 sovereigns trading at spreads of more than 700 basis points, a level at which market access has historically been very challenging (Figure 1.13, panel 3). Since the October 2022 *Global Financial Stability Report*, many emerging market currencies have appreciated back to the levels seen before the war in Ukraine, and they have been little affected by the banking turmoil (Figure 1.13, panel 4).

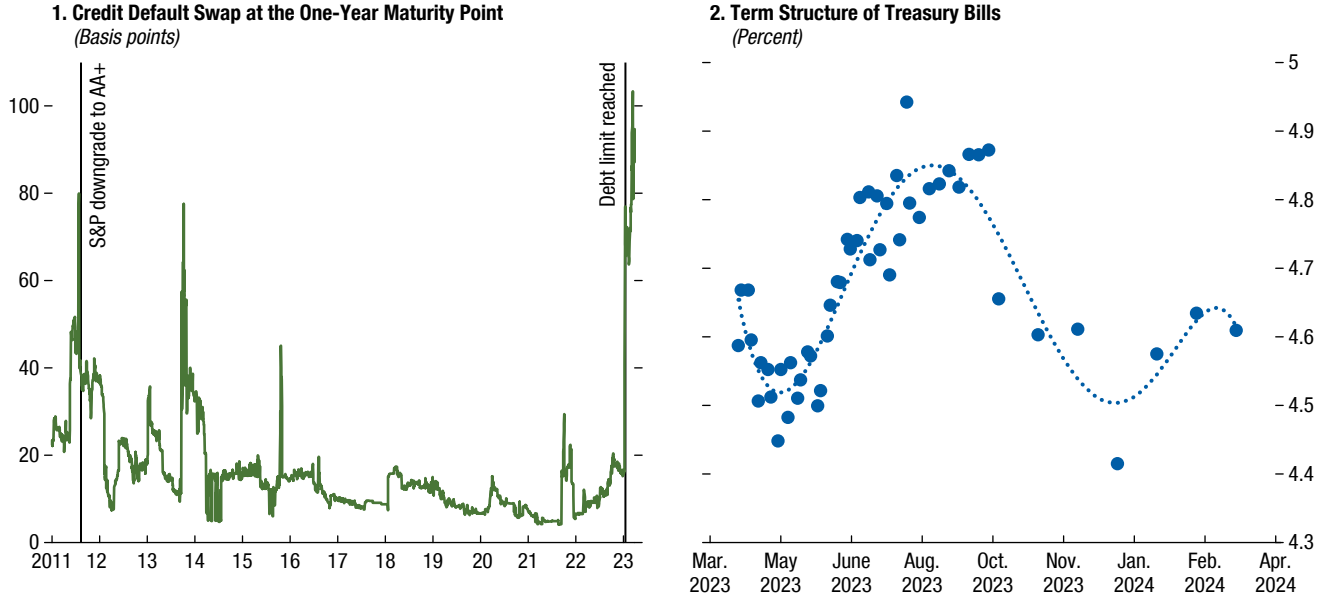
Financial Stability Risks Are Elevated

According to the April 2023 *World Economic Outlook*, the global growth forecast for 2023 is at 2.8 percent, with balance of risks around this forecast skewed to the downside, amid banking sector turmoil. In particular, the probability of growth falling below

Figure 1.12. US Debt Ceiling Debate: How It Affects Short-Term Markets

The US credit default swaps recently soared to levels seen during past debt ceiling episodes ...

... while the kink in bill yields aligns with the projected date when the treasury is expected to face payment difficulties.



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: Credit default swaps shown in panel 1 based on the contract denominated in euros and the 2014 contract definition by the International Swaps and Derivatives Association. Snapshot date in panel 2 corresponds to March 31, 2023.

current 2023 baseline of 2.8 percent is estimated around 62 percent, based on the Growth-at-Risk framework (Figure 1.14, panel 1).[14] Overall, downside risks—specifically, as measured by the growth-at-risk metric—remain elevated compared with historical norms (Figure 1.14, panel 2).

Manifestations of stress on banks' balance sheets could lead to severe and persistent credit tightening, further lowering global credit supply, resulting in significantly tighter financial conditions. Under the severe downside scenario discussed in Box 1.3 of the April 2023 *World Economic Outlook*, global financial conditions would tighten significantly and the forecast for global growth would decline to around one percent.[15] Importantly, downside risk would increase significantly (black dashed distribution in Figure 1.14, panel 1), with the growth-at-risk metric deteriorating to levels comparable to the peak COVID-19 crisis (black marker in Figure 1.14, panels 1 and 2).

Advanced Economies Face the Difficult Task of Ensuring Financial Stability while Bringing Inflation Back to Targets

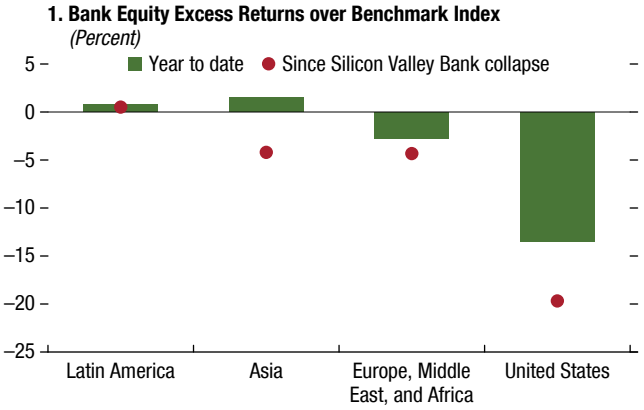
The market-implied path of monetary policy has gyrated wildly in advanced economies since the October 2022 *Global Financial Stability Report.* After moving sharply higher (with the exception of that for the United Kingdom) on expectations that monetary policy would be tighter for longer to tackle persistent inflationary pressures, the policy path has shifted sharply lower in recent

[14]The Growth-at-Risk framework assesses downside risks by gauging the range of severely adverse growth outcomes, falling within the lower 5th percentile of the conditional growth forecast distribution (see the October 2017 *Global Financial Stability Report* and April 2018 *Global Financial Stability Report* for details). Because of the unprecedented level of volatility at the current juncture, estimates based on the Growth-at-Risk framework may be subject to larger than usual uncertainty bands.

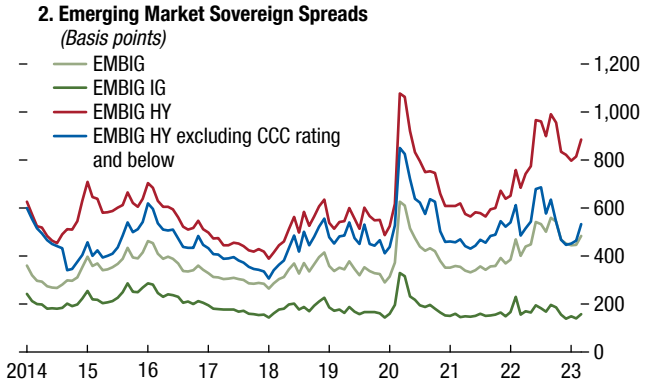
[15]Assumptions underlying this scenario pertain, broadly, to a widening in corporate and sovereign spreads by varying magnitudes across countries, and decline in equity prices globally. See Box 1.3 in the April 2023 *World Economic Outlook* for details of the scenario.

Figure 1.13. Emerging Market Economies' Financial Market Developments

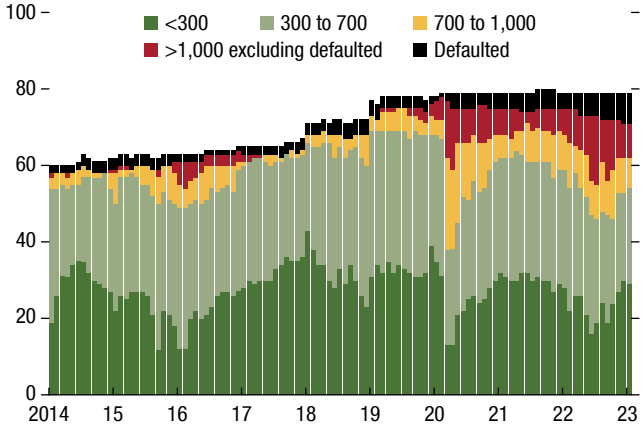
Emerging market banks have been relatively unaffected by recent events.



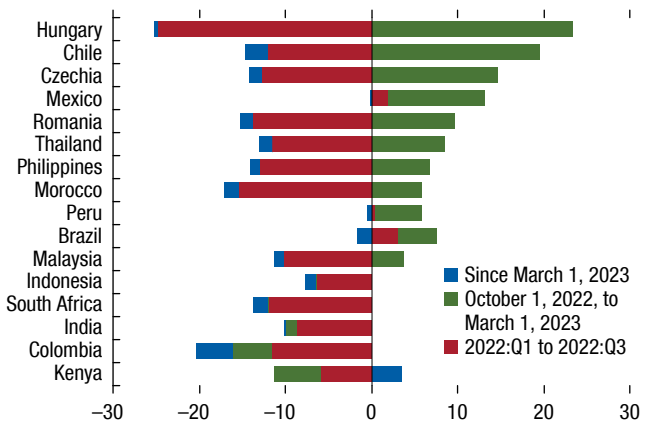
International funding costs have spiked again for risky issuers.



The number of distressed and defaulted sovereigns remains high compared with recent history.



Emerging market currencies have been resilient to recent market stress, and most have strengthened on net since the October 2022 *Global Financial Stability Report.*



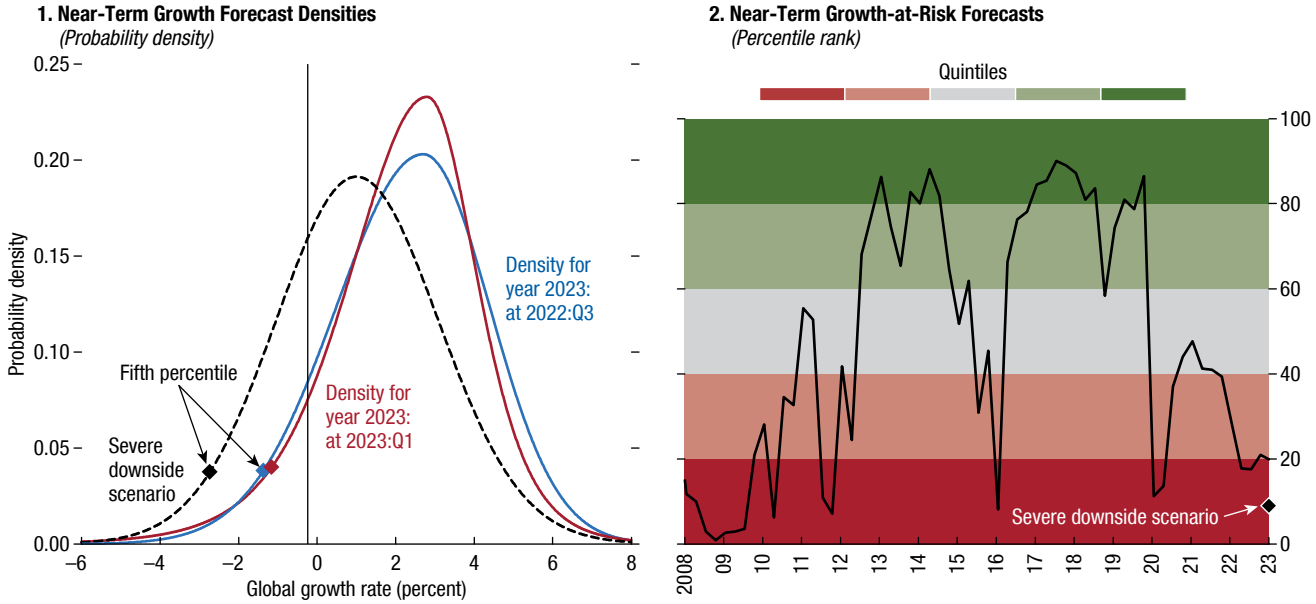
Sources: Bloomberg Finance L.P.; JPMorgan Chase & Co.; MSCI; and IMF staff calculations.
Note: Panel 1 is based on a sample 320 listed banks in 18 emerging market countries. Panel 2 uses weights from the previous month for any missing data point. In panel 3, ">1,000 excluding defaulted" refers to the number of sovereigns trading with spreads over 1,000 basis points that have not defaulted. The defaulted category includes those sovereigns that were or have been rated in default for more than one month by ratings agencies and have international bond issuances. EMBIG = Emerging Market Bond Index Global; HY = high yield; IG = investment grade; Q = quarter.

weeks, as investor have priced in significant easing as a result of stress in the banking sector (Figure 1.15). Central banks have indicated they have tools to separately address financial stability risks, allowing them to continue tightening monetary policy to bring inflation back to targets. Investors, however, appear to have concluded that policymakers will soon end policy tightening. They now anticipate policy rate cuts in the United States and Europe to start as early as the second half of this year.

One-year-ahead market-based measures of inflation expectations, as implied by the prices of inflation swaps, have moved upward in the euro area and the United States, on net, so far this year (Figure 1.16, panel 1). Pricing from inflation options markets suggests that the probability of inflation being higher than central banks' target of 2 percent over the next 5 years remains elevated. Investor disagreement around the most likely inflation outcomes continues to be notable for the euro area—as evidenced by the bimodal shape of the option-implied density—while investors in the United States appear to have converged around a 3 percent outcome (Figure 1.16, panel 2).

Figure 1.14. Global Growth-at-Risk

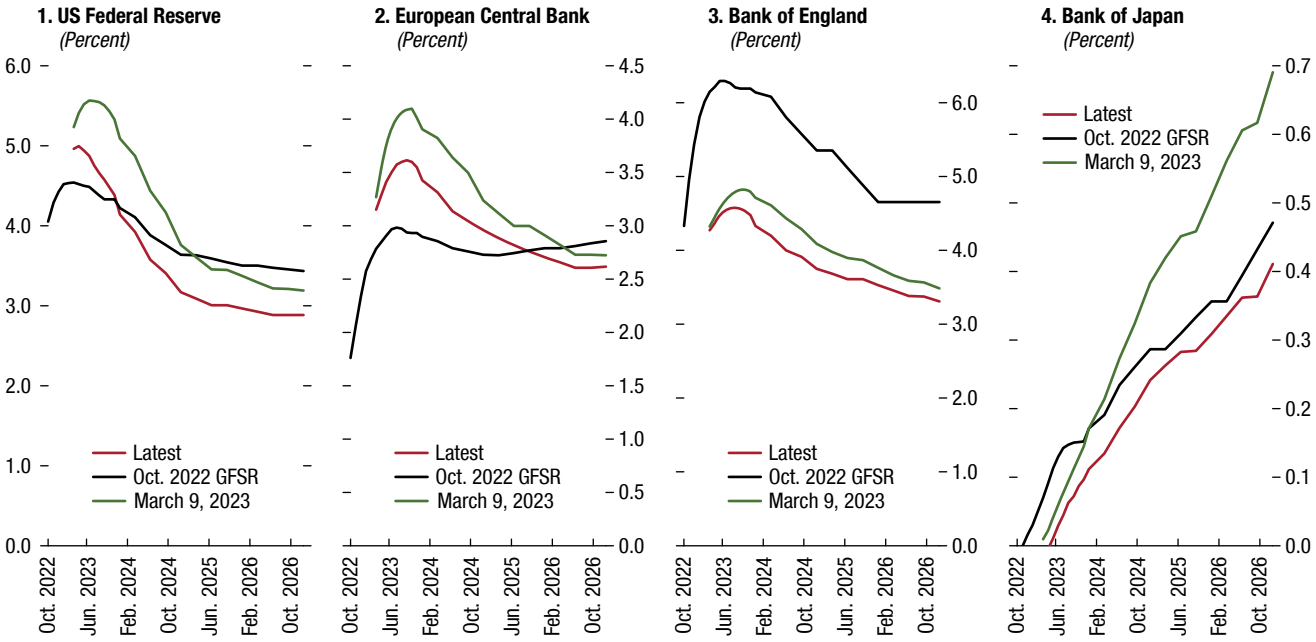
On balance, risks to growth are skewed moderately to the downside ... ... but remain somewhat elevated compared with historical norms.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, International Financial Statistics database; and IMF staff calculations.
Note: Forecast density estimates are centered around the World Economic Outlook database forecasts for 2023 made at the third quarter of 2022 and the first quarter of 2023, respectively. In panel 2, 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. See the April 2018 *Global Financial Stability Report* for details.

Figure 1.15. Policy Rate Expectations in Advanced Economies

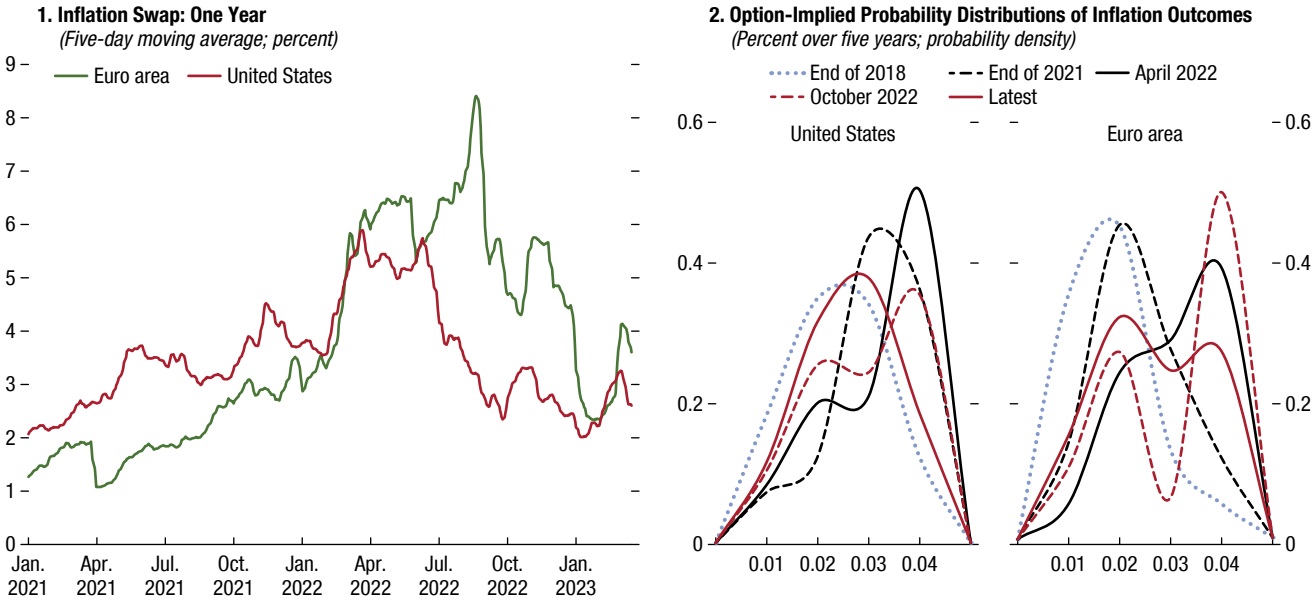
Market-implied paths for policy rates have shifted significantly lower over recent weeks, driven by investors' reassessment of the future course of policy amid turmoil in the banking sector.



Sources: Bloomberg Finance L.P.; European Central Bank; national authorities; US Federal Reserve; and IMF staff calculations.
Note: GFSR = *Global Financial Stability Report*.

Figure 1.16. Market-Implied Probability of Future Inflation Outcomes

The probability of high inflation outcomes over the next five years has moderated somewhat in the United States and the euro area. Investor disagreement around the most likely inflation outcomes is still notable in the euro area.



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: "Latest" refers to the time of publishing the April 2023 *Global Financial Stability Report*. Probability densities shown in panel 2 are derived from inflation caps and floors.

Despite the recent moderation in some commodity prices, inflation remains well above target in most advanced economies. In addition, core inflation remains stubbornly high across most regions, if not rising by some measures, and labor markets are still very tight. Furthermore, the global economy could be susceptible to further inflation shocks—for example, energy prices may surge again if the war in Ukraine were to intensify or if commodity prices rise as a result of a strong reopening of China.

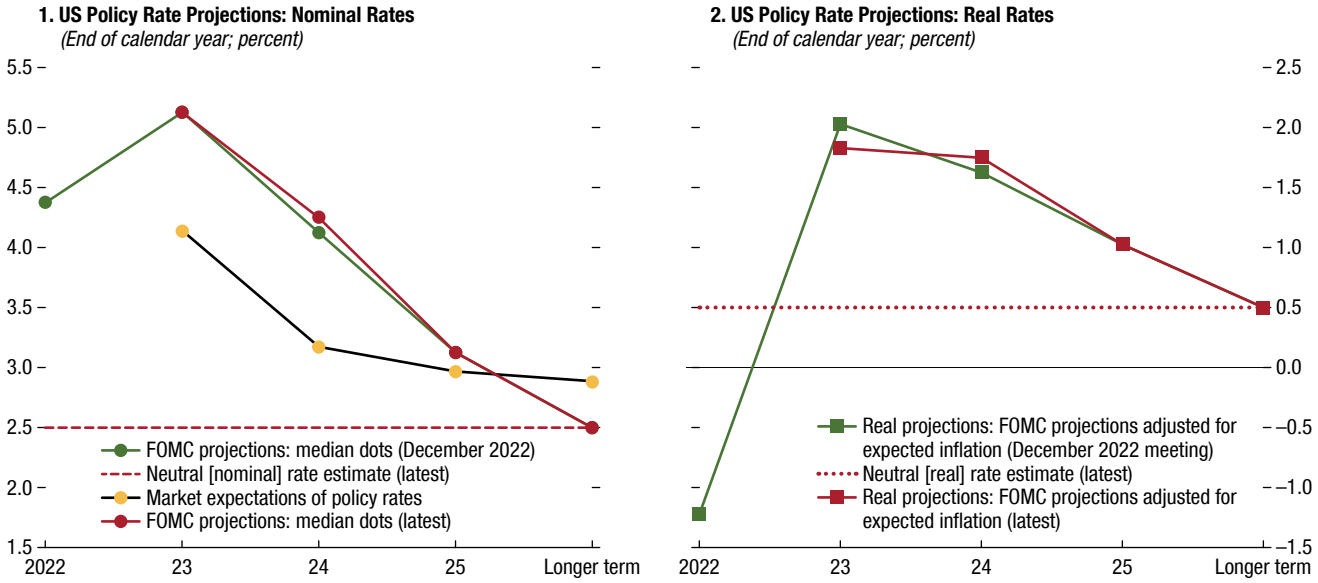
In the United States, the Federal Reserve has continued to raise the federal funds rate since the October 2022 *Global Financial Stability Report*, bringing the latest target range to 4.75 percent to 5 percent. In March, the median Federal Open Market Committee (FOMC) participant anticipated the policy rate to reach slightly above 5 percent in 2023, before declining to about 4.3 percent in 2024 and about 3 percent in 2025 (Figure 1.17, panel 1), although there appears to be significant dispersion in the participants' assessment of appropriate monetary policy. By contrast, investors have priced in some easing of policy this year. In terms of real rates, the median FOMC participant foresees a significantly tight policy stance over the next three years compared to the longer-term neutral rate of 0.5 percent (Figure 1.17, panel 2).

Central banks in other major advanced economies have also continued to tighten monetary policy. On March 16, the European Central Bank increased policy rates by 50 basis points, with its communications emphasizing the separation between monetary policy used to achieve price stability and other tools used to achieve financial stability. Monetary authorities in other countries have also turned hawkish in recent weeks as signs of slower progress on inflation have emerged. Overall, the Bank of England, the European Central Bank, the Bank of Canada, and the Reserve Bank of Australia have increased rates by 400 basis points, 300 basis points, 425 basis points, and 350 basis points, respectively, since December 2021, and most have stepped down the pace of increases at recent meetings.

By contrast, the Bank of Japan has continued to pursue an accommodative stance of monetary policy by keeping its policy rate unchanged and reaffirming its bond-buying strategy to anchor the 10-year yields

Figure 1.17. Policy Rates Paths: Nominal and Real

The assessment by the FOMC of appropriate monetary policy has shifted higher since the October 2022 *Global Financial Stability Report*.



Sources: Bloomberg Finance L.P.; US Federal Reserve; and IMF staff calculations.
Note: FOMC policy rate projections in panels 1 and 2, and market expectations of policy rates in panel 1, correspond to the level of the federal funds rate expected at the end of each calendar year. Real policy rates, in panel 2, are based on FOMC projections for personal consumption expenditures inflation. FOMC = Federal Open Market Committee.

on Japanese government bonds at about 0 percent (Bank of Japan 2023). To address the effects of its bond buying on market functioning and the shape of the yield curve, the Bank of Japan widened the band to 50 basis points on either side of its 0 percent target in December. The announcement was largely unanticipated and interpreted by some market participants as a possible pivot toward eventual normalizing of its long era of qualitative and quantitative easing rather than purely a technical move to improve market functioning. Volatility surged, with the 10-year Japanese government bond yield reaching its highest level since 2015 (Figure 1.18, panel 1, and Box 1.4). More recently, the 10-year Japanese government bond yield moved down.

Medium- and longer-term interest rates have declined, on net, in most advanced economies since the October 2022 *Global Financial Stability Report*, with downward pressure having increased significantly following the failure of SVB (Figure 1.18, panel 2). In the case of United States, the decline in rates across all horizons may be attributed to lower real yields, consistent with expectations of less policy tightening. Rates in the United Kingdom have also fallen both on account of lower real yields as well as lower inflation breakevens (market-based proxy for expected inflation). In Europe, rates have increased somewhat as higher real yields have more than offset a decline in breakevens.

Quantitative Tightening amid High and Increasing Public Debt

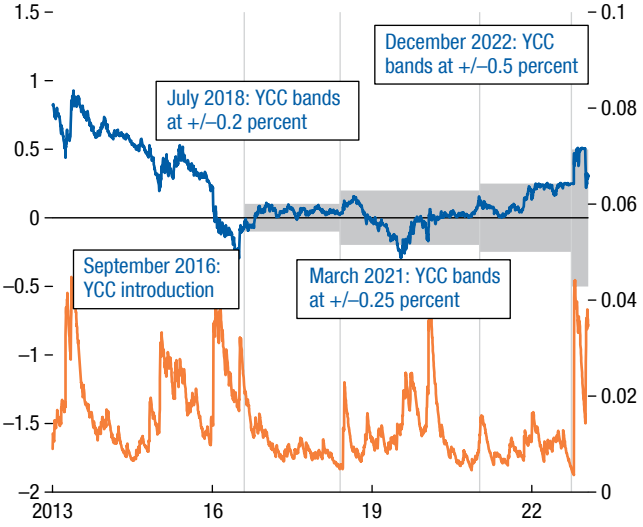
After having significantly increased their securities holdings during the pandemic, the US Federal Reserve, Bank of England, and European Central Bank have started to reduce their balance sheets. This normalization process could pose challenges for sovereign debt markets at a time when liquidity is generally poor, debt levels are high, and additional supply of sovereign debt will have to be absorbed by private investors.

In the United States, net issuance of the US Treasury securities is projected to increase in 2023 and 2024, while quantitative tightening is reducing the share absorbed by the Federal Reserve's

Figure 1.18. Drivers of Advanced Economy Bond Yields

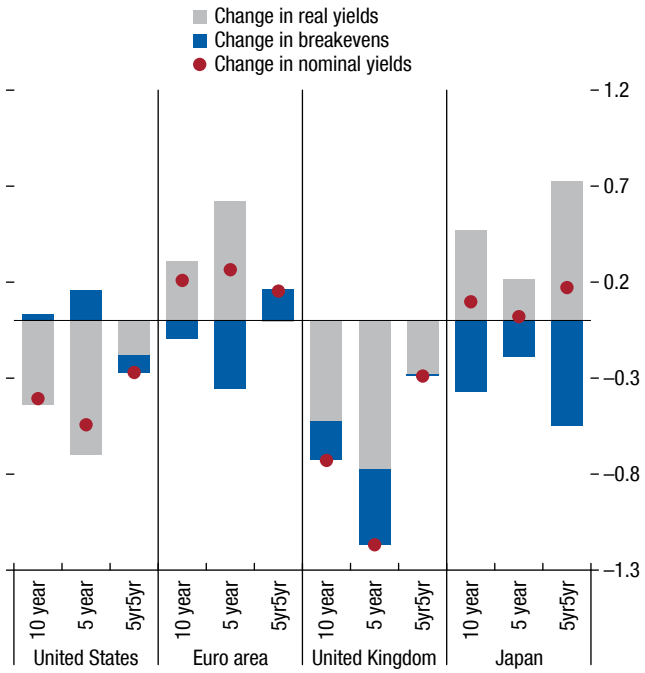
The unexpected adjustment in the YCC led to higher volatility in the Japanese government bond market.

1. Ten-Year Japanese Government Bond Yield and Its Realized Volatility
(Percent)



Medium- and long-term interest rates have decreased in most advanced economies, on net.

2. Change in Yields since the October 2022 *Global Financial Stability Report*
(Percentage points)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: In panel 1, realized volatility is computed using an exponentially weighted moving average method. The YCC band when YCC was initially introduced in 2016 was markets perception of the meaning of the target of "round zero percent" but not the official announcement. 5yr5yr = five-year, five-year forward; YCC = yield curve control.

balance sheet (Figure 1.19, panel 1). Assuming the same US government debt maturity profile, the private sector will need to absorb more short- and medium-term securities, as these are likely to be run off at a faster pace by the Federal Reserve (Figure 1.19, panel 2).[16] Other traditional buyers—such as foreign official sector institutions and US banks—have also reduced their holdings in recent months (Figure 1.19, panel 3), adding pressure on Treasury market liquidity.[17]

Elsewhere, quantitative tightening is also increasing the government securities that the private sector will need to absorb amid higher funding needs. In the United Kingdom, the net supply of gilts to the private sector is set to increase significantly in 2023. In the euro area, the European Central Bank began reducing its securities holdings this March, while the financing needs of European governments are expected to remain substantial in 2023 (Figure 1.20, panels 1 and 2).[18]

In this context, while the recent surge of risk aversion has led to a compression of term premiums[19]

[16]Projections assume the US Treasury will roll over maturing securities, which is normally the case. They are based on the US Federal Reserve (Federal Reserve Board 2022).

[17]US banks have significantly increased their holdings of US Treasuries since the pandemic. Their current level of Treasury holdings amid ongoing quantitative tightening could be maintained, for instance, by a shift away from other high-quality liquid assets (for example, reserves) toward Treasuries.

[18]See the October 2022 *Global Financial Stability Report* for more details.

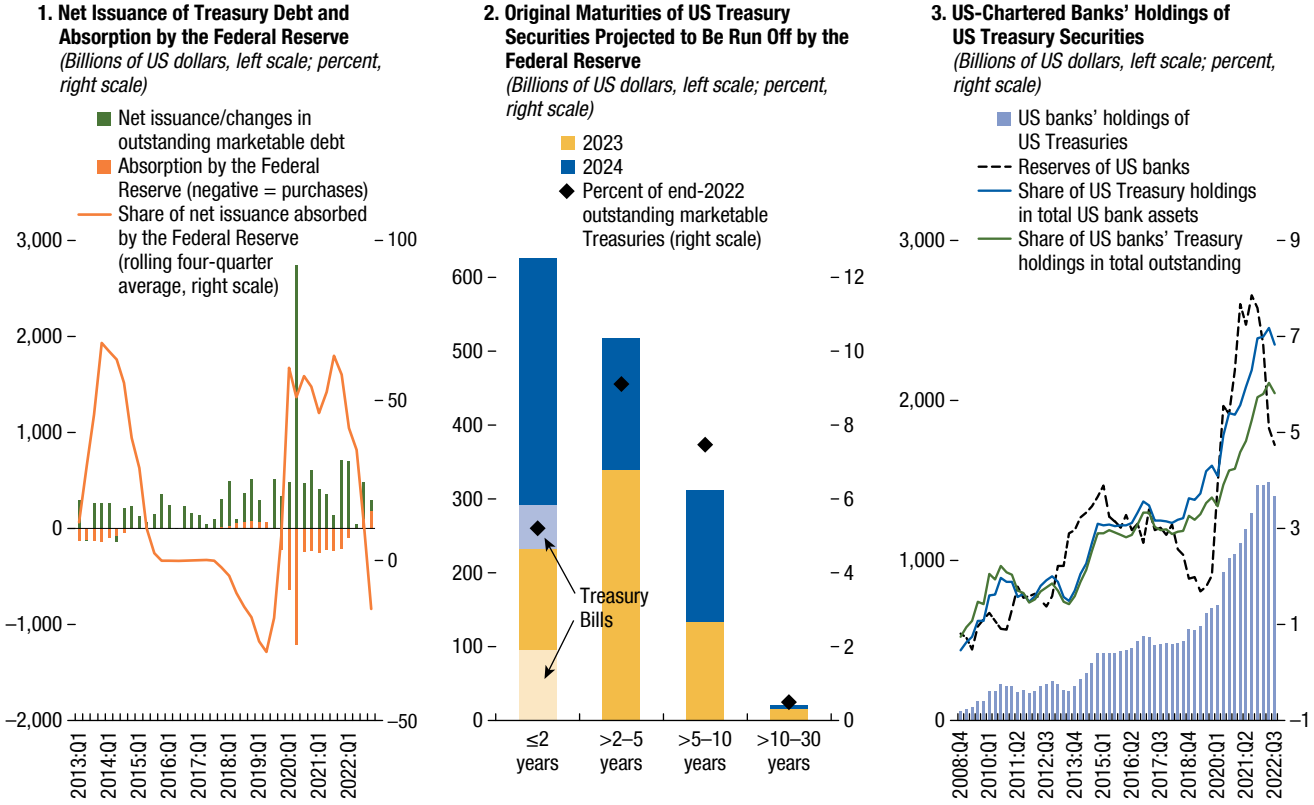
[19]The term premium is defined as the compensation investors require to bear interest rate risk over the life of a fixed-coupon bond.

Figure 1.19. Quantitative Tightening in the United States and the Additional Supply of US Treasury Securities

With quantitative tightening, the Federal Reserve stops absorbing a large share of Treasury net issuance ...

... particularly in short- and medium-term securities.

US banks had been significant buyers of these securities but have recently reduced their holdings.



Sources: US Federal Reserve System Open Market Account data; US Flow of Funds; US Monthly Statistics of Public Debt; and IMF staff calculations.
Note: In panel 1, absorption by the US Federal Reserve is presented as a negative number to visualize the reduction in net issuance to be absorbed by the other institutions and investors. In panel 3, US banks are US-chartered banks, including US subsidiaries of foreign banks.

in the bond market as investors have rushed toward safe haven assets, there is a risk of a sharp repricing. In the United States, term premiums have remained low despite a 250-basis-point increase in terminal rate expectations since March 2022 (Figure 1.21, panel 1). Defying historical correlations, the 10-year Treasury term premium has remained negative, at about –70 basis points. Similar patterns have prevailed in the United Kingdom and the euro area since the start of their hiking cycles. The persistence of compressed term premiums likely reflects investors' preference for holding safe sovereign bonds amid still-substantial uncertainty about the economic outlook, as well as the fact that central banks are still holding sizable shares of sovereign bond duration (Figure 1.21, panel 2).

Quantitative Tightening Adds Challenges to Money Markets

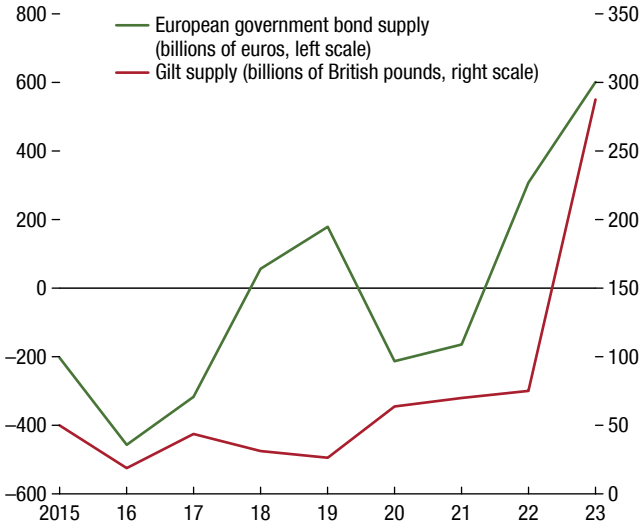
Since the pandemic, G10 central banks have injected massive amounts of liquidity into the financial system, leading to a surge in banks' reserves, a liability item on central bank balance sheets (Figure 1.22, panel 1). As these moves are unwound by quantitative tightening, reserves are drained from the financial system. As reserves decline, there is a risk that funding rates could increase markedly as market participants compete for increasingly scarce pools of liquidity in the open market (as seen in September 2019 in the United States).[20] Before the

[20]Similarly, in Australia, banks will face higher funding costs as cheaper funding from the pandemic-era Term Funding Facility expires in 2023–24.

Figure 1.20. Quantitative Tightening in the Euro Area and the United Kingdom amid Additional Supply of European Government Bonds and Gilts

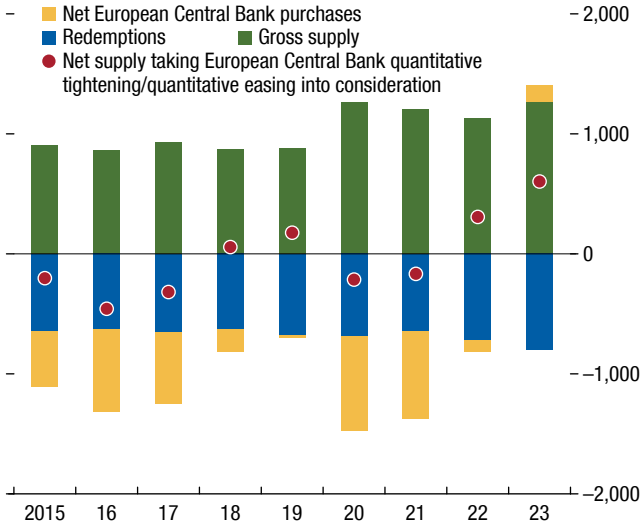
Gilt and European government bonds net supply to the private sector is set to increase significantly this year.

1. European Government Bonds and Gilt Net Supply
(Billions of euros, left scale; billions of British pounds, right scale)



European government bonds net issuance is set to increase significantly in 2023.

2. European Government Bond Issuance versus European Central Bank Purchases
(Billions of euros)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.

recent bank turmoil, as quantitative tightening was advancing, there were some signs that the funding was getting tighter, particularly for smaller banks, as deposit outflows have led banks to pursue other financing alternatives, including advances from the FHLBs and borrowing in the federal funds market—the volumes of which reached the highest point since 2016—as well as from the discount window. However, reserves were still abundant and account for around 14 percent of the assets of the entire banking system. Therefore, with the exception of some pressures in funding markets from the turmoil in the banking sector, money market rates have adjusted in line with policy rates without major distortions.

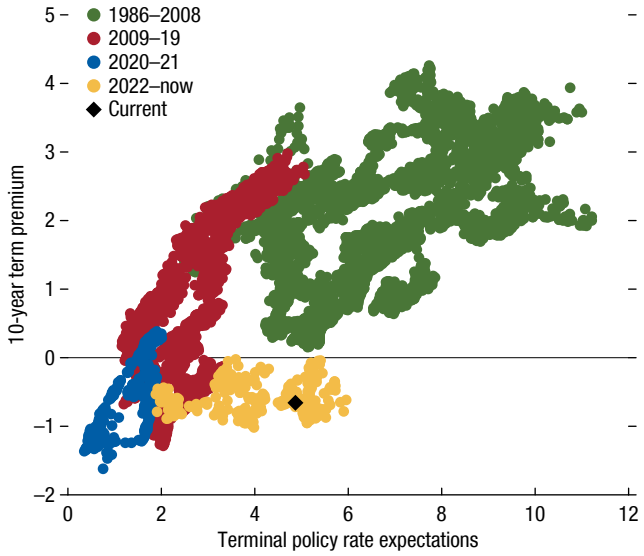
Reserve dynamics have changed substantially with the recent turmoil, reversing in part the impact of quantitative tightening so far. In the United States, bank reserves had declined significantly in the months before quantitative tightening (about $725 billion), and by about $330 billion from the beginning of quantitative tightening through early March. The banking turmoil in March has reversed the decline in reserves by approximately $400 billion, as concerns about deposit outflows led banks to bolster liquidity by borrowing from the FHLBs and the Federal Reserve. So far, the $540 billion declines in Federal Reserve assets since June 2022 has been associated, on the liabilities side, with a decline in the Treasury General Account (the US government's operating account). Reserves and balances in the ON RRP—a Federal Reserve facility in which MMFs can invest cash—have increased a bit over the same period (Figure 1.22, panel 2).

At the current pace, the Federal Reserve's balance sheet will shrink by about $800 billion in the remaining months of 2023, further reducing reserves. Assuming total banking system assets stay at early March (before the turmoil) levels, reserves could decline to 11.5 percent of bank assets in 2023, all else equal. At that level of projected reserves, funding spreads have historically been only a bit more sensitive to changes in reserve balances (Figure 1.22, panel 3). Strains at banks could further add to funding higher funding spreads.

Figure 1.21. Term Premiums Remain Compressed Despite Tightening

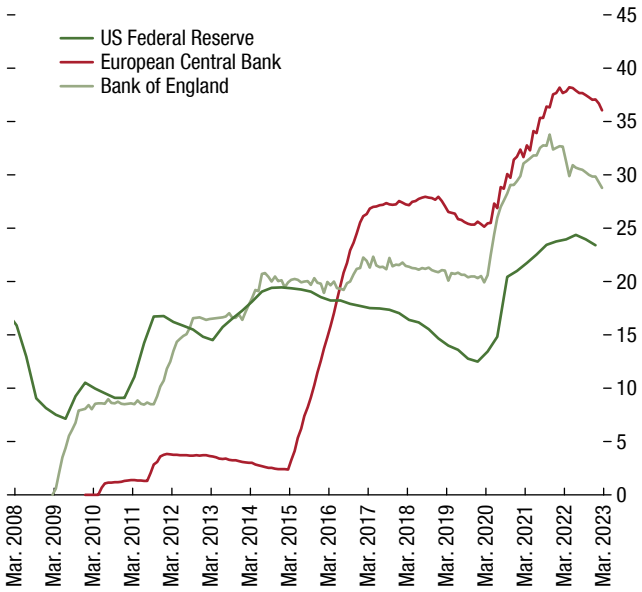
Notwithstanding advanced stage of tightening, term premiums at present remain compressed ...

1. US 10-Year Term Premiums and Terminal Policy Rate Expectations
(Percent)



... even though central banks have started to shrink their bond market presence.

2. US Federal Reserve, European Central Bank, and Bank of England Duration Absorption of Public Sector Securities for Monetary Policy Purposes
(Percent)



Sources: Bloomberg Finance L.P.; European Central Bank; Haver Analytics; and IMF staff calculations.
Note: Panel 1 shows term premiums and terminal rates observed daily. Term premiums are based on the Adrian, Crump, and Moech (2013) model and shown for the 10-year tenors. Terminal policy rate expectations reflect the near-term peak forward rate of money market futures curves at a given point in time. Panel 2 shows the duration risk absorbed, which is defined as the share of central bank holdings divided by the overall sovereign bond market capitalization. Horizontal lines reflect the start of the US Federal Reserve's quantitative tightening programs in July 2017 and June 2022. For the European Central Bank, it shows holdings in the asset purchase program and the pandemic emergency purchase program, government bond holdings relative to the outstanding government debt securities in euro area

Emerging Markets: Higher Rates Pose Debt Risks to Vulnerable Countries

High debt levels continue to pose serious medium-term risks for many countries, as the era of easy international market access for all emerging markets may be coming to an end. In recent weeks, the deterioration in global risk appetite has partially unwound the easing in financial conditions in emerging markets seen since October, with bond yields moving higher and exchange rates depreciating. Sovereign and corporate hard-currency spreads also have widened by about 30 basis points, highlighting the sensitivity of emerging market assets to global developments. Notwithstanding recent moves, as noted in the October 2022 *Global Financial Stability Report*, market perception of emerging market risks remain strongly differentiated according to ratings.

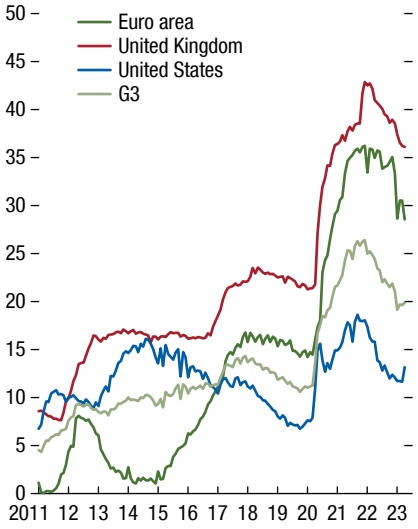
On net since October, higher-quality emerging market bonds have rallied to levels at which new issuance in international markets is reasonably easy, whereas frontier and other lower-rated issuers will likely face continued difficulties. Low-income countries, which have been adversely affected by high food and energy prices, continue to have extremely challenging debt situations. Several existing debt distress cases have unfortunately already showcased the potential for large spillovers from debt issues to the real economy, with a disproportionate effect on the most vulnerable households.

Portfolio flows have stalled since mid-February, with modest outflows from local currency bonds and equities resuming after a strong rebound from late 2022 through January. Sovereign hard-currency issuance also has slowed after one of the strongest

Figure 1.22. Quantitative Tightening and the Effect on Reserves

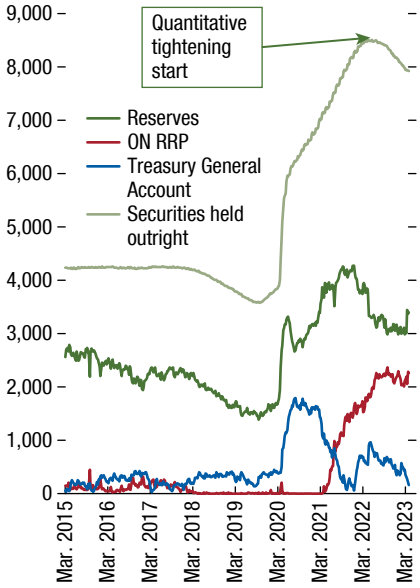
Central banks' balance sheets have swollen during the pandemic, leading to a massive increase of bank reserves.

1. Bank Reserves in the United States, the Euro Area, and the United Kingdom
(Percent of GDP)



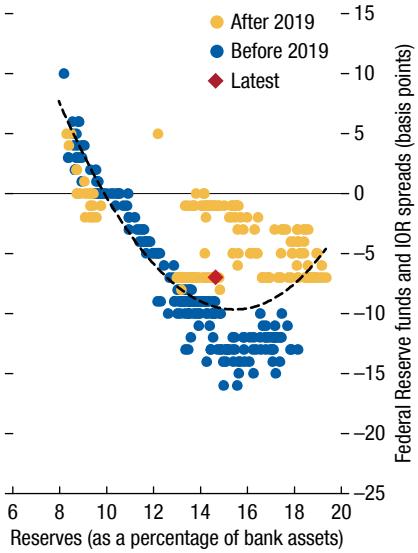
In the United States, the effect of quantitative easing on reserves so far has been small, despite reverse repurchases remaining high.

2. Securities Held Outright, Reserves, and Overnight Reverse Repurchase Volumes
(Billions of US dollars)



Upcoming quantitative easing volumes could squeeze reserves further, well into the part of the upward-sloping demand curve.

3. Reserve Balance and Federal Funds Interest Rate of Excess Reserves Spreads
(Basis points; percent of bank assets)



Sources: US Federal Reserve System Open Market Account data; US Monthly Statistics of Public Debt; US Flow of Funds; and IMF staff calculations.
Note: G3 = Group of Three countries; IOR = interest on reserves; ON RRP = overnight reverse repurchase agreement.

months on record in January. Chinese equities had seen the strongest inflows from nonresidents over three months since 2019 with $34 billion through January, whereas local currency bonds,[21] which saw large outflows of $84 billion in 2022, had yet to rebound and have seen sharp outflows begin again (Figure 1.23, panel 1). Overall, foreign portfolio investments in emerging markets have yet to fully recover from 2022 and show signs of remaining vulnerable to shifts in global market conditions. IMF staff analysis, which is based on the capital-flows-at-risk methodology,[22] suggests that outflows could reach 2.8 percent of GDP, less severe than the 3.2 percent projected in the October 2022 *Global Financial Stability Report* but still above the long-term average (Figure 1.23, panel 2).

Other forms of nonresident capital inflows have been fairly resilient since the COVID-19 pandemic.[23] As demand for emerging market debt in public markets dropped dramatically starting in 2020, the supply of private loans (from banks and other financial corporations) and other investment flows[24] increased to make up the shortfall, including the use of special drawing rights allocations in late 2021 (Figure 1.23, panel 3). However, these flows could now be at risk if conditions in advanced economies, particularly in the banking sector, remain unstable. In frontier markets, brisk debt issuance evaporated in 2021 and may not resume at the same scale, given the ongoing challenges

[21]Refers primarily to central government and policy bank bonds.

[22]See the April 2020 *Global Financial Stability Report*. Capital flows at risk are defined as the fifth percentile of the three-quarters-ahead capital flows probability density.

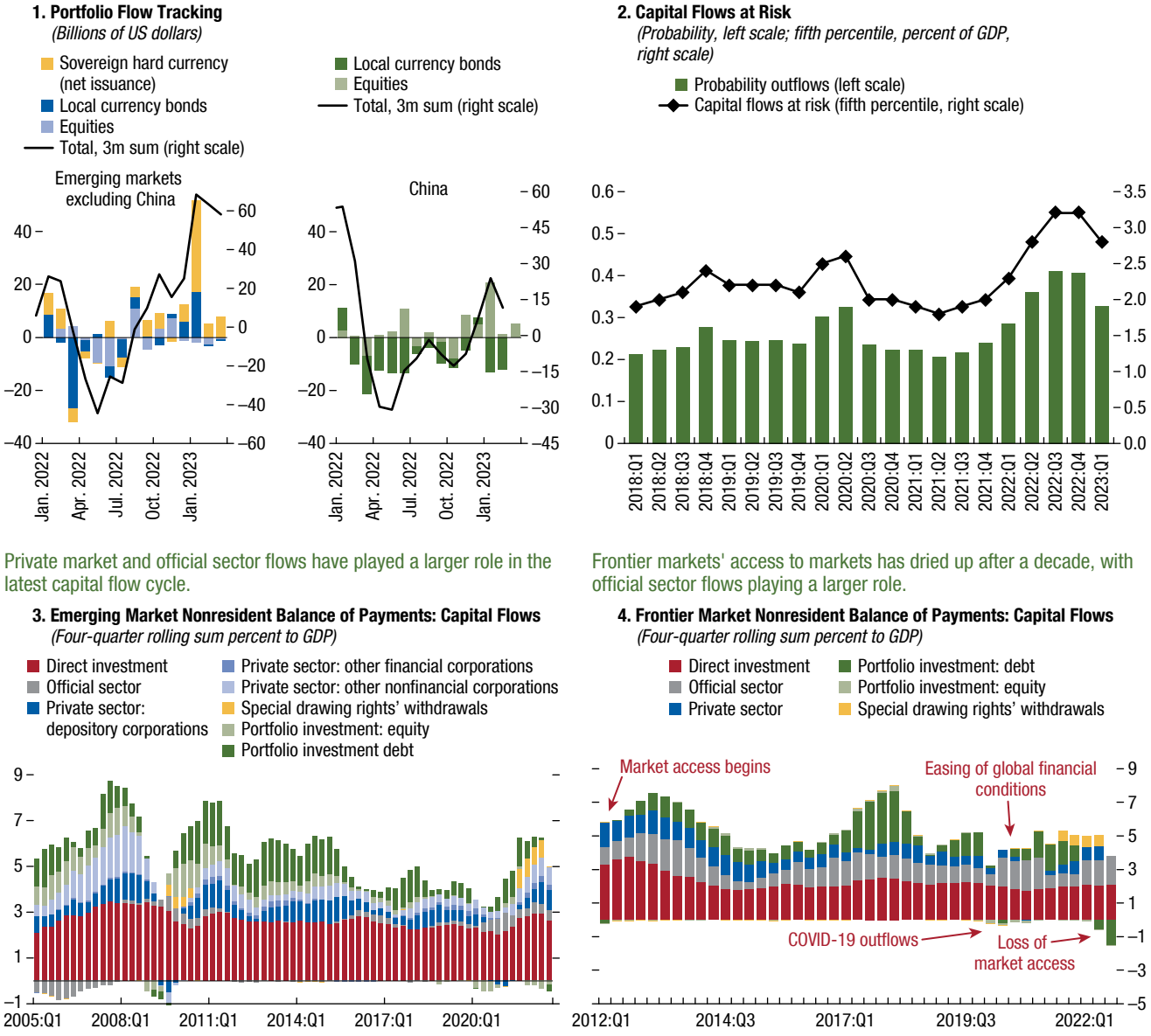
[23]Findings refer to a sample of 18 emerging and frontier markets excluding China and Russia.

[24]Other investment flows are the residual flows not included in foreign direct and portfolio investment, which can include bank loans, currency and deposits, and trade credits. Please see the sixth edition of IMF's *Balance of Payments and International Investment Position Manual* (https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf) for the specific definition.

Figure 1.23. Emerging Market Capital Flows

Portfolio flows have stalled after rebounding in late 2022.

Risks to capital flows have eased but remain somewhat elevated.



Private market and official sector flows have played a larger role in the latest capital flow cycle.

Frontier markets' access to markets has dried up after a decade, with official sector flows playing a larger role.

Sources: Bloomberg Finance L.P.; Haver Analytics; national sources; IMF, World Economic Outlook database; and IMF staff calculations.
Note: In panel 1, local currency bond flows refer primarily to government bonds. Latest data for February and March may be incomplete and preliminary. China's bond flow data for March had not been released at the time of publication. 3m sum = three-month rolling sum; Q = quarter.

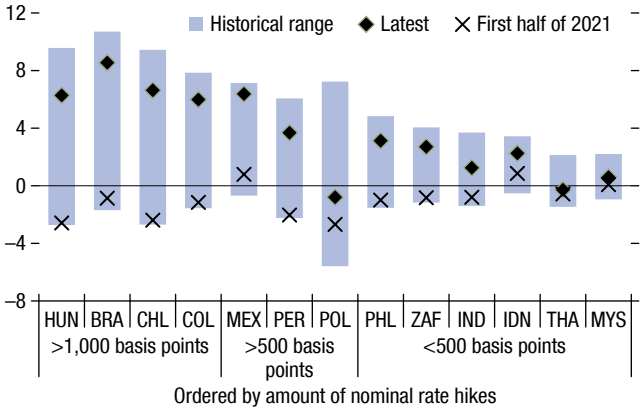
with sovereign defaults and macro-vulnerabilities (Figure 1.23, panel 4).

Early and aggressive policy rate hikes have contributed to the resilience of emerging markets since 2022 through large interest rate differentials with respect to advanced economies. Real (ex ante) policy rates have tightened substantially and appear restrictive relative to those in previous tightening episodes in a number of countries, particularly in Latin America, although less so in emerging Asia (Figure 1.24, panel 1). Forward-looking monetary policy expectations for emerging markets have generally eased since the October 2022 *Global Financial Stability Report* but remain sensitive to developments in advanced economies. Recent stress

Figure 1.24. Emerging Market Policy Outlook

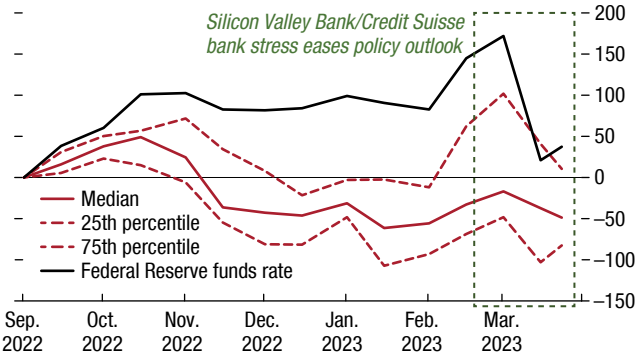
Real policy rates have tightened substantially.

1. Real Ex Ante Policy Rates
(Percent, policy rate adjusted by one-year-ahead inflation surveys, historical range and latest)



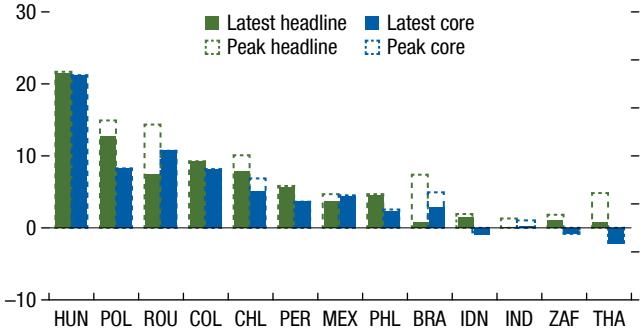
Recent stress in advanced economies and easing policy expectations has spilled over into emerging markets.

2. Monetary Policy Expectations, Cumulative Change in Market Pricing of Policy Rate for December 2023
(Change in market-implied expectations, median, interquartile range, basis points)



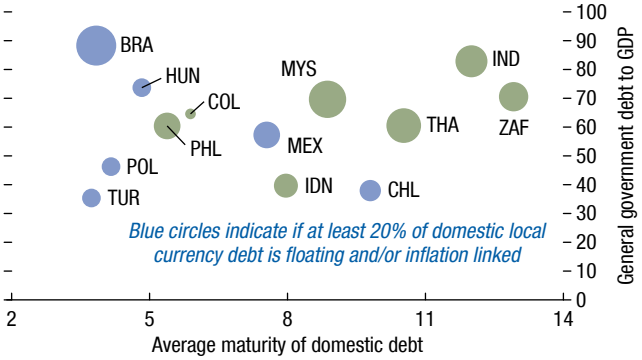
Inflation remains well above target in many emerging markets.

3. Inflation versus Target: Peak and Latest
(Core and headline year-over-year inflation versus upper bound of the target range, cycle peak since 2021 and latest, percentage points above target)



The structure of domestic bond markets varies considerably across countries.

4. Domestic Debt Structure and Refinancing Needs
(Percent of GDP; average maturity in years; bubble size scaled by projected net issuance needs as percent of GDP)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; BNP Paribas; Haver Analytics; JPMorgan Chase & Co.; IMF, World Economic Outlook database; and IMF staff calculations.
Note: In panel 2, the median and interquartile range refers to a sample of 11 emerging markets. In panel 3, the upper bound of the target range for headline inflation is used for both core and headline. In panel 4, net issuance needs are derived from analysts' projections for 2023. South Africa also has a material share of inflation linked debt, but does not meet the categorical threshold. Average maturity is based on domestic local currency debt and is derived from national sources, Bank for International Settlements, or estimated from the stock of outstanding securities. Data labels use International Organization for Standardization (ISO) country codes.

in global banking has driven markets to reprice policy expectations for 2023 for both advanced economies and emerging markets (Figure 1.24, panel 2).

Although there are signs that inflation may have peaked in some emerging markets, bringing inflation back to target will remain a long journey. Both headline and core inflation remain substantially above target in most emerging markets (Figure 1.24, panel 3). Premature easing of policy or the market perception that central banks are losing resolve could lead to a depreciation of the exchange rate, widening of sovereign spreads, and capital outflows. Persistent inflation in advanced economies also suggests that monetary policy could be tighter than expected over the short and medium term

despite recent financial stress. Countries with larger external deficits and weaker policy frameworks could be more vulnerable to adverse exchange rate moves or capital outflows in the event of hawkish monetary policy surprises from the Federal Reserve or a renewed deterioration in global risk sentiment.

The interaction of fiscal risks and uncertainty about the inflation outlook can pose challenges for domestic bond markets. The structure of domestic debt and refinancing needs varies considerably, and countries with shorter maturity and higher debt levels tend to be more vulnerable to rollover risks.[25] Moreover, the transmission of persistent inflation pressures to fiscal risks may be greater in countries with a significant share of floating rate or inflation-linked debt. Deficits remain large relative to prepandemic levels amid an uncertain growth outlook, and net domestic debt issuance in 2023 is likely to be substantial in several countries (Figure 1.24, panel 4). Markets remain sensitive to policy, and several countries have seen a rapid sell-off in bond yields at times over the last year amid questions about the fiscal framework.

Frontier Markets and Low-Income Countries Face Financing and Debt Sustainability Challenges

For frontier markets, conditions are back near crisis levels as global financial stress has increased. Market access remains an issue. International bond spreads for frontier markets remain high at 885 basis points, more than 300 basis points above their long-term average. More than 40 percent of frontier bonds maturing through 2025 are trading at distressed spreads (above 1,000 basis points), and nearly 80 percent are trading at spreads of more than 700 basis points. While debt-to-GDP levels are high in both frontier and emerging markets after the pandemic compared with those over the last two decades, frontier markets have significantly less fiscal space given much higher interest-to-revenue ratios (Figure 1.25, panel 1). Frontier external reserves have fallen to an average of only four months of imports, down from about five months in September 2021, just after the special drawing rights allocations were received. Hard-currency bond refinancing needs are modest in 2023, at $3 billion after March 2023, but will become more meaningful in 2024 ($12.4 billion). Frontier markets may struggle to meet this level without a sharp recovery in issuance (Figure 1.25, panel 2). Exchange rates in several frontier markets (Egypt, Ghana, Pakistan) have weakened substantially through market pressure or official devaluations, with growing divergence between official and parallel market rates in some cases.

With little to no access to market-based financing, more than half (37 out of 69) of all low-income countries are assessed to be at high risk or in debt distress, according to the latest IMF Debt Sustainability Analysis and World Bank Debt Sustainability Framework. With reduced international financing, domestic banks have been left to finance the sovereign, thus strengthening the sovereign-bank nexus[26] across low-income countries and raising risks of an adverse bank-sovereign feedback loop that could threaten macro-financial stability.[27] Sovereign assets as a fraction of total banking sector assets more than doubled between 2008 and 2022 to reach 13.5 percent in low-income countries. For one-quarter of low-income countries, the sovereign-bank nexus has crossed the historically high 20 percent mark since the end of 2020 (Figure 1.25, panel 3). A number of countries are increasingly relying on monetary financing, financial repression, or both, with potentially undesirable macroeconomic consequences in the medium term.

Five countries (Belarus, Ghana, Malawi, Russia, Sri Lanka)[28] defaulted on their sovereign debt during 2022, bringing the total currently in default to eight. In December 2022, Ghana announced that it would restructure its external and domestic debt, seeking an external debt restructuring under the G20 Common Framework,[29] the fourth country to do so after Chad,

[25]In the October 2022 *Global Financial Stability Report*, IMF staff highlighted that many emerging markets have increasingly relied on local currency debt issuance. Onen, Shin, and von Peter (2023) of the Bank for International Settlements suggest that the trade-offs between rollover and market risks for issuance maturity can be complicated by the structure and behavior of certain foreign investor types.

[26]The sovereign debt nexus is computed as the ratio of claims on the central government to total assets of the banking sector.

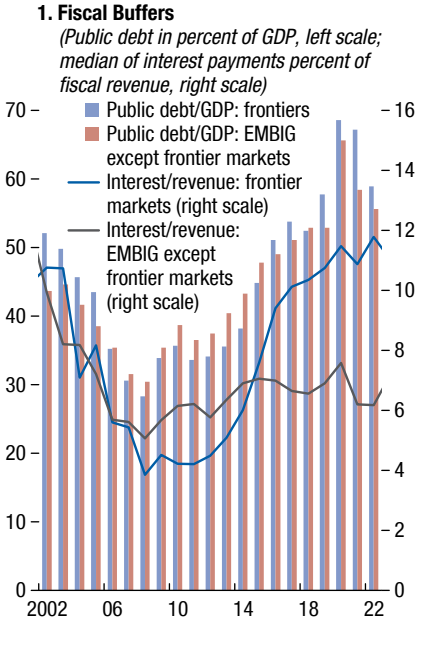
[27]For a detailed analysis of the sovereign-bank nexus in emerging markets, see Chapter 2 of the April 2022 *Global Financial Stability Report*.

[28]Belarus and Russia fell into default as their debt payments could not be processed because of sanctions after Russia's war in Ukraine.

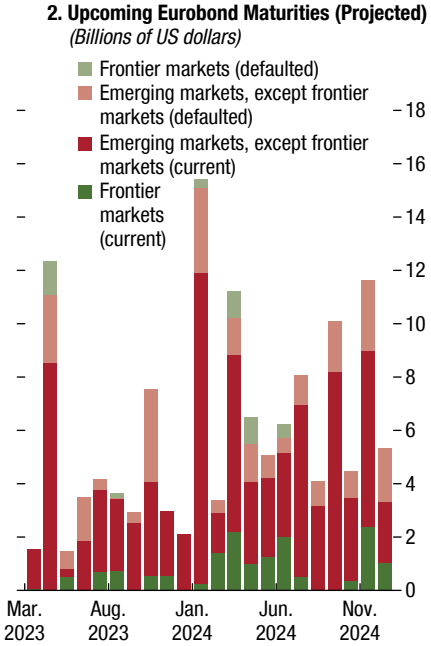
[29]Sixty-nine low-income countries are eligible under the G20 Common Framework, for which an IMF-supported program is a precondition.

Figure 1.25. Frontier Markets and Low-Income Country Challenges

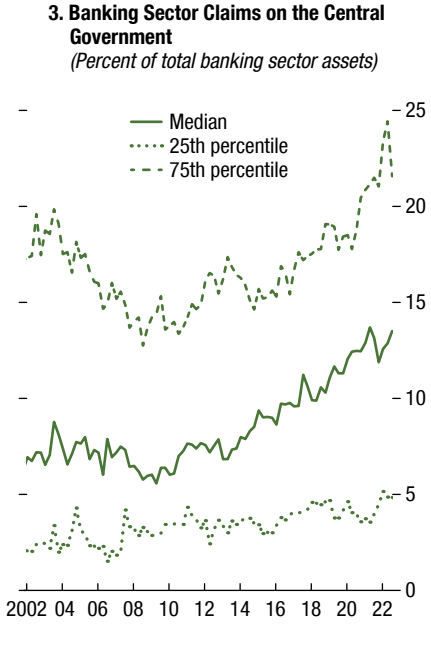
Frontier markets suffer from high levels of both debt and debt service.



Upcoming maturities for frontier markets are limited in the remainder of 2023 but will pick up in 2024.



The bank-sovereign nexus is increasing in low-income countries.



Sources: Bloomberg Finance L.P.; Haver Analytics; International Financial Statistics database; IMF, World Economic Outlook database; and IMF staff calculations.
Note: EMBIG = Emerging Market Bond Index Global.

Ethiopia (both of which were seeking preemptive debt restructuring and were not in default), and Zambia.[30] Sri Lanka defaulted in April 2022 and has been working to restore debt sustainability in a transparent and timely fashion, with equitable burden sharing among creditors, including through a Fund supported program approved in March 2023, after the country secured financial assurances from its major official bilateral creditor. Malawi, a non–market-access low-income country, has initiated a comprehensive restructuring of both its commercial and its official bilateral debt.

[30]Chad, which had not defaulted, became the first country to reach a debt treatment agreement under the G20 Common Framework with its official bilateral and private creditors in November 2022. In Zambia, the official creditor committee provided financing assurances and committed to restructure Zambia's bilateral debt in July 2022. Discussions are ongoing to reach an agreement on specific terms and with private sector creditors. In Ethiopia, which is not in default but sought a preemptive debt restructuring, progress has been more limited because of delays in creditor and development partner support given internal conflict. Outside of the G20 Common Framework, Suriname, which defaulted on its Eurobonds in March 2021, reached a restructuring agreement with its Paris Club creditors in June 2022 but has not yet been able to reach an agreement with other bilateral creditors and its bondholders.

China's Reopening Brings Hope of Economic Recovery although Downside Risks Remain

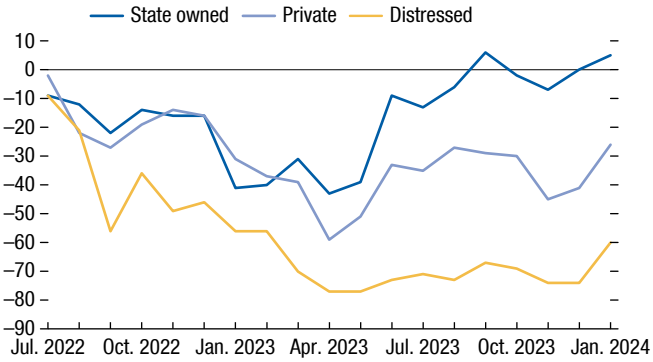
The reopening of the Chinese economy—with the steady recovery in mobility—and the announcement of enhanced policy support for the country's real estate sector[31] have boosted investor sentiment. Financial markets staged a sharp rally beginning in October 2022, with domestic market equities up 17 percent and the renminbi strengthening 5.8 percent against the US dollar on the back of a strong rebound in portfolio flows. Foreign investors bought a record amount of Mainland Chinese shares through the Stock Connect programs. The brightening of the near-term growth outlook has boosted prices of some commodities, such as copper and steel. However, downside risks remain because of uncertainty around the ongoing contraction in the housing market.

[31]In the fourth quarter of 2022, the Chinese authorities announced 16 measures to support the property sector, including expanded bond issuance programs, lower mortgage rates, and easing of home purchase restrictions across the country.

Figure 1.26. Developments in Chinese Property and Financial Markets

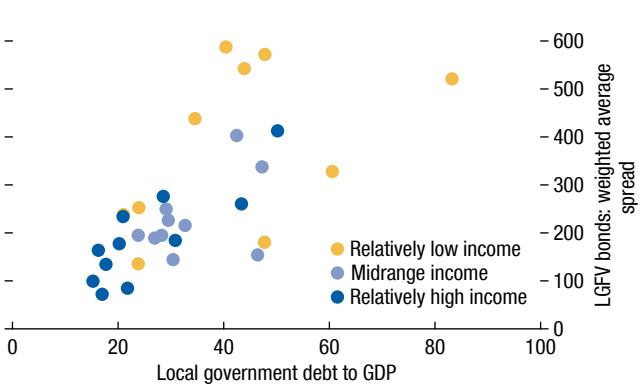
Housing market activities remain weak, and nascent recovery is uneven, favoring top-tier cities and state-owned developers.

1. Contract Sales of Top 100 Property Developers
(Percent; year-over-year change)



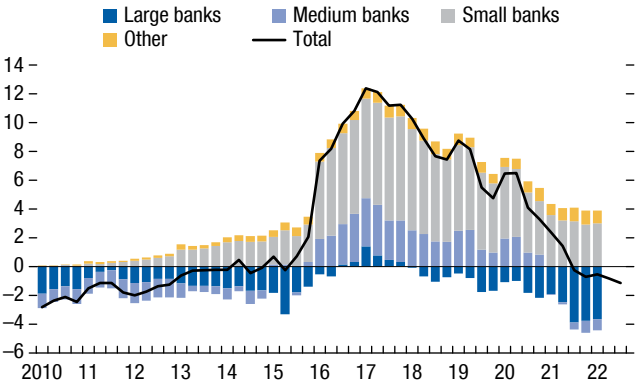
Strained local government fiscal capacity raises concerns for the sustainability of debt issued by LGFVs ...

2. LGFV Spreads versus Local Government Debt
(Percent; basis points)



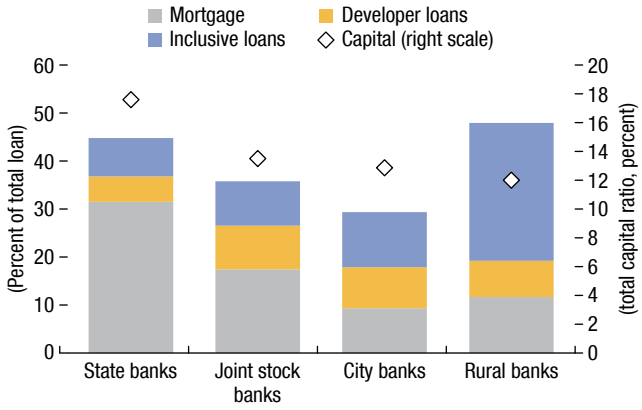
... and indirect exposures to nonbank financial sectors that remain key funding sources for the real estate markets.

3. Net Claims on Nonbank Financial Institutions
(Trillions of yuan)



Small banks are vulnerable through direct loan exposures.

4. Loan Exposures, by Counterparty Sectors
(Percent of total loans)



Sources: Bloomberg Finance L.P.; China Banking and Insurance Regulatory Commission; CEIC; JPMorgan Chase & Co.; and Wind Information Co.
Note: LGFV = local government financing vehicle.

Despite a plethora of policy support, the housing market in China remains sluggish. After a 28 percent contraction in 2022, home sales remain weak, and prices are only starting to stabilize. Lower-tier cities, where stalled presold properties are concentrated, have not shown signs of recovery. Financing conditions for some property developers, including state-owned developers, have improved, leading to a strong rebound in their stock and bond prices. But improvements remain uneven, and financially weaker private developers continue to face funding challenges. In light of the slow progress in completion and delivery of stalled presold properties, home buyers continue to avoid purchasing from private developers (Figure 1.26, panel 1), underscoring the limited progress in restoring confidence in the broader housing market.

Concerns about the debt sustainability of local government financing vehicles (LGFVs) have intensified since late 2022. During the fourth quarter, a city-level LGFV facing imminent default restructured its debt, coinciding with a sharp widening of lower-rated LGFV bond spreads. The tightening of financing conditions later spread across the entire LGFV sector amid the bond market volatility in December. With total LGFV debt estimated at about 50 percent of China's GDP, a broadening of LGFV debt distress would impose

significant losses on some banks, particularly in low-income regions with higher local government debt and large stocks of unfinished housing (Figure 1.26, panel 2; see also the October 2022 *Global Financial Stability Report*). Some weaker banks have already suffered from contagion from the LGFV sector, as evidenced by widening subordinated bond spreads.

The public finances of local governments have become strained as responsibilities for home completions and the pandemic response have increased, while land sale revenues have plummeted. Local government debt has increased to about 30 percent of GDP after record issuance in 2022.[32] Local governments with weak fiscal positions could be limited in their capacity to backstop LGFVs, which may be increasingly needed as LGFVs are constrained from raising additional debt after recent actions by the authorities.

Chinese NBFIs are particularly exposed to real estate and LGFVs. Trust companies typically provide financing at the initial phase of property development—for example, for land purchases—while wealth management products invest directly in debt securities issued by property developers and LGFVs and indirectly through investments in trust companies. IMF staff estimates show real estate and LGFV exposures could amount to 14 percent of wealth management products' assets under management, or 4.2 trillion yuan, and 23 percent of trust assets, or 3.3 trillion yuan.[33] The financial deleveraging campaign begun in 2016 targeting shadow banking has helped improve the health of NBFIs and contain the spillover risk to the banking sector.[34] Nonetheless, further escalation of risks related to real estate and LGFVs could incur significant losses to investors' holdings of wealth management products and trust products, potentially triggering runs on these products and resulting in broader funding market stress. In addition, small banks have been relatively slow to participate in the deleveraging process, and their net exposures to NBFIs remain sizable (Figure 1.26, panel 3).

Beyond exposures to NBFIs, banks face heightened credit risks because of exposures to small and medium enterprises and the property sector (Figure 1.26, panel 4). A policy directive in place since 2019 that urges banks to increase lending to small and medium enterprises has led to increased credit risk, as small businesses have been disproportionately affected by the pandemic and economic slowdown. The recent policy support to the property sector, which puts a priority on the completion and delivery of stalled presold housing, will likely help contain credit risk of mortgages. Banks could still face large losses from exposures to weaker property developers, which account for 25 percent of the sector. IMF staff analysis in the October 2022 *Global Financial Stability Report* suggested the nonperforming loan ratio for developer loans could rise to about 8 percent for the system, a ratio similar to the reported nonperforming loan ratio from listed trust companies in the second quarter of 2022. Given various regulatory forbearances on pandemic-related and developer loans, banks' reported figures on their nonperforming loans may underestimate the underlying credit risks, particularly in the case of smaller banks, which have lower capital ratios and comparatively large exposures to local and smaller borrowers. Distress at smaller banks could spill over to the larger banks, given interconnectedness of the banking system.

The Corporate Sector Is Navigating the Challenges of Higher Interest Rates and a Slowing Economy

The global corporate sector has emerged from the pandemic in reasonably good shape—default rates have remained low and earnings have generally outperformed expectations. Corporate spreads widened following the recent banking turmoil, but remain not far from their historical average levels. Large cash buffers the sector has built since the pandemic have cushioned it against current conditions. However, looking ahead, the sector faces two important headwinds: the decline

[32]Local governments issued 2.8 trillion yuan of refinancing bonds, some of which were used to pay down off-balance sheet financing, and 4.8 trillion yuan of new bonds.

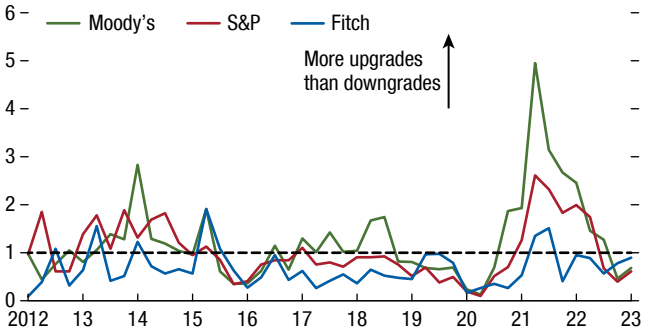
[33]The estimate is based on the following assumptions. Wealth management products allocate 53 percent of assets to bonds and 7 percent to nonstandard credit assets. Within bonds, 1.5 percent is assumed to be developer bonds and 11.2 percent to be LGFV bonds, proxied by the share of developer and LGFV bonds in the total nonfinancial corporate bond market (6 and 43 percent, respectively) multiplied by the share of nonfinancial corporate bonds in the total onshore bond market (26 percent). All nonstandard credit assets are assumed to be trust products financing the real estate and LGFV sectors. For trust companies, according to the China Trustee Association, 8.5 percent of pecuniary trust assets are allocated to real estate and 10.8 percent to infrastructure and 19.7 percent are invested in bonds. All of the infrastructure allocation is assumed to finance LGFVs, and the bond allocation follows the same methodology for wealth management products.

[34]For example, by separating banks' wealth management products' assets from the banking parent, prohibiting provision of principal guarantee, and increasing wealth management products' risk buffers.

Figure 1.27. Corporate Performance and Default Outlook

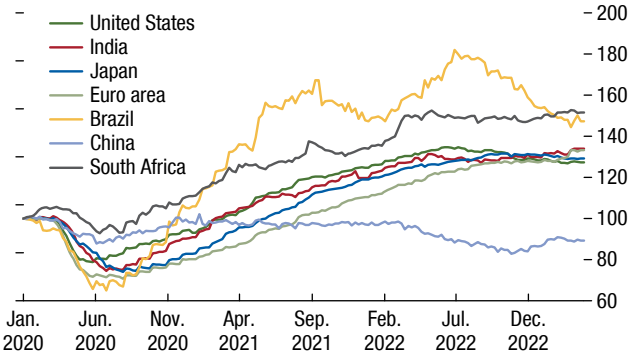
Rating agencies have downgraded US corporates more than upgraded them.

1. Upgrade/Downgrade Ratio for the United States
(Ratio)



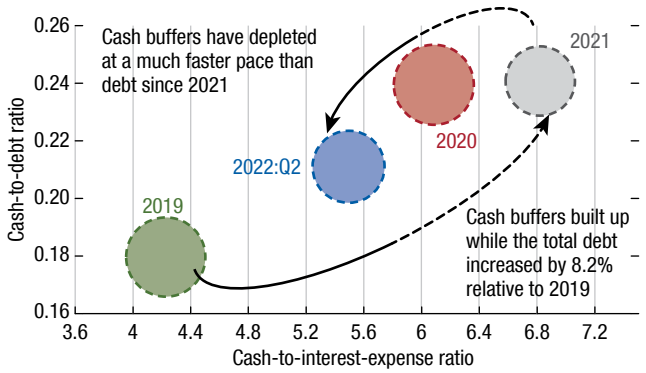
Corporate profitability prospects have likely peaked out and are expected to slow down.

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



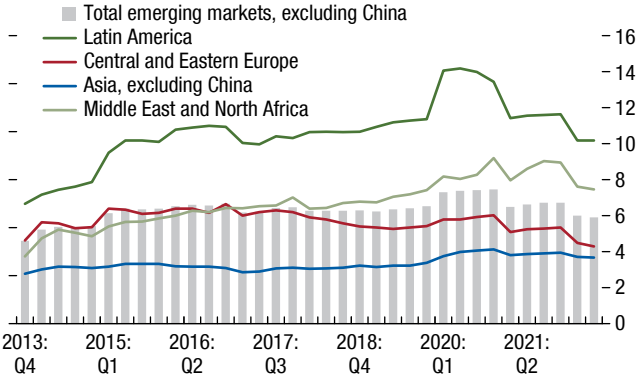
Liquidity buffers have been eroded relatively quickly, implying a more challenging environment for corporate borrowers to come.

3. Cash-to-Interest Expense Ratio and Cash-to-Debt Ratio
(Ratio)



Foreign currency debt has declined in emerging markets from prepandemic levels.

4. Nonfinancial Corporation Bonds and Cross-Border Loan Denominated in Foreign Currency in Emerging Markets Excluding China
(Percent of GDP)



Sources: Bloomberg Finance L.P.; Fitch Ratings; Moody's Investors Service; National Bureau of Economic Research; Refinitiv Datastream; S&P Capital IQ; S&P Global Ratings; and IMF staff calculations.
Note: In panel 1, the ratio is calculated as the number of upgrades divided by the number of downgrades. In panel 3, the sample includes 13,300 firms from 20 countries (see the footnote of Figure 1.24) except for outliers based on cash to interest expense ratio. The size of the bubble corresponds to the aggregated debt amount.

in revenues—owing to a compression of margins—and tighter funding conditions, particularly from banks (Figure 1.5). Under such a scenario, large firms could be exposed to downgrade risks and hence further funding stresses, especially for large firms in emerging markets. Lending to small firms, which tend to rely on bank financing, may be curtailed as lending standards tighten in a slowing economy, and these firms could face a very challenging funding environment.

The resilience of the sector has yet to be fully tested. Corporations emerged from the pandemic with much higher debt loads. The ability to service this debt could weaken in a higher-for-longer environment as interest rates lead to higher borrowing costs, weaker aggregate demand, and more stringent bank lending standards. In addition, some companies may find it difficult to pass higher input costs along to customers. In this context, credit agency downgrades have risen in the United States and Europe (Figure 1.27, panel 1), and earnings growth is expected to slow (Figure 1.27, panel 2). Cash buffers and other liquid assets that helped firms weather the pandemic over the past few years have started to erode (Figure 1.27, panel 3).

In emerging markets, the ratio of total foreign currency debt to GDP of nonfinancial firms has fallen 3 percentage points from its prepandemic highs, but

the level of this debt remains high for several countries. A large currency depreciation could lead to meaningful increases in debt- servicing costs for firms with significant foreign debt, further deteriorating interest coverage ratios (Figure 1.27, panel 4). For some emerging market economies, this debt largely rests with commodity producers or firms that will benefit from increased exports because of the depreciated currency, but for many firms, this is not the case.

To estimate the extent of debt that may not be repaid should earnings decline, and interest expenses rise, IMF staff conducted a scenario analysis on corporate interest coverage ratios.[35] The share of debt with an interest coverage ratio below 4—a level that typically distinguishes investment and noninvestment ratings—rises significantly for all types of firms. In advanced economies, the shares of small and medium firms that have interest coverage ratios less than 4 rises by 7 percentage points and 17 percentage points, respectively; the changes are similar for emerging markets excluding China (Figure 1.28, panels 1 and 2). Although the share of large firms with interest coverage ratios falling below 4 under the scenario is also significant, they have stronger debt-servicing ability to begin with. For example, 60 percent of large firms in advanced economies have an interest coverage ratio greater than 4, compared with only 21 percent of small firms and 44 percent of medium firms.

Looking at the firms in advanced economies that have credit ratings,[36] more than 75 percent of firms with a BBB rating would have their interest coverage ratio fall below 4 under the shock scenario, implying that many would be at risk of a rating downgrade below investment-grade status, and thereby a sharp increase in the cost of funding (Figure 1.28, panel 3). The rise in debt at risk could potentially result in losses at those bank and nonbank financial institutions with significant direct and indirect exposures to highly indebted nonfinancial firms. Decomposing the sources of this fall in interest coverage reveals that, broadly speaking, higher interest rates account for more than 60 percent of the change. Higher-graded firms are more sensitive to the universal interest rate shock, as they typically have more debts with lower effective funding costs (Figure 1.28, panel 4).[37]

Housing Markets Are Slowing, Headwinds Picking Up Speed

The residential real estate market has been directly and quickly affected as monetary policy has tightened around the world. The steep increase of residential mortgage rates, coupled with stretched house valuations, has generally cooled demand, although to varying degrees across countries (Figure 1.29, panel 1). House prices fell in 65 percent of emerging markets (on average by 0.7 percent year over year) in the third quarter of 2022; similarly, prices decreased in nearly 55 percent of advanced economies.[38] Economies with a larger share of adjustable-rate mortgages—that is, those in which borrowing costs track more directly changes in interest rates—have recorded some of the highest declines in real house prices (such as in Sweden and Romania).[39] That said, valuations remain stretched in a number of countries, and affordability—as measured by the price-to-income ratio—continues to deteriorate amid higher mortgage costs, overall increasing the risk of a sharp correction in prices (Figure 1.29, panel 2).

Downside risks to house prices remain significant in the medium term (Figure 1.29, panel 3). With

[35]The analysis is based on corporate data from the second quarter of 2022, when inflation was close to peak in several countries. Earnings and interest rate shocks are applied, and these are calibrated to approximately match those during previous recession episodes, including inflationary recessions and the global financial crisis. In general, across firms, earnings before interest and taxes are assumed to fall by 20 percent, while the effective interest rate (which accounts for the fact that not all debt is floating) rises by 200 basis points, both instantaneously. The extent of the interest rate shock is broadly in line with that used in the corporate stress test in the 2020 United States Financial System Stability Assessment.

[36]Rating information is available for about 11 percent of the entire sample (about 1,490 of 13,300 firms), and these firms own 70 percent of the entire debt stock; most (about 1,000) firms are located in the United States.

[37]For higher-rated firms, effective interest rates (EIRs) are broadly very low before the shock; thus, the impact of a 200 basis points increase in EIRs on interest expenses, the denominator of the interest coverage ratio, is proportionally more significant than for lower-rated firms whose EIRs are generally higher in the first place.

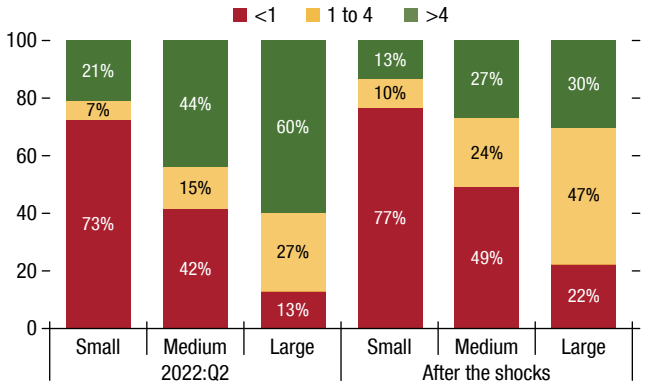
[38]In the third quarter of 2022, the annual growth in real house prices remained flat globally, although regional differences persisted. Following widespread price declines, the aggregate real house price growth for advanced economies was significantly slower than during the previous two quarters (0.9 percent year over year). Housing transactions also fell much more in the third quarter of 2022, with Denmark and the United States facing the most significant drops (about 20 percent year over year). In many emerging market economies, the downturn accelerated, especially in emerging Asia, where home prices dropped on average about 4 percent year over year. There are, however, some exceptions. For example, in Türkiye, house prices increased by 60 percent year over year in real terms, primarily driven by surging construction costs, housing demand, and housing supply constraints.

[39]This trend is in contrast with the trends prevailing before the COVID-19 pandemic, when house prices in economies with a larger share of adjustable-rate mortgages increased on average by 5 percent each year, whereas house prices in other economies increased by 3.5 percent.

Figure 1.28. Corporate Debt Analysis: Debt at Risk

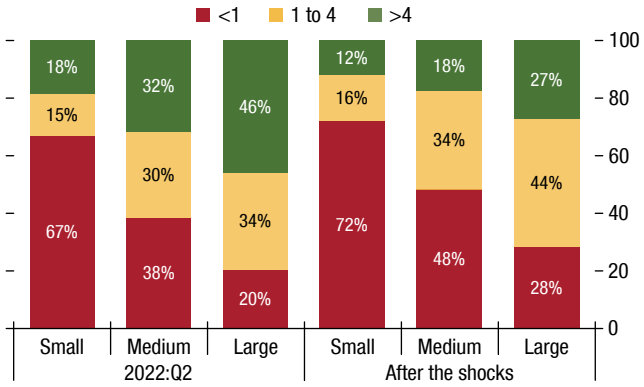
Lower earnings and higher funding costs would further worsen leverage metrics, including those for large firms ...

1. Share of Debt at Firms by Interest Coverage Ratio by Firm Size in Advanced Economies
(Percent of total debt, average across countries)



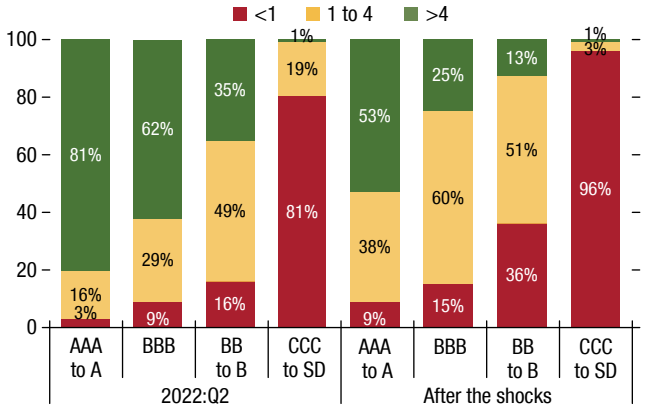
... with the ratings for the majority of firms facing a risk of rating downgrade (interest coverage ratios below 4).

2. Share of Debt at Firms by Interest Coverage Ratio by Firm Size in Emerging Markets Excluding China
(Percent of total debt, average across countries)



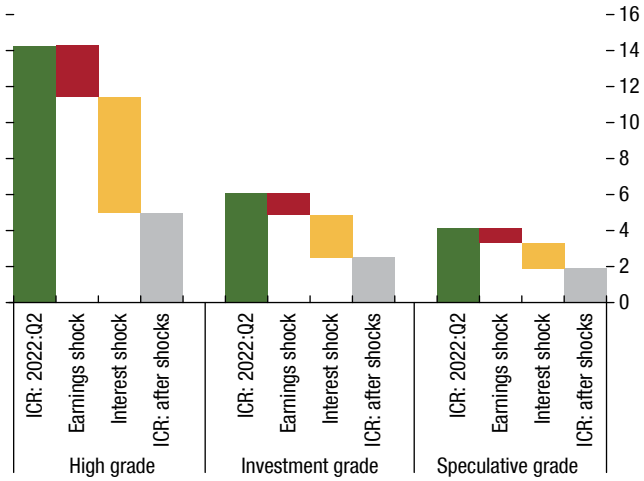
In advanced economies, more than 70 percent of triple BBB-rated investment-grade corporations could face a rating downgrade to speculative grade.

3. Share of Debt at Firms by Interest Coverage Ratio by Rating in Advanced Economies
(Percent of total debt, average across countries)



Higher-graded firms are more sensitive to a shock to effective interest rates because their funding costs were very low.

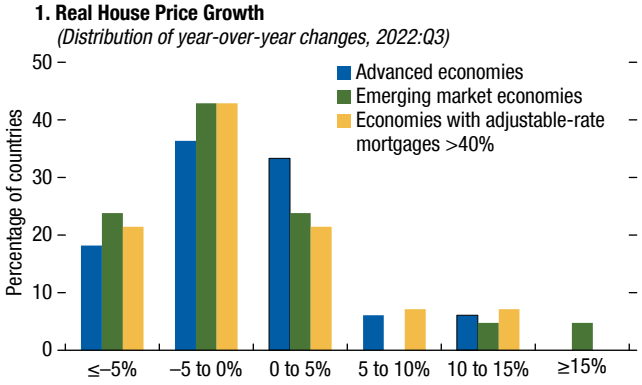
4. Earning and Interest Expense Shocks on Interest Coverage Ratio of Firms in Advanced Economies by Rating Group
(Ratio, average across countries)



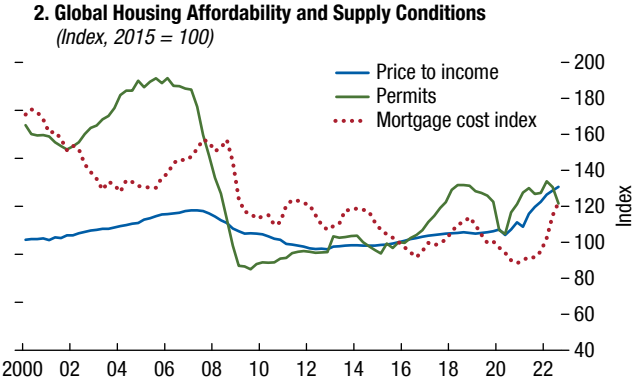
Sources: S&P Capital IQ; and IMF staff calculations.
Note: A partial sensitivity analysis was run to estimate the increase in debt at risk in response to a combined shock to earnings and interest expense. The shock scenario assumes that earnings before interest and taxes decline by 20 percent, and the effective interest rate on firms' total debt rises by 200 basis points. The earnings shock scenario was calibrated to the previous recession episodes. This time, seven more countries were added (Colombia, Hungary, Indonesia, Korea, Malaysia, South Africa, Thailand). A total of about 13,300 firms in 20 countries were analyzed (Brazil, Colombia, France, Germany, Hungary, India, Indonesia, Italy, Japan, Korea, Malaysia, Mexico, Poland, Russia, South Africa, Spain, Thailand, Türkiye, United Kingdom, United States). Large, medium, and small firms are defined as those having assets greater than $500 million, between $500 and $50 million, and less than $50 million, respectively. In panel 4, high grade includes credit ratings between AAA and A, investment grade includes BBB-rated firms, and speculative grade includes BB- to B-rated firms. The ratings are given by S&P.
ICR = interest coverage ratio.

Figure 1.29. Developments in Residential Real Estate Markets

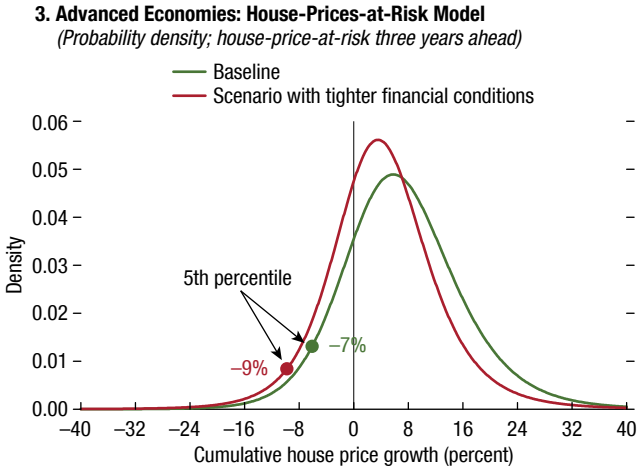
Housing markets are feeling the effect of the higher interest rate environment ...



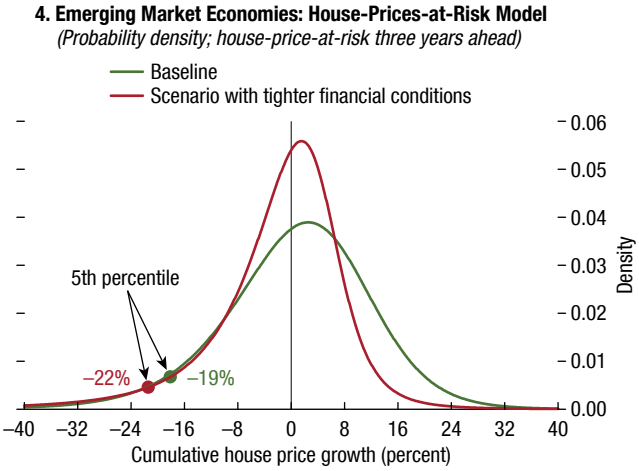
... but housing supply constraints and affordability pressures persist.



Downside risks in house prices remain elevated in the medium term ...



... especially in emerging economies in a scenario with tighter-than-expected financial conditions.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; and IMF staff calculations.
Note: In panel 2, all indicators are rebased and averaged across economies with nominal GDP weights. Mortgage cost corresponds to the average rate indexes of long-term mortgage rates. Panels 3 and 4 show the estimation results from a house-prices-at-risk model. The model allows prediction of house price growth in adverse scenarios; that is, the range of outcomes in the lower tail of the future house price distribution. Probability densities are estimated for the three-year-ahead (cumulative) house price growth distribution across advanced economies and emerging markets. The red lines indicate projections in a scenario with tightening financial conditions as proxied by two standard deviations higher financial condition index (that is, half of the increase occurred during the global financial crisis). Filled circles indicate the price decline in an adverse scenario with a 5 percent probability (fifth percentile).

5 percent chance, house price decline over the next three years could be about 7 percent in advanced economies and 19 percent in emerging markets.[40]

[40]Formally, house prices at risk correspond to downside risks to house prices, defined as the forecast house price growth at the 5th percentile of the house price distribution. The estimation model is based on Chapter 2 of the April 2019 *Global Financial Stability Report*. Note that large heterogeneity is present across countries. House prices at risk over the next three years could be about 20 percent for countries with elevated vulnerabilities, such as Canada, Hong Kong SAR, and the United States.

If financial conditions were to tighten to an extent half as severe as during the global financial crisis—similar to what was assumed in Figure 1.14—the projected declines could be up to 3 percentage points more, especially in emerging market economies (red density in Figure 1.29, panel 4).

Some fundamental factors could continue to support house prices in the short term. Supply constraints in housing availability, including shortages in construction labor, persist, even though a slight increase in

inventories and still-robust levels of disposable income help partly offset the effect of the monetary policy tightening on housing demand, thereby reducing the extent of house price adjustment so far.[41] At the same time, in economies with a lower share of adjustable-rate mortgages or a longer average maturity of household debt, the effect of the ongoing tightening on household demand could take a while to fully materialize, given that the outstanding pool of mortgages will be affected by higher rates only gradually. Mortgage underwriting standards are still conservative relative to those in the mid-2000s, helping to reduce leverage and exposure to nonqualified mortgages, and debt service ratios for households remain generally below the levels seen before 2007 (Figure 1.30, panel 1). That said, household debt in countries such as Belgium, France, Korea, and Sweden has increased since the COVID-19 pandemic, which could exacerbate household vulnerabilities.[42] In advanced economies, banks are comparatively more exposed to the real estate sector than in emerging market economies, as banking systems with lower capital-to-assets ratios also have more mortgage loans as a share of total loans (Figure 1.30, panel 2), indicating a stronger feedback loop between house price declines and a contraction of mortgage lending.

Household excess savings ratios that were built up during the pandemic partly because of government support measures and precautionary motives have started to fall back to (or below) prepandemic averages (Figure 1.30, panel 3). Lower saving rates reduce households' buffers and make consumption more sensitive to a decline in housing wealth should real estate prices fall. IMF staff estimate that a real home price correction is associated with material declines in real consumption across countries, especially ones with low savings (Figure 1.30, panel 4).[43] These factors complicate policy efforts to tame inflation, given that a sharp drop in housing prices could adversely affect the economic outlook.

Commercial Real Estate Market under Pressure

As central banks continue to tighten their monetary policy stance, the CRE market is facing significant pressures. Global transaction activity has broadly declined (down 17 percent from the previous year).[44] In market-traded REITs, large price corrections have already occurred (Figure 1.31, panel 1).[45] The value of US-listed REITs decreased almost 14 percent year over year in the first quarter of 2023, whereas in Europe they declined by 13 percent. Losses have been particularly elevated in the office sector, as pandemic-induced remote work practices have lowered office demand and occupancy rates.[46] Similarly, REIT valuations have also declined in many emerging market economies such as Africa (–16 percent) and Asia and the Pacific (–20 percent). At the same time, the confluence of higher interest rates and structurally lower demand for CRE raises the risk of a broader correction to commercial real estate valuation, including in private, nonlisted CRE markets.

Similar to what takes place in residential markets, a key driver of the repricing in CRE markets is the sharp rise in market interest rates. This in turn raises the required return for real estate, as rising interest

[41]Pandemic-induced lifestyle changes—work-from-home arrangements and internal migration—and other temporary supply bottlenecks also help explain why demand outpaced housing supply in recent quarters.

[42]See Box 1.1 of the April 2023 *World Economic Outlook*.

[43]Recent evidence (Harding and Klein 2022) suggests that the pass-through of monetary policy tightening tends to be weakened in the presence of high household buffers. However, as excess savings are eroded, higher interest rates might be felt largely by highly indebted households, whose holdings of savings are generally smaller (Aladangady and others 2022). High interest rates can also have an impact on housing demand through lower mortgage originations.

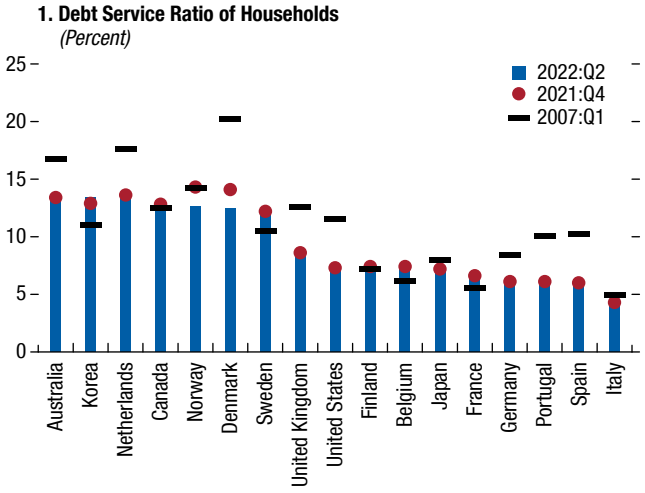
[44]Volumes have decreased across all regions, with a 26 percent decrease in North, Central, and South America and declines of 30 percent and 18 percent in Europe and the Asia and Pacific region, respectively.

[45]A CRE investment fund trust is a company set up to own, operate, and finance (pooling funding from investors) CRE. A real estate investment fund trust typically specializes in a certain type of property (such as office space), although there are also some with more diversified portfolios. In general, asset managers are among the top real estate investment fund trust's owners. However, real estate remains a key component also of most pension fund portfolios. In the United States, for example, 87 percent of all public sector pension funds and 73 percent of all private sector pension funds currently invest in the asset class. The share of US pension plans investing in real estate investment fund trusts is also rising, from 55 percent in 2016 to an estimated 67 percent in the period before the pandemic.

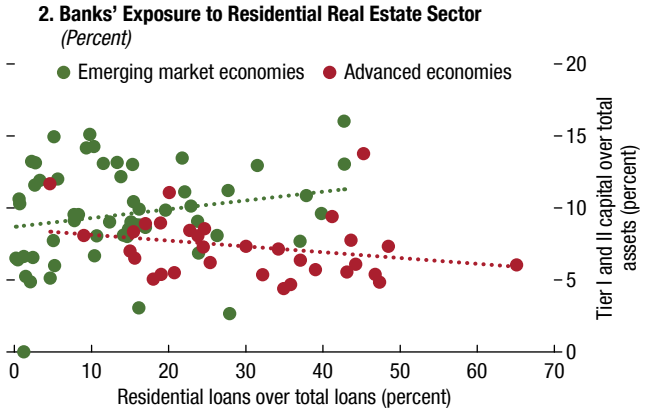
[46]The US national office vacancy rate reached a nearly 30-year high of 17.1 percent in the third quarter of 2022. The use of subleases is rising as occupiers attempt to shed underused office space. The combination of challenging occupancies for commodity space and the deterioration of liquidity that is needed to support office conversions have put significant pressure on valuations for less competitive and older buildings (class B and class C).

Figure 1.30. Household Vulnerabilities and Risks to the Broader Economy

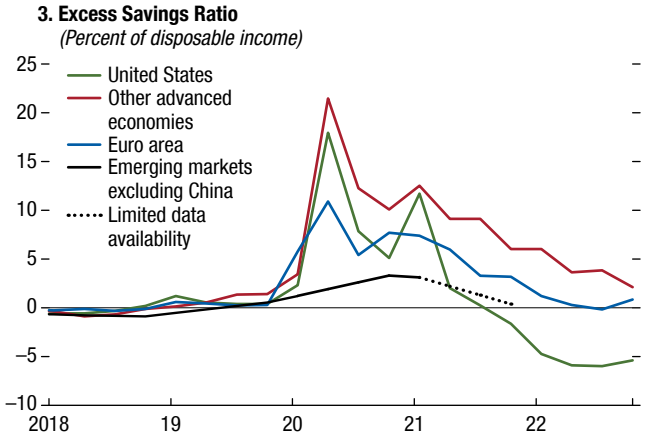
Debt service ratio of households has decreased since the global financial crisis because of lower mortgage costs ...



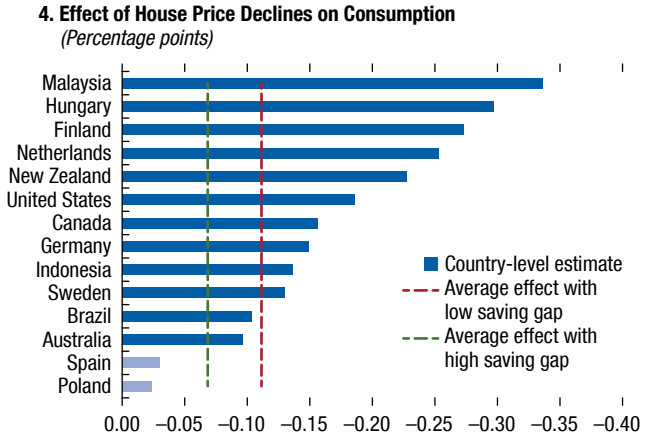
... but banks remain exposed to the real estate sector, particularly in advanced economies ...



... while households' saving ratios have continued to decelerate since the COVID-19 pandemic.



A shock to house prices could have broader macroeconomic implications, especially for consumption.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Federal Reserve Bank; Haver Analytics; IMF Financial Soundness Indicators; and IMF staff calculations.

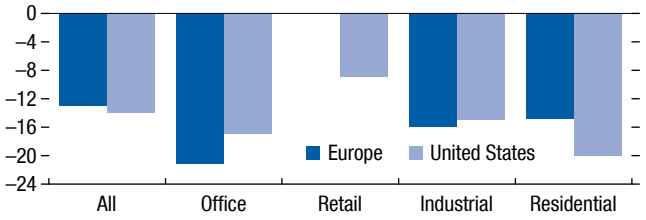
Note: In panel 2, data refers to the average for 2022. In panel 3, excess savings ratios are calculated as current savings in percent of disposable income in deviation from a linear trend based on the prepandemic average for 2015–19. In panel 4, the bars represent the estimated effect for selected economies of a one percent decline in real house price growth on the one-period-ahead private consumption yearly growth based on an IMF staff regression analysis. The specification includes controls for financial conditions, a proxy for permanent income, the credit-to-GDP ratio, and the real short-term interest rate. The dashed lines indicate the average effect of house price declines in the presence of a saving gap as computed using a state-dependent panel model. "High" ("low") saving gap is defined as a value of the saving gap above 0.8 (below –1.3) percent, corresponding to the last (first) quartile of its historical distribution. The solid bars indicate significance at the 10 percent level or lower.

rates are not accompanied by either higher expectations for growth or lower perceptions of risk; in addition, a decade of very low interest rates boosted values in the run-up to the pandemic beyond what was explained by fundamental factors. CRE markets appear to be significantly overvalued across countries based on a CRE misalignment measure derived from capitalization rates—defined as the deviation of the net-operating-income-to-property-price ratio from an estimated trend. This overvaluation raises the risk of a

Figure 1.31. Trends and Developments in the Commercial Real Estate Market

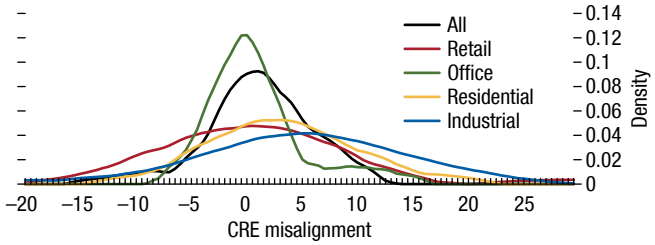
The correction in real estate investment fund trusts' pricing has been sizable across sectors.

1. Change in Real Estate Investment Fund Trusts' Commercial Property Price Index
(Year over year, percent)



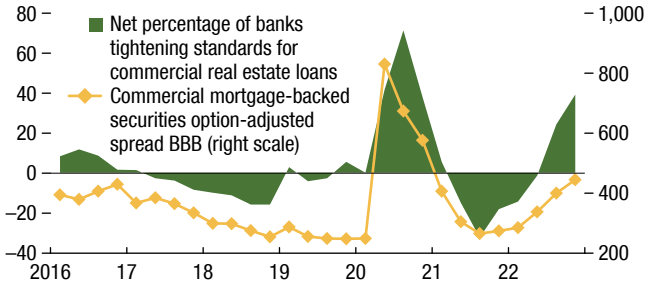
Trends in commercial real estate capitalization rates suggest significant overvaluation in some segments of the market.

2. Commercial Real Estate Overvaluation across Countries
(Percent, latest)



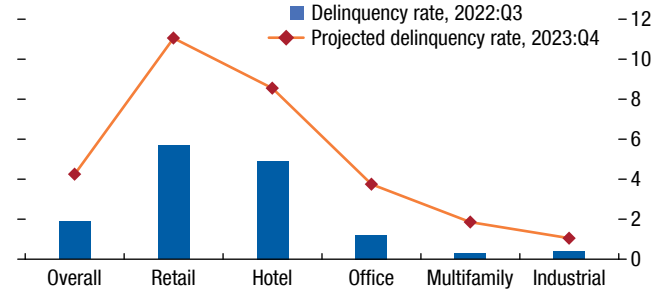
Lending standards for real estate collateralized loans have tightened significantly, increasing the cost of capital.

3. Credit Standards for US Commercial Real Estate Loans and Funding Conditions for Commercial Mortgage-Backed Securities
(Percent, left scale; basis points, right scale)



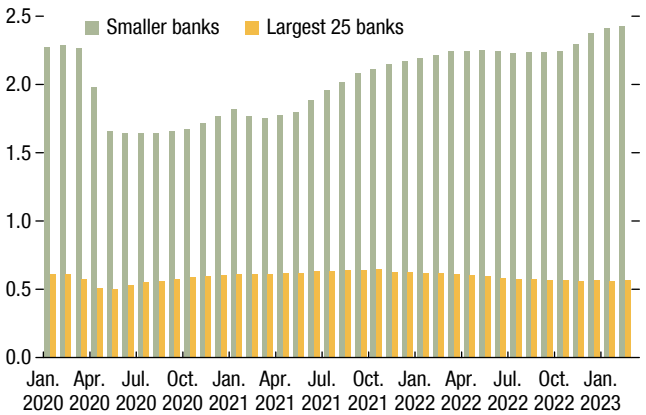
Shifting capital markets amid higher interest rates could create refinancing challenges and lead to borrowers' insolvencies in a downside scenario.

4. US Commercial Mortgage-Backed Securities' Delinquencies
(Percent)



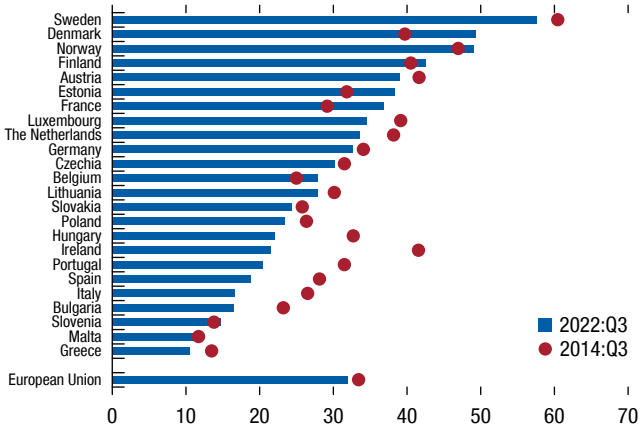
Small banks have grew their CRE portfolio more aggressively than large banks since the pandemic

5. Commercial Real Estate to Commercial and Industrial Loan Ratio for the Largest 25 Banks and Smaller Banks in the United States
(Ratio)



The commercial real estate sector represents a sizable share of banks' exposures to firms.

6. Commercial Real Estate Loans to Total Loans to Nonfinancial Corporations
(Percent)



Sources: Bloomberg Finance L.P.; Commercial Mortgage Alert; European Banking Authority Risk Dashboard, Fitch Ratings; Green Street Advisors; MSCI Real Estate; Trepp; US Federal Reserve; and IMF staff calculations.
Note: In panel 1, the latest data available are for January 2023 in Europe and February 2023 in the United States. In panel 2, the misalignment refers to the deviation of the capitalization rate—a traditionally used valuation metric for commercial real estate prices, measured as the ratio of net operating income to property price—from an estimated trend. The distributions of misalignment are constructed for each commercial real estate segment using country-level observations of a sample of 31 major economies. In panel 3, lending standard statistics are based on responses in the Federal Reserve's Senior Loan Officer Opinion Survey on Bank Lending Practice. "Net percentage of banks tightening standards" refers to the fraction of banks that reported having tightened ("tightened considerably" or "tightened somewhat") minus the fraction of banks that reported having eased ("eased considerably" or "eased somewhat"). In panel 4, delinquency forecasts for US commercial mortgage-backed securities loans are sourced from Fitch. The forecasts assume that the US economy enters a mild recession in the middle of 2023. In panel 6, commercial real estate exposure is computed as the sum of total loans for construction and real estate activities. Statistics are computed based on the sample of the largest banks included in the European Banking Authority monitoring exercise. If 2014:Q3 data are missing, the earliest available observation is used.
Q = quarter.

sharp price correction, especially in the residential and industrial segments (Figure 1.31, panel 2).[47] Another source of vulnerability stems from the financial (or balance sheet) health of lenders in the CRE market. A tightening of financial conditions could create an adverse feedback loop between credit growth and asset prices, as lower house prices can reduce the demand for and supply of credit—because of the role of housing as collateral.

In the United States, banks have tightened lending standards for CRE, making it more challenging for CRE investors with high debt levels to secure financing (Figure 1.31, panel 3). Spreads of US CMBS over ordinary Treasury bonds jumped to about 450 basis points at the end of 2022. Similarly, financing costs of senior loans in core offices in Europe rose to about 350 basis points in the second quarter of 2022, more than 200 basis points higher than the previous year. Higher financing costs and the relatively high-risk weights of CRE assets are also lowering the loan-to-value ratios at which large banks are willing to provide CRE loans.

Many nonbank lenders, which are typically funded by warehouse lines from money center banks, have also curtailed their activity in anticipation of weaker property markets and a more challenging lending environment.[48] The cost of capital for funding structures related to CRE has increased significantly, along with higher interest rates and wider spreads from lenders.

More restrictive bank lending and a decline in the participation of nonbanks in funding markets could exacerbate adverse shocks if the economy slows significantly. Higher interest rate caps (that is, the maximum interest expense on a mortgage) could intensify debt burdens for borrowers, and lenders could face losses because of falling property values and illiquid markets.[49] Difficulty refinancing maturing loans and deteriorating property net cash flows may increase default rates. In such a scenario, the loan delinquency rate for CMBS is projected to increase significantly to between 4 percent and 4.5 percent by the end of 2023 given that higher interest rates and weak economic growth could contribute to more maturity defaults (Figure 1.31, panel 4). In the third quarter of 2022, the share of CRE loans worth less than the CMBS tranches they are in spiked to 30 percent (marking an increase of 25 percentage points from the previous year).

After reducing CRE exposures sharply, smaller and regional US banks are increasing them again at a pace much brisker than the growth rate of commercial and industrial loans, while the largest banks are not (Figure 1.31, panel 5). This growing CRE-regional bank nexus is at risk of being unraveled by structurally lower CRE demand and the financial fragility of banks.[50] In Europe, the stock of CRE loans also represents a large share of total bank lending to nonfinancial corporations, with shares standing at about 30 percent in aggregate and above 49 percent in Sweden, Denmark, and Norway (Figure 1.31, panel 6).

[47]The estimates also show that prices in the retail sector remain subdued, given that the rapid onset of the pandemic hastened the pace of the transition to e-commerce and logistic sectors. There are, however, some signs of recovery for the sector. Net absorption (that is, the change in tenant demand relative to the supply available) began to improve for all retail segments after 2021, with the annual net absorption for neighborhood center retail reaching its strongest level since 2017. Moreover, although supply growth is historically low, high population growth could support the demand for modern retail space, especially in suburban locations.

[48]Although regulators have strengthened regulation and oversight to better address risks posed by securitization, investors' searching for yield over the past decade has supported the growth of nonbank leveraged institutions with large liquidity mismatches, such as property investment funds, that could cause a reversal of capital flows after a sudden shift in global investor sentiment. For example, a substantial rise in interest rates could lower the net present value of mortgages, which could reduce the value of REITs' assets and lead to margin calls (as happened, for example, in the redemption shock that occurred at Blackstone Real Estate Income Trust in 2022; see also Chapter 2 of this report). The deteriorating financial soundness of REITs could then force these institutions to deleverage, amplifying a price decline and possibly leading to substantial losses for a wide range of financial intermediaries and investors exposed to these markets, including foreign institutions. Based on IMF staff estimates, the median portfolio illiquidity of funds holding REITs is about 30 percent higher than that for those holding other equities. At the same time, institutional foreign investors headquartered outside the United States own approximately 16 percent of the total market capitalization of US REITs, which could increase the risk of cross-border spillover effects.

[49]In the third quarter of 2022, negative leverage—instances in which the interest rate charged by a lender is higher than the capitalization rate of the property being financed—spiked to 30 percent, up from only 5 percent from one year earlier. It is notable that the increase in negative leverage was concentrated in industrial and multifamily properties, with shares relative to the total count of about 36 percent and 31 percent, respectively.

[50]To deal with the expected regulatory scrutiny following the aftermath of the SVB fallout, smaller regional banks may be forced to curtail lending and tighten lending conditions. This may further tighten financial conditions and provide additional balance sheet risk for these banks, exacerbating deposit flight concerns.

Policy Recommendations

The financial system is being tested by higher inflation and rising interest rates at a time when inflation in many jurisdictions remains uncomfortably above central banks' targets. The emergence of stress in financial markets is complicating the task of central banks. Policymakers need to continue to address inflationary pressures and use tools aimed at addressing financial stability risks as needed.

If financial strains worsen significantly and threaten the health of the financial system amid high inflation, trade-offs between inflation and financial stability objectives may emerge. Clear communication about central banks' objectives and policy functions will be crucial to avoid unnecessary uncertainty. Policymakers should act swiftly to prevent any systemic events that may adversely affect market confidence in the resilience of the global financial system. Maintaining confidence is paramount for the functioning of the global financial system. If policymakers need to adjust the stance of monetary policy for financial stability purposes, they should clearly communicate their resolve to bring inflation back to target as soon as possible once financial stress lessens.

The recent turmoil in the banking sector has highlighted failures in internal risk-management practices with respect to interest rate and liquidity risks at some US banks, as well as lapses on their supervisory oversight. Supervisors should ensure that banks have corporate governance and risk management commensurate with their risk profile, including in the areas of risk monitoring by bank boards and the capacity and adequacy of capital and liquidity stress tests. Adequate minimum capital and liquidity requirements including for smaller institutions that, individually, are not considered systemic are essential to contain financial stability risks. Policymakers should consider prudential rules ensuring that banks hold capital for interest rate risk and guard against hidden losses that could materialize abruptly in the event of liquidity shocks. Financial institutions should have adequate capital conservation plans and credible capital restoration plans to address decreases in capital ratios. Similarly, banks need to maintain a cushion of unencumbered high-quality liquid assets and have a formal contingency funding plan that clearly sets out the strategies for addressing liquidity shortfalls in emergency situations. In parallel, authorities should be more prepared to deal with financial instability, including by early intervention and by strengthening, where needed, their bank resolution regimes and preparedness to deploy them. In the current environment of persistent inflation and high interest rates, authorities should pay specific attention to bank asset classification and provisions as well as to exposures to interest rate and liquidity risks.

Central banks' liquidity support measures should aim to address liquidity, not solvency issues. The latter should be left to relevant fiscal (or resolution) authorities. Liquidity should be provided to counterparties that are compelled by supervision and regulation to internalize liquidity risk (the "stick") so that central banks may need to intervene only to address systemic liquidity risks (the "carrot"). A significant part of the risk should remain in the marketplace ("partial insurance") to minimize moral hazard, and interventions should have a well-defined end date, allowing market forces to reassert themselves once acute strains subside. The financial stability intervention should be parsimonious to avoid conflicting with the monetary policy stance, especially in a tightening cycle. This means that liquidity support should be priced relatively expensive to avoid attracting opportunistic demand not in need of support. Finally, central banks should maintain appropriate risk mitigation (for example, haircuts) and agree on loss sharing with fiscal authorities to manage risks to their own balance sheets.

Taking note of the decisive policy actions taken by authorities in the United States and Switzerland to preserve financial stability, some of the measures implemented suggest that further work is needed on the resolution reform agenda to increase the likelihood that systemic banks can be resolved without putting public funds at risk. While it is a positive development that shareholders and holders of other capital instruments incurred losses, allocating more losses across the creditor hierarchy before public funds are put at risk is proving harder to deliver. The international community will need to take stock of these experiences and draw policy conclusions on the effectiveness of resolution reforms after the global financial crisis. Consideration may need to be given to extending the perimeter of the international resolution standard to a wider set of banks given that even relatively small banks have proven to be systemic at times of wider stress, as well as to the appropriate reach of deposit insurance schemes, compensated by commensurate levels of insurance premiums. In the near term, supervisors should pay close attention to the risk of potential contagion to other banks that could occur through various channels.

While quantitative tightening has so far proceeded in an orderly manner, central banks should be attuned to the functioning of short-term funding markets, avoiding unwarranted strains in financial markets that would adversely affect their pursuit of price stability objectives. If necessary, central banks should adjust how they implement quantitative tightening to address market functioning issues. In the euro area, where TLTRO loans are being repaid, authorities should be attuned to possible disorderly market dynamics or fragmentation risks. Policymakers should clearly communicate the objectives of and steps for removing liquidity and reducing their balance sheets, especially if adjustments are needed in response to the macroeconomic outlook or financial market developments.

Monetary policy can get support from tighter fiscal policy in achieving the mandated inflation objective (see the April 2023 *Fiscal Monitor*). In addition, to help limit governments' debt burdens, fiscal consolidation would ease aggregate demand pressure on prices, moderating the magnitude of interest rate increases required to rein in inflation. Within budget constraints, governments can reprioritize spending to protect the most vulnerable, for example, from high food and energy prices.

Emerging and frontier markets remain vulnerable to a sharp tightening in global financial conditions and increased capital outflows. Emerging market central banks should be cautious about premature easing of policy rates despite the challenging trade-offs involved, particularly if continued tightening in advanced economies creates widening interest rate differentials and capital outflow pressures. Countries with highly vulnerable financial sectors, limited or no fiscal space, and significant external financing needs are already under strong pressure and could face further severe challenges in the event of a disorderly tightening of 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.

Countries should integrate their policies, including, where applicable, within the Integrated Policy Framework, the IMF's macro-financial framework for countries to actively 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 addresses underlying macroeconomic balances 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 to lessen outflow pressures.

Sovereign borrowers in emerging market economies, frontier markets, and low-income countries should enhance efforts to contain risks associated with their high debt vulnerabilities, including through early contact with their creditors, multilateral cooperation, and support from the international community. 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. For countries near debt distress, bilateral and private sector creditors should find ways to coordinate on preemptive and orderly restructuring to avoid costly hard defaults and prolonged loss of market access. Where market access still exists, refinancing or liability management operations should be executed to rebuild buffers. Where applicable, the G20 Common Framework—including a reformed quicker and more effective version—should be utilized, including in preemptive restructurings.

Policymakers should promote the depth of local currency markets in emerging markets and foster a stable and diversified investor base. Local currency markets continue to be a key funding channel for emerging markets. Measures should strive to (1) establish a sound legal and regulatory framework for securities, (2) develop efficient money markets, (3) enhance 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.

Policymakers should continue to increase financial resilience, particularly in areas likely to be strongly affected by the changed macroeconomic environment, including the increase in the bank-sovereign nexus. Relevant macroprudential tools should be recalibrated as needed to tackle pockets of elevated vulnerabilities. Striking a balance between increasing resilience and

avoiding procyclicality and a disorderly tightening of financial conditions remains important in light of the uncertain economic outlook.

Developments and risks in real estate markets during the ongoing cycle of monetary tightening should be carefully monitored. National authorities should deploy stringent stress tests to estimate the potential effect of rising interest rates on borrowers' repayment capacity and a sharp fall in household and CRE prices on household balance sheets and ultimately on financial institutions. Some policymakers had previously tightened macroprudential tools to address overheating conditions. They should consider whether there is a need 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.

In China, a robust mechanism to restore confidence in the real estate sector will be critical to limit risks of negative macro-financial spillovers. With households wary of buying presold housing from weaker developers, proactive measures could help break the negative feedback loop between developer distress and sluggish home-buying demand. Use of demand-side measures such as relaxing home purchase restrictions should be complemented with timely restructuring or resolution of troubled developers and fiscal reforms that reduce local government's structural reliance on the property market. Forbearance policies should be phased out, and banks should maintain adequate loss-absorbing buffers. Contingency planning should be developed to manage a situation of materializing credit contagion, which may require system-wide liquidity provision to contain systemic risk. Upgrades to restructuring frameworks are urgently needed to help facilitate the exit of nonviable firms and banks while protecting financial stability.

As financial conditions tighten, policymakers need appropriate tools to tackle the financial stability consequences of NBFI stress (see Chapter 2). However, it is paramount to guarantee that appropriate guardrails are in place to avoid moral hazard. As a first line of defense, it is essential to close gaps in key data about NBFIs, provide incentives for risk management by NBFIs, set appropriate regulation, and intensify supervision. In addition, policymakers may consider three potential types of central bank liquidity support to NBFIs: (1) discretionary marketwide operations; (2) access to standing lending facilities (the bar for such access should be set very high); and (3) central bank support, as lender of last resort, of a systemic NBFI. Clear communication on such interventions is essential. Central banks may be perceived as working at cross-purposes, such as needing to purchase assets to restore financial stability while continuing with quantitative tightening to bring inflation back to target. In addition, communications about central bank liquidity support should clearly explain the financial stability objective and the parameters of the program, including the timeframe for exit.

The collapse of multiple entities in the crypto asset ecosystem has again made the call more urgent for comprehensive and consistent regulation and adequate supervision, with an emphasis on the fundamentals of consumer (and customer fund) protection, financial integrity, and corporate governance.[51] The regulatory framework should cover all critical activities and entities, including activities related to the storage, transfer, exchange, and custody of reserves. Entities carrying out multiple functions should be subject to additional prudential requirements. Stable coin issuers should be subject to strict prudential requirements. The cross-sector and cross-border nature of crypto limits the effectiveness of uncoordinated national approaches. Strong international cooperation, supported by robust, comprehensible, globally consistent crypto regulation, is essential to provide guidance, ensure consistent implementation, and contain spillover risks.

Aligning capital flows on a low-carbon trajectory has become a critical policy objective, including for financial stability, given that current renewable energy investment and production fall grossly short of funding needed to meet climate targets (Box 1.5). A rapid acceleration of investment in low-carbon energy infrastructure is needed, especially in emerging market and developing economies. Private finance is key to achieving these objectives, while climate and financial policies, such as a transition-oriented climate information architecture, are complementary. The new Resilience and Sustainability Trust can help eligible IMF members address longer-term structural challenges generated by climate change.

[51]For a more comprehensive set of principles to guide the policy response to crypto assets, see IMF (2023).

Box 1.1. The Failures of Silicon Valley Bank and Signature Bank

Silicon Valley Bank (SVB) was established in 1983 with the goal of serving mostly startup and venture capital firms. During the postpandemic venture capital boom, SVB's deposit base grew rapidly, and SVB became the 16th-largest bank in the United States (Figure 1.1.1, panel 1). As venture capital funding reportedly dried up in 2022, depositors began to leave the bank. The bank attempted to raise fresh capital on March 8 and at the same time revealed that it had incurred a $1.8 billion loss from selling Treasury and agency securities to meet earlier large deposit withdrawals. The failed attempt to raise capital quickly led to investor concerns about the bank's liquidity position and ultimately its solvency. Liquidity concerns reflected primarily the structure of SVB's deposit base, as most of its deposits were wholesale and uninsured. Solvency fear was driven by the extent of unrealized losses (about $18 billion) related to the impact of higher rates on the bank's large holdings of fixed income (Treasury and agency) securities as well as its concentrated loan exposures to venture capital, a sector facing a gloomy outlook. Negative sentiments about SVB on social media surged, and its stock sold off precipitously (Figure 1.1.1, panel 2), likely intensifying the deposit run the bank faced. Deposit withdrawal requests on March 9 alone reportedly reached $42 billion, more than one-fourth of the bank's deposit base, fueled by electronic withdrawals. SVB was placed under Federal Deposit Insurance Corporation (FDIC) receivership on March 10.

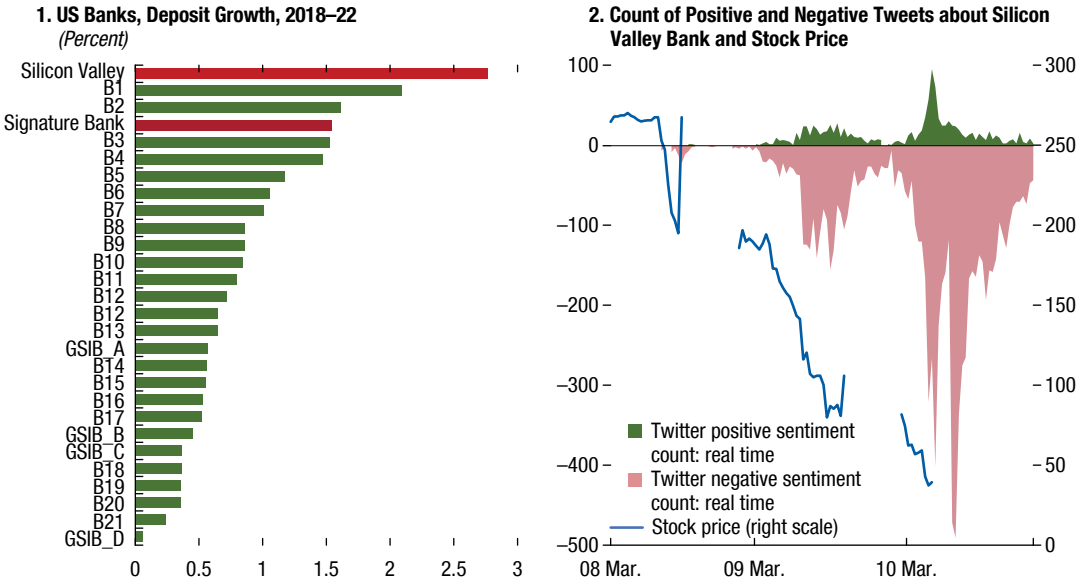
The deposit run on SVB reportedly led to intense investor focus on other banks with similar funding profiles also serving the same sectors as SVB. Stock in Signature Bank of New York (SBNY), a $110 billion bank that served technology and crypto clients—30 percent of its deposits were from the crypto sector—came under intense pressure, declining by almost 40 percent between March 8 and 10. The bank was closed by the New York State Department of Financial Services on March 12, with the FDIC appointed as receiver.

The strategy for dealing with these bank failures evolved significantly in the days that followed.

Figure 1.1.1. The Predicament of Silicon Valley Bank and Signature Bank

Total deposits grew exponentially postpandemic, until they did not.

Negative sentiment on Twitter surged and stock prices tanked after Silicon Valley Bank announced its securities losses.



Sources: Bloomberg Finance L.P.; SVB's 10-K filings; Twitter; and IMF staff calculations.
Note: In panel 1, "GSIB" denotes a globally systemically bank. The sample includes US banks with assets above $50 billion. In panel 2, positive and negative tweets are categorized by Bloomberg using their proprietary language model.

Box 1.1 *(continued)*

After closing SVB on March 10, the FDIC announced that it would protect only insured deposits, leaving those with higher balances (greater than $250,000) and other creditors facing losses. As evidence of contagion to the rest of the financial system grew, the Treasury, the Federal Reserve, and the FDIC rolled out an emergency package with two key components. First, the authorities triggered the systemic risk exemption. This allows the FDIC to resolve SVB and SBNY by protecting all deposits. Any cost to the deposit insurance fund will be recovered, if needed, by a special assessment on banks, effectively mutualizing losses across the banking system.

Second, the Federal Reserve introduced the Bank Term Funding Program to lend to any US bank and foreign branch against the par value of its holdings of US Treasuries, agency debt, and mortgage-backed securities that were owned by the borrower as of March 12, for up to one year at zero margins, but with recourse to the borrower. The program will be kept in place until March 2024. Banks can obtain funds for up to one year (as opposed to 90 days for the existing discount window), equivalent to the full face value (as opposed to the lower market value) of the securities they hold. This offers banks an alternative to sales should they need to raise liquidity. Disclosure is ex post, occurring after two years, thereby limiting stigma. Any losses from the program of up to $25 billion will be absorbed by the Treasury's exchange stabilization fund.

Outside the United States, authorities in countries where SVB operated (including Canada, China, Germany, Hong Kong SAR, Korea, and Thailand) spoke publicly to calm depositors. In the United Kingdom, the authorities facilitated a purchase by HSBC of the local SVB subsidiary, protecting all creditors at no cost to the UK deposit insurance fund. Authorities also intervened in SVB branches in other countries (that is, Canada and Germany, both of which were dependent on parent funding, not deposit taking), which are expected to be wound down.

Box 1.2. The Failure of FTX Unveiled High Interconnectedness in the Crypto Ecosystem

FTX, one the largest trading platforms in the crypto ecosystem, filed for bankruptcy in November 2022. The FTX fallout inflicted severe losses on clients and had large spillovers to the crypto ecosystem (Figure 1.2.1, panel 1). Before the debacle, FTX had more than 1 million registered users, an estimated trading volume of about $600 billion, an estimated market value of nearly $35 billion, $8.8 billion in liabilities, and $900 million in liquid assets. The sudden failure of FTX revealed major shortcomings in risk management as well as fraudulent practices. These included a lack of business transparency in the corporate structure, inappropriate use of clients' funds, reliance on self-issued unbacked tokens for solvency and liquidity, and inadequate financial reporting.

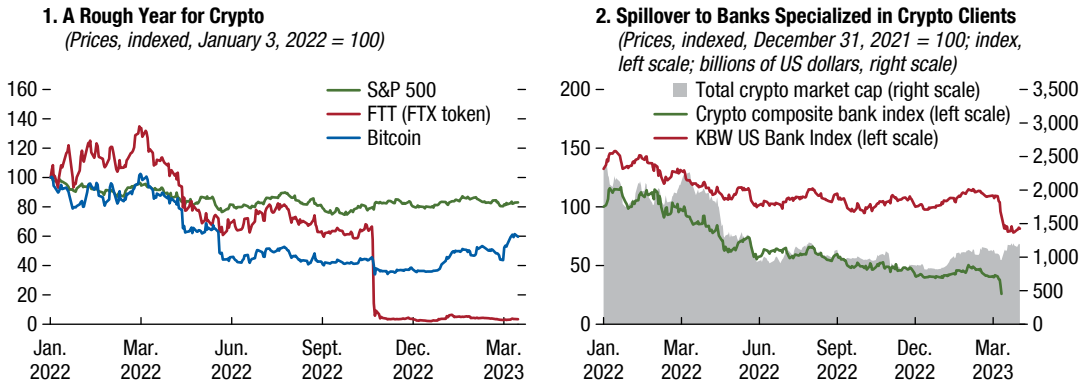
The bankruptcy marked the end of a series of events that exposed grave liquidity and solvency problems at FTX. Reports that Alameda Research, a hedge fund affiliated with FTX, had significant holdings of FTT, the unbacked crypto token issued by FTX, ignited market pressures on November 2, 2022. Subsequently, it was announced that Binance, FTX's main competitor, intended to sell off its FTT holdings. The price of FTT plummeted, triggering a run on the FTX platform and contagion to other cryptocurrencies. The run intensified after Binance withdrew its plans to acquire FTX as a result of allegations that FTX had mishandled customers' funds as well as the potential for investigations of FTX by US regulatory agencies.

Fraud, lack of transparency, and inadequate risk management were at the epicenter of the FTX fallout. The fallout exposed the high dependency of FTX and Alameda Research on the market value of FTT for their solvency and liquidity, highlighted by the revelation that FTX had made an estimated $8 billion in loans collateralized by FTT (equivalent to more than half of its customer deposits) to Alameda Research. FTX also allegedly misused customer funds to help Alameda Research cover its funding gaps, exempted Alameda Research from the exchange's process for liquidating bad trades, and manipulated the value of FTT to enable Alameda Research to borrow against inflated collateral. When FTX failed, FTT became worthless.

The FTX failure created significant contagion in the crypto ecosystem, including to other crypto exchanges and crypto lending firms. This contagion caused some crypto lenders such as Genesis and BlockFi to file for bankruptcy because of large exposures. It is notable that at the peak, Genesis reportedly had $6.5 billion in loans outstanding to Alameda Research, only 50 percent of which were secured. The contagion also extended through Genesis to another crypto exchange, Gemini, which also temporarily halted withdrawals. However, broader contagion outside of the crypto ecosystem has been limited, except in the case of a few small banks with close ties to crypto and some pension funds in the United States with investments in FTX (Figure 1.2.1, panel 2).

Figure 1.2.1. The Fallout from FTX

The crypto market was extremely volatile in 2022 after the fallout of partially backed stable coins and the bankruptcy of a large crypto exchange.



Sources: Bloomberg Finance L.P.; CoinGecko; and IMF staff calculations.
Note: For panel 1, the crypto index ends on March 10, 2023. The chart has been updated with data up to March 30, 2023. FTT refers to a self-issued unbacked token.

Box 1.3. The Fast-Growing Interest in Retails' Trading in the Zero-Day Options Market: Is It a Hidden Risk?

Retail investor participation in the options markets has increased dramatically in recent years, especially since the COVID-19 pandemic. In particular, interest is growing in instruments such as zero-day to expiry (0DTE) options. These options either offer potentially large "lottery ticket"–like payoffs or they expire worthless. The options trade only on their day of expiration and are usually traded on individual stocks, stock indices, or exchange-traded funds. They provide a right (not the obligation) to purchase or sell a financial asset at an agreed-on price, thereby protecting the investor against a rise or a drop in the underlying asset. Nearly half the options trading volume on the S&P 500 is now attributed to 0DTE,[1] a stark contrast to the 15 percent share of 0DTE before the pandemic.

The participation of retail investors in 0DTE options increased after the Chicago Board Options Exchange (CBOE) added the short-dated stock options on large exchange-traded funds in November 2022. Given their relatively small contract size, 0DTE exchange-traded fund options have been drawing an increasing amount of retail investment flows. 0DTE instruments are used by both retail and institutional investors for hedging or speculative reasons. These investors operate through dealers. The share of retail investors has been growing quickly with the proliferation of retail platforms and amounts to about 10 percent of the trading volume in 0DTE options (Figure 1.3.1, panel 1).

Empirical research shows that retail investors generally tend to trade options around important announcements (releases of economic data and central bank decisions), when market volatility is the highest. They increasingly turn to 0DTE options to leverage their bets during these days, when trading activity tends to surge. According to research, retail investors trading in the options market often end with losses ranging between 5 and 9 percent, reflective of substantial transaction costs and slower ability to respond to news events than market makers (de Silva, Smith, and So 2022).

The trading of 0DTE options could mechanically amplify the volatility of the underlying asset, with a possible ripple effect on broader measures of stock market volatility, traditionally measured with the CBOE Volatility Index. Such a scenario could result from dealers' hedging strategy. Depending on

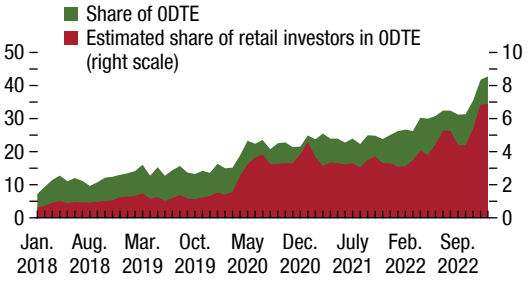
[1]0DTE options were originally available only on the last trading day of the week. In April and May 2022, the Chicago Board Options Exchange added new expiration dates, allowing 0DTE options to be traded throughout the week. This has sparked the growth in trading volumes.

Figure 1.3.1. Zero-Day to Expiry Options

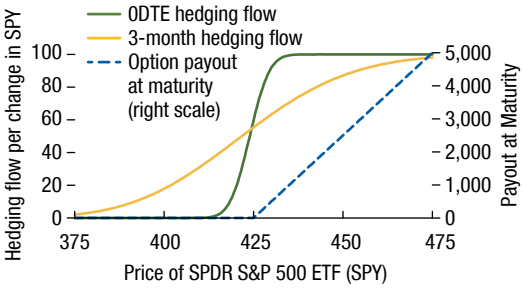
In derivatives markets, 0DTE have gained a growing market share.

Compared with longer-dated options, the 0DTE offers potentially large "lottery ticket"–like payoffs, amplifying dealer hedging flows.

1. Overall and Retail Share of 0DTE in S&P 500 Options Trading
(Percent)



2. Stylized Option Hedging Flows for 0DTE and Three-Month Expiries
(Units of SPYs, left scale; option payout in US dollars, right scale)



Sources: Bloomberg Finance L.P.; JPMorgan Chase & Co.; and IMF staff calculations.
Note: Calculations underpinning panel 2 are done based on using the Black-Scholes model for a stylized call option on the SPDR S&P 500 ETF Trust (SPY). The example rests on the assumption of a strike price of $425, a risk-free rate of 4.58 percent, an annualized volatility of 20 percent, and a contract multiplier of 100. 0DTE = zero-day to expiry options.

Box 1.3 *(continued)*

the evolution of the price of a stock, a dealer must dynamically adjust its hedging,[2] potentially leading to higher intraday volatility (Figure 1.3.1, panel 2). Recently, market participants have reported higher 0DTE volume around the release of consumer price index data and the US job report, as well as Federal Reserve meetings, leading to an increased occurrence of intraday fluctuations in the S&P 500 exceeding 1 percent during the first quarter of 2023. Moreover, dealers often also use standard longer-dated equity options to hedge their 0DTE exposures, which could affect the CBOE Volatility Index.

[2]This strategy, known as delta hedging, consists of reducing the directional risk in the underlying asset price.

The popularity of these sophisticated instruments poses various policy issues. The active involvement of retail investors in this area raises questions about the disclosures and regulation of retail investor participation in complex financial instruments. In addition, although no financial stability risk is imminent, the rapid growth of this market among a wide range of investors raises concerns regarding whether these instruments could amplify market movements, potentially leading, in the worst-case scenario, to panic selling. Given that these options are often used in directional strategies around important economic events, hedging 0DTE options could prove very challenging, particularly when the volume is significant. This could result in higher volatility, which could particularly be amplified if liquidity is poor.

Box 1.4. Potential Spillover Effects of Changes to Japan's Yield Curve Control Policy

As central banks around the world tighten monetary policy to tackle high inflation, the Bank of Japan has so far maintained accommodative monetary policy aiming to achieve a price stability target of 2 percent and maintain the target in a stable manner.[1] The Bank of Japan has resorted to a quantitative and qualitative easing framework with a negative policy interest rate and yield curve control, respectively, since January 2016 and September 2016—purchasing assets, primarily Japanese government bonds, with the objective of maintaining within a band centered at 0 percent.[2]

[1]See also International Monetary Fund, "Japan 2023 Article IV Staff Report: Annex XI," Washington, DC (forthcoming).

[2]Under the yield curve control introduced in September 2016, the Bank of Japan aims to maintain a specific range of yields through its commitment to buy an unlimited quantity of government bonds to achieve its target.

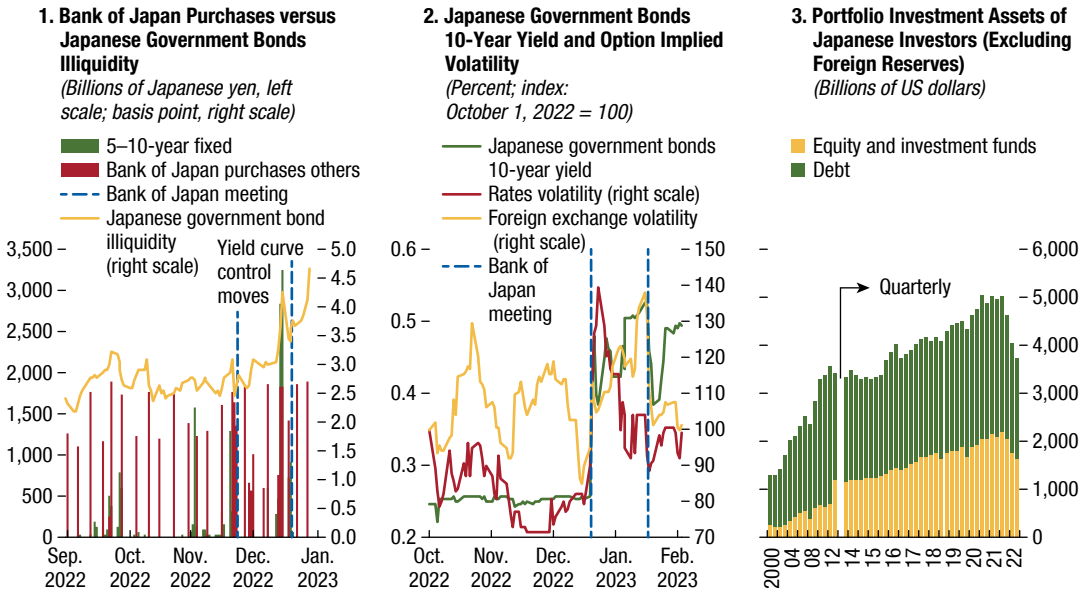
Ten-year Japanese government bond yields have recently declined in sympathy with global yields as strains have emerged in US and European banking sectors. Prior to that, the monetary policy tightening in other advanced economies and rising domestic inflation had put upward pressure on Japanese bond yields, pushing the Bank of Japan to scale up its purchases to keep 10-year Japanese government bond yields around the target. In this context, the future of the yield curve control framework has become a major focus of market participants. The Bank of Japan has purchased large amounts of Japanese government bonds in recent months and now owns 70 percent of all outstanding 5-year and more than 80 percent of outstanding 10-year Japanese government bonds (Figure 1.4.1, panel 1). To mitigate the sharp deterioration in the functioning of bond markets and facilitate the transmission of monetary easing, the Bank of

Figure 1.4.1. Bank of Japan's Policies, Bond Investments, and the Japanese Government Bond Market

The Bank of Japan has become a market maker of last resort amid signs of an increase in Japanese government bond illiquidity.

Increased Japanese government bonds yield and volatility illustrate that adjustments to the yield curve control in December 2022 came as a surprise ...

... creating the potential for international spillovers as Japanese bond holdings abroad remain substantial.



Sources: Bank of Japan; Bloomberg Finance L.P.; Haver Analytics; Japanese Ministry of Finance; US Department of Treasury; and IMF staff calculations.
Note: In panel 1, Japanese government bonds illiquidity is approximated by spline yield curve fitting error. In panel 2, rates volatility is JPY OIS (Japanese yen overnight indexed swap) swaption one-month into 10-year implied volatility. Foreign exchange volatility is USDJPY one-month option implied volatility.

Box 1.4 *(continued)*

Japan announced at its December 2022 meeting the widening of the target band for 10-year yields from 25 basis points to 50 basis points.[3] The announcement was unexpected, leading to significant volatility in Japan's exchange rate and long-term interest rates (Figure 1.4.1, panel 2). The decision ultimately improved demand-supply imbalances but required that the Bank of Japan increased the pace of its bond buying from December to January. This box assesses possible spillover effects in the event of a change to the Bank of Japan yield curve control policy.

The Bank of Japan's decade-long monetary accommodation has driven significant Japanese portfolio investments abroad. As institutional investors have sought higher-yielding fixed-income assets, Japan's portfolio of investment assets abroad reached $5 trillion in the fourth quarter of 2020—double its level before the global financial crisis—before declining somewhat more recently (Figure 1.4.1, panel 3).

Changes to the Bank of Japan's yield curve control framework may affect international financial markets through three channels: exchange rates, term premiums on sovereign bonds, and global risk premiums. One chain of interlinked spillovers could be as follows. A rise in Japanese government bond yields could increase Japanese government bond term premiums (for a given policy rate and expected path of monetary policy), providing incentives for the repatriation of Japanese portfolio investments as well as drawing foreign investors into Japanese bonds—pushing up the foreign exchange value of the yen and putting upward pressures on interest rates. The size of the possible spillovers would vary across countries, depending on their financial links with Japan, country-specific factors, and the broader risk-appetite backdrop.[4]

While allowing more flexibility in the yield curve control policy could have some repercussions in global financial markets, such a change not only is warranted to meet monetary policy objectives but could also help prevent abrupt policy changes later that could trigger larger spillovers.

Security portfolio rebalancing by Japanese investors is a critical element of the spillovers described earlier. In 2022, life insurance companies and banks started to rebalance their portfolios as Japanese government bond yields and the cost of foreign exchange hedging rose, selling $200 billion of foreign bonds (Figure 1.4.2, panel 1). However, recent available data point to strong demand by Japanese investors this year. Should domestic long-term interest rates in Japan rise further, this trend of repatriation would likely continue (albeit at a slower pace, as institutional investors are reportedly cautious not to exit foreign markets in ways that will lead to large marked-to-market losses).[5] The effect would likely be larger on sovereign bond yields in countries where Japanese investors hold a large market share—such as Australia, several euro area countries, and the United States (Figure 1.4.2, panel 2). Some emerging markets, such as regional neighbors Indonesia and Malaysia, could also face material capital outflows because Japanese investors hold a nonnegligible share of their sovereign bonds outstanding. The pace and possible effects of repatriation could be larger, however, should market participants be surprised by the Bank of Japan's announcements and actions. In such a scenario, even emerging markets with small direct financial links to Japanese investors could potentially see material outflows, because capital flows to emerging markets are sensitive to shocks in global risk premiums (Kalemli-Ozcan 2019). This points to the crucial importance of clear communication when announcing and implementing any changes in the instruments, framework, or stance of

[3]In September 2016, the Bank of Japan implemented its yield curve control policy, which paved the way for two announcements until the latest adjustment in December 2022. The first occurred on July 31, 2018, when the bank announced that Japanese government bond yields might move upward and downward in about double the range, which was previously around ±10 basis points. The second happened on March 19, 2021, when the trading range was clarified to be around ±25 basis points.

[4]Existing literature finds that the spillovers from Japanese monetary policy shocks have been modest, especially compared with those from US monetary policy shocks, and more regional in nature (Buch and others 2019; Kearns, Schrimpf, and Xia 2022; Spiegel and Tai 2018). However, these studies examine the spillovers in a period when Japan has been increasingly monetarily accommodative, rather than spillovers during policy tightening.

[5]The pace of outflows by pension funds could be slower than that of those by other investors. For example, in the case of the Government Pension Investment Fund, representing roughly half of the entire stock of pension funds in Japan, the policy mix consists of 25 percent domestic bonds, 25 percent domestic equities, 25 percent foreign bonds, and 25 percent foreign equities. Pension fund managers review the mix in a five-year cycle, suggesting that their investment policy for diversification may not change immediately. As shown in Chapter 2, pension funds in the Asian region have assumed increasing amounts of foreign exchange risk, which can be linked to the widening foreign-exchange-hedging costs.

Box 1.4 *(continued)*

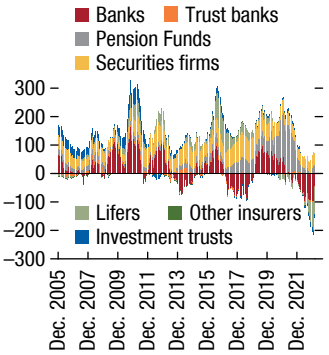
Figure 1.4.2. Japanese Investor Holdings Abroad

Carry sensitive banks and lifers have already sold $200 billion of foreign bonds over the past year.

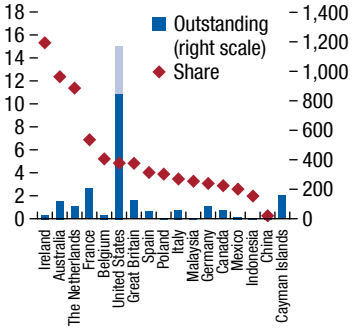
Japanese investors are heavily positioned, particularly in the euro area, the United States, and Australia.

When Japanese government bond yields increased in December 2022, directional spillover effects from Japan spiked.

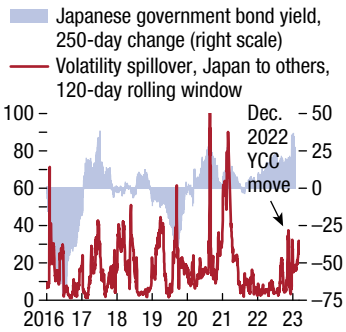
1. Japanese Investors' Cumulative Flows into Foreign Bonds
(Billions of US dollars, trailing 12-month sums)



2. Outstanding Debt Securities Investment Balance and Share to Market Cap
(Percent, left scale; billions of US dollars, right scale)



3. Spillovers from Japan to Four Other Advanced Economics, Estimated Using a 120-Day Rolling Window
(Index)



Sources: Bank of Japan; Bloomberg Finance L.P.; Japanese Ministry of Finance; Haver Analytics; national sources; US Department of the Treasury; and IMF staff calculations.
Note: Panel 2 presents a snapshot as of December 31, 2021, of debt securities owned by Japanese investors issued by non-Japanese entities. For the United States, the light blue bar shows corporate bonds. The share is relative to Bloomberg Global Aggregate Country Index market capitalization for advanced economies and local bond market capitalization, combined with the JPMorgan EMBI Global Diversified Index market capitalization for emerging markets. China local market cap includes sovereign and policy bank bonds. In panel 3, the volatility spillover indices in the spillover analysis capture how changes in Japanese government bond yields affect changes in the Canadian, German, UK, and US yields. Conceptually, this analysis relies on a statistical procedure by breaking down the prediction errors into components caused by each individual country yield, following the approach of Diebold and Yilmaz (2008).

monetary policy. As central banks pursue their price stability mandate, it is imperative they clearly telegraph their intentions to avoid unwarranted volatility and mitigate spillovers in global financial markets.

Until the adjustment in December, spillovers from Japan to other advanced economies had not increased meaningfully last year despite higher Japanese government bond yields during 2022 (Figure 1.4.2, panel 3). Clear communication in the event of adjustments to the Bank of Japan's monetary policy stance is critical to avoid market volatility (see "Policy Recommendations").

Box 1.5. The Impact of the Energy Crisis on the Transition toward a Low-Carbon and Secure Energy System

Russia's invasion of Ukraine has exacerbated existing strains in energy markets. The result: A global energy crisis has led to an increase in coal production as European countries have moved to reduce their energy dependency on Russia's energy sources. As Russia curtailed natural gas supply to Europe and sanctions on imports of Russian oil and coal were introduced, coal and gas prices rose (Figure 1.5.1). These increases accounted for 90 percent of the inflationary pressure on electricity prices worldwide (IEA 2022). Amid high prices and a tight supply market environment, natural gas consumption has declined across all gas-importing regions. While energy prices have since eased to fall below levels prevailing before the war began, global coal demand and production are set to reach all-time highs in 2022. They are projected to rise by 1.2 percent and 5.5 percent, respectively, as the world's largest producers (China, India, Indonesia) have set production records to overcome supply shortages of other sources of energy (IEA 2022). In the European Union, coal production is set to rise by 7 percent in 2022, driven by Germany and Poland switching from higher-priced natural gas and reactivating coal-fired power plants. With improved profitability, the equity value of coal companies has exceeded that of oil and gas companies since the summer of 2022 (Figure 1.5.1).

Higher prices of critical minerals are adversely affecting the cost-competitiveness of renewable energy, while higher fossil fuel prices and policy reforms have encouraged the expansion of capacity. Prices of minerals and metals critical to renewables soared in 2021 and 2022, with prices remaining elevated in the first month of 2023 (Figure 1.5.1, panel 2). Price increases were driven by higher demand, while supply was limited by production bottlenecks, the shut-in of some metal smelters because of high energy prices in Europe, and Russia's role as a key exporter of certain commodities such as aluminum and nickel.[1] Even though generation of wind and solar electricity rose in 2022, average prices for onshore wind and solar photovoltaics have risen worldwide, reversing a decade-long declining trend.

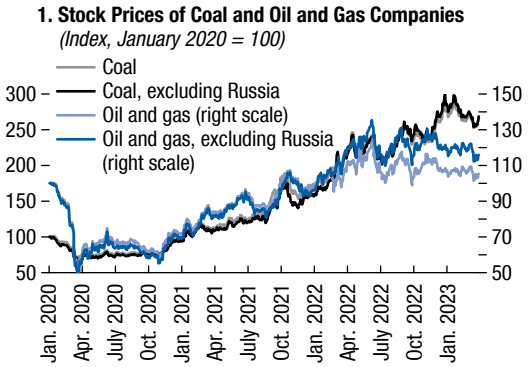
Despite positive policy developments,[2] current investments in the low-carbon transition remain insufficient to meet Paris Agreement temperature targets, thus increasing climate-related financial stability risks.

[1]This is all the more concerning given the capital-intensive nature of renewable energy (including grid infrastructure) and the anticipated emergence of a supply and demand mismatch in regard to copper, lithium, and nickel resulting from bottlenecks in supplies for these materials (Miller and others 2023).

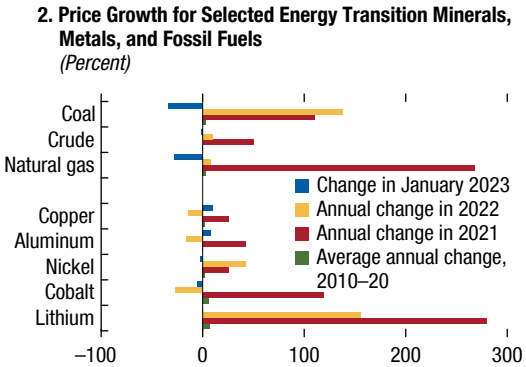
[2]The upsurge took place amid higher fossil fuel prices—and subsequent windfall profits for electricity producers—as well as policy measures to ensure market resilience and diversification and enhance supply security. Policies included the 2022 REPowerEU and the 2023 Green Deal Industrial Plan in the European Union; the Inflation Reduction Act of 2022 in the United States; and China's 14th Five-Year Plans on Renewable Energy Development and Modern Energy System.

Figure 1.5.1. Fossil Fuel Performance and Mineral Price Inflation

Backed by strong demand and prices, coal and oil and gas equities have rebounded strongly ...



... while price gains in minerals required for renewable energy production exceeded those in fossil fuels in 2022.



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: In panel 1, stock prices of major coal and oil and gas companies are averaged for the respective commodity. The sample includes 22 companies involved in coal production across Australia, China, India, Indonesia, Poland, Russia, South Africa, and the United States, as well as integrated upstream and downstream oil and gas companies from China, Norway, Russia, Saudi Arabia, and other major international players in the sector.

Box 1.5 *(continued)*

Sustainable debt issuance hit more than $1 trillion in 2022 but recorded its first annual year-over-year decline (19 percent). Performance of renewable energy indices (such as the MSCI Global Green Bond Index) has also deteriorated, while most environmental, social, and governance bond and equity funds have underperformed. Meanwhile, investment in fossil fuels continues to increase, including in expansion,[3] with total debt rising by 3.3 percent among companies in the oil and gas sector and by 23.3 percent among companies in the coal sector since the start of 2022 (Figure 1.5.2, panels 1 and 2). These trends substantially increase the risks of carbon lock-in and related transition and physical risks.[4] While a plateau in global coal-fired power generation capacity is expected by 2025, shortfalls in renewable energy investment remain significant ($1 trillion) compared with investment targets in a net-zero scenario (Figure 1.5.2, panel 3), especially in emerging market and developing economies.[5] In those economies, natural gas may therefore play a larger dispatchable role in order to satisfy peak demand amid potentially limited production of renewable energy in the absence of large-scale storage capacity.

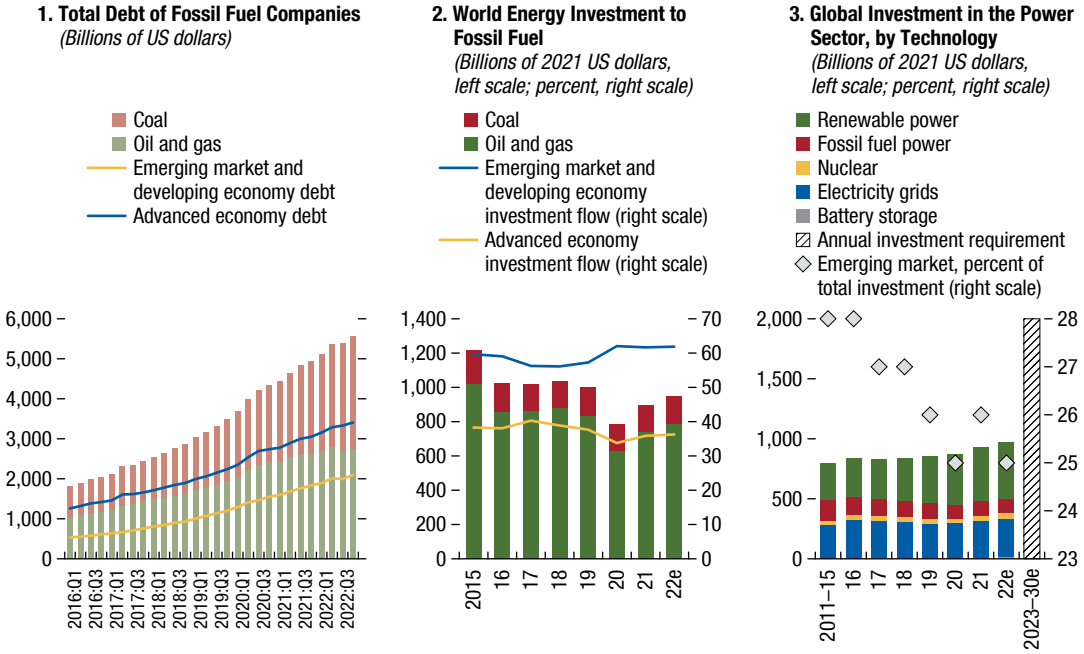
[3]New oil and gas fields, coal mines, and coal-fired power production. This is contrary to the IEA's net-zero scenario (2022) allowing investment during the energy transition only in existing fossil fuel infrastructure.

[4]Carbon lock-in risks result from a situation in which fossil fuel–intensive systems perpetuate, delay, or prevent the low-carbon transition, reinforcing climate-related physical and transition risks (including those related to stranded assets).

[5]Calculated using the International Energy Agency database: "Global Investment in the Power Sector by Technology, 2011–2022."

Figure 1.5.2. Debt of Fossil Fuel Companies and Investment in Power Sectors

There is a significant shortfall in the annual investment required to reach net zero by 2050, while investment in fossil fuel companies continues to see an upward trend, primarily in expansion.



Sources: Bloomberg Finance L.P.; International Energy Agency 2022; Urgewald 2022; and IMF staff calculations.
Note: Companies in panel 1 include those meeting criteria as set out by Urgewald in the Global Coal Exit List and Global Oil & Gas Exit List. Total debt includes bonds and loans. The emerging market and developing economies include China. In panel 2, investment flows include investment in both fuel and power sectors; and e = estimated. The emerging market and developing economies include China. In panel 3, e = estimated; 2023–30 is the annual investment requirement under the International Energy Agency's net-zero emissions scenario. The emerging market and developing economies exclude China. Panel 3 was calculated using the International Energy Agency database (https://www.iea.org/data-and-statistics/charts/global-investment-in-the-power-sector-by-technology-2011-2022).

References

Adrian, Tobias, Richard Crump, and Emanuel Moench. 2013. "Pricing the Term Structure with Linear Regressions." *Journal of Financial Economics* 110 (1): 110–38.

Aladangady, Aditya, David Cho, Laura Feiveson, and Eugenio Pinto. 2022. "Excess Savings during the COVID-19 Pandemic." FEDS Notes, October 21, Board of Governors of the Federal Reserve System, Washington, DC.

Altavilla, Carlo, Matthieu Darracq Paries, and Giulio Nicoletti. 2019. "Loan Supply, Credit Markets, and the Euro Area Financial Crisis." *Journal of Banking & Finance* 109 (2019): 105658.

Bank of Japan. 2023. "Statement on Monetary Policy." January 18. https://www.boj.or.jp/en/mopo/mpmdeci/mpr_023/k230118a.pdf.

Bassett, William, Mary Beth Chosak, John Driscoll, and Egon Zakrajsek. 2014. "Changes in Bank Lending Standards and the Macroeconomy." *Journal of Monetary Economics* 62 (C): 23–40.

Buch, Claudia M., Matthieu Bussierè, Linda Goldberg, and Robert Hills. 2019. "The International Transmission of Monetary Policy." *Journal of International Money and Finance* 91: 29–48.

Corwin, Shane A., and Paul Schultz. 2012. "A Simple Way to Estimate Bid-Ask Spreads from Daily High and Low Prices." *Journal of Finance* 67 (5): 719–59.

de Silva, Tim, Kevin Smith, and Eric C. So. 2022. "Losing Is Optional: Retail Option Trading and Earnings Announcement Volatility." https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4050165.

Diebold, Francis, and Kamil Yilmaz. 2008. "Measuring Financial Asset Return and Volatility Spillovers, with Application to Global Equity Markets." *Economic Journal* 119 (534): 158–71.

European Central Bank. 2022. "The Transmission Protection Instrument." Press Release, July 21. Frankfurt, Germany. https://www.ecb.europa.eu/press/pr/date/2022/html/ecb.pr220721~973e6e7273.en.html.

European Central Bank. 2023. "Monetary Policy Decisions." Press Release, March 16. https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.mp230316aad5249f30.en.html.

Federal Reserve Board. 2022. "Plans for Reducing the Size of the Federal Reserve's Balance Sheet." Press Release, May 4. https://www.federalreserve.gov/newsevents/pressreleases/monetary20220504b.htm.

Federal Reserve Board. 2023. "Coordinated Central Bank Action to Enhance the Provision of U.S. Dollar Liquidity." Press Release, March 19. https://www.federalreserve.gov/newsevents/pressreleases/monetary20230319a.htm.

Harding, Martin, and Mathias Klein. 2022. "Monetary Policy and Household Net Worth." *Review of Economic Dynamics* 44 (1): 125–51.

International Energy Agency (IEA). 2022. *World Energy Outlook*. Paris: IEA.

International Monetary Fund (IMF). 2023. "Elements of Effective Policies for Crypto Assets." IMF Policy Paper 2023/004, Washington, DC.

Kalemli-Ozcan, Sebnem. 2019. "U.S. Monetary Policy and International Risk Spillovers." NBER Working Paper 26297, National Bureau of Economic Research, Cambridge, MA.

Kearns, Jonathan, Andreas Schrimpf, and Dora Xia. 2022. "Explaining Monetary Spillovers: The Matrix Reloaded." *Journal of Money, Credit, and Banking* (November): 1–34.

Miller, Hugh, Simon Dikau, Romain Svartzman, and Stéphane Dees. 2023. "The Stumbling Block in 'The Race of Our Lives': Transition-Critical Materials, Financial Risks and the NGFS Climate Scenarios." Centre for Climate Change Economics and Policy Working Paper 417, Centre for Climate Change Economics and Policy, London.

Onen, Mert, Hyun Song Shin, and Goetz von Peter. 2023. "Overcoming Original Sin: Insights from a New Dataset." BIS Working Paper 1075, Bank for International Settlements, Basel, Switzerland.

Spiegel, Mark M., and Andrew Tai. 2018. "International Transmission of Japanese Monetary Shocks under Low and Negative Interest Rates: A Global Factor-Augmented Vector Autoregressive Approach." *Pacific Economic Review* 23: 51–66.

Urgewald. 2022. "Global Coal Exit List 2022." Urgewald, Sassenberg, Germany. https://www.coalexit.org/.

US Department of the Treasury. 2023. "Secretary of the Treasury Janet L. Yellen Sends Letter to Congressional Leadership on the Debt Limit." Press Release, January 19, 2023. https://home.treasury.gov/news/press-releases/jy1196.