INTERNATIONAL MONETARY FUND

GLOBAL FINANCIAL STABILITY REPORT

Safeguarding Financial Stability amid High Inflation and Geopolitical Risks

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

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

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

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

"Billion" means a thousand million.

"Trillion" means a thousand billion.

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

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

As used in this report, the terms "country" and "economy" do not in all cases refer to a territorial entity that is a state as understood by international law and practice. As used here, the term also covers some territorial entities that are not states but for which statistical data are maintained on a separate and independent basis.

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PREFACE

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

The analysis in this report was coordinated by the Monetary and Capital Markets (MCM) Department under the general direction of Tobias Adrian, Director, MCM. The project was directed by Fabio Natalucci, Deputy Director, MCM; Jason Wu, Assistant Director, MCM; Nassira Abbas, Deputy Division Chief; Charles Cohen, Deputy Division Chief; Antonio Garcia Pascual, Deputy Division Chief (all MCMGA); Mahvash Qureshi, Division Chief; Jérôme Vandenbussche, Deputy Division Chief; and Mario Catalán, Deputy Division Chief (all MCMGS). It benefited from comments and suggestions from senior staff in the MCM Department.

Individual contributors to the report were Mustafa Oguz Caylan, Yingyuan Chen, Fabio Cortes, Cristina Cuervo, Reinout De Bock, Andrea Deghi, Max-Sebastian Dovì, Torsten Ehlers, Salih Fendoglu, Deepali Gautam, Sanjay Hazarika, Shoko Ikarashi, Phakawa Jeasakul, Esti Kemp, Oksana Khadarina, Nila Khanolkar, Darryl King, Johannes Kramer, Harrison Kraus, Yiran Li, Corrado Macchiarelli, Sheheryar Malik, Aurelie Martin, Junghwan Mok, Kleopatra Nikolaou, Natalia Novikova, Tatsushi Okuda, Thomas Piontek (Chapter 2 co-lead), Silvia Ramirez, Patrick Schneider, Felix Suntheim, Hamid Reza Tabarraei, Tomohiro Tsuruga (Chapter 3 co-lead), Romain Michel Veyrune, Jeffrey David Williams, Ying Xu, Dmitry Yakovlev, Mustafa Yenice, and Akihiko Yokoyama. Luigi Zingales served as Expert Advisor. Javier Chang, Monica Devi, Olga Lefebvre, and Srujana Sammeta were responsible for word processing.

Rumit Pancholi from the Communications Department led the editorial team and managed the report's production, with editorial assistance from Denise Bergeron, David Einhorn, Nancy Morrison, Grauel Group, and Absolute Service, Inc.

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

This *Global Financial Stability Report* reflects information available as of March 30, 2023. The report benefited from comments and suggestions from staff in other IMF departments, as well as from Executive Directors following their discussions of the *Global Financial Stability Report* on March 30, 2023. However, the analysis and policy considerations are those of the contributing staff and should not be attributed to the IMF, its Executive Directors, or their national authorities.

FOREWORD

In March 2023, banking stability was tested. Silicon Valley Bank (SVB) and Signature Bank of New York, US regional banks, failed after rapid depositor flight. One week later, Swiss authorities announced a state-supported merger of Credit Suisse with UBS following a loss of market confidence. This marked the first failure of a global systemically important bank since the global financial crisis. In March, US and European bank stock prices sold off significantly, by about 25 and 14 percent, respectively. At the same time, a flight to quality in sovereign bond markets and a reassessment of the global monetary policy path took place even as coordinated central bank action served to contain broader financial market stress.

Faced with a potential loss of confidence in the banking system, authorities took strong and rapid action. US authorities applied a rarely used "systemic risk exception" allowing the Federal Deposit Insurance Corporation to protect all depositors of the banks under stress, at higher cost to the deposit insurance fund. At the same time, the Federal Reserve created a new lending facility allowing all banks to borrow against high-quality securities at par value—which is generally higher than market values—to mitigate liquidity pressures on the banking system. For their part, Swiss authorities acted decisively through the state-supported merger, which included both liquidity support and a fiscal backstop. These quick and decisive actions contained the immediate threats to financial stability.

The recent events are powerful reminders of the challenges posed by the interaction between tighter monetary conditions and the vulnerabilities built up since the global financial crisis. After years of low interest rates, tighter monetary policy is challenging banks' effective risk management in securities portfolios and of loan exposures. With few signs of underlying inflation abating, most central banks are expected to continue tightening. Yet, the well-telegraphed and appropriate monetary tightening has created a challenging environment for bank and nonbank financial intermediaries that are poorly managed, as evident in the newfound focus on unrealized interest rate–driven losses in securities portfolios. Some institutions are simply unprepared for the higher rate environment. Previous *Global Financial Stability Reports* have consistently warned of risks to the financial system from rapid monetary tightening following the period of high liquidity and low rates. In addition, Financial Sector Assessment Programs have flagged country-specific gaps in supervision, regulation, and resolution.

Financial crises have often been preceded by monetary tightening, but the latest stress episode differs in important respects from the 2008 global financial crisis, the 1997 Asian financial crisis, and the 1980s US savings and loan crisis. While the current stress is squarely in the banking system, the 2008 crisis quickly spread from banks to nonbanks and off-balance sheet entities of banks. Furthermore, the 2008 crisis was triggered by credit losses due to housing market declines, while the current turmoil in part stems from unrealized losses in portfolios of safe, but falling-in-value, securities. Finally, bank capital and liquidity rules and crisis management frameworks were strengthened significantly after the global financial crisis, helping stem a broader loss of confidence and underpinning a swifter and better coordinated policy response. The current turmoil also differs from the Asian financial crisis, when current account deficits and heavy external borrowing exposed corporates and banks to exchange rate and funding risks. And it differs from the 1980s savings and loans crisis, which occurred outside of larger banks, in entities with significantly less capital and liquidity.

Stresses triggered by the tighter stance of monetary policy may result in further bouts of financial instability. Activities in riskier segments of capital markets such as leveraged loans and private credit markets have slowed. Concerns have also been growing about conditions in commercial real estate markets, which are heavily dependent on smaller banks. While banking stocks in advanced economies have undergone significant repricing, broad equity indices remain very stretched in many countries, having appreciated markedly since the beginning of the year. A more extensive loss of investor confidence or a spreading of the banking sector strains

into nonbanks could result in a broader sell-off in global equities. Some mutual funds have experienced outflows in recent weeks. Liquidity backstops and resolution mechanisms are less well developed for nonbanks. In the second chapter, we extensively discuss crisis management tools for nonbanks.

The recent banking turmoil also demonstrated the growing influence of mobile apps and social media in spreading sudden financial asset allocations. Word of deposit withdrawals spread globally at lightning speed, potentially signaling that future banking stress may spread faster and be less predictable.

At this point, contagion to the banking systems of major emerging markets remains contained, continuing the theme of resilience of these economies during this period of global monetary tightening. Emerging market banks tend to have less exposure to interest rate risk and a substantially higher share of stickier retail deposits. That said, the coverage level of deposit insurance schemes varies and emerging market banks in some countries have assets with lower credit quality than those in advanced economies, so they may not be shielded from a sharp deterioration of confidence. For frontier economies and emerging markets with lower credit ratings, the situation is more worrisome. While sovereign spreads of investment-grade emerging market have remained stable, those for frontier economies and high-yield emerging market widened to crisis levels following these recent events. Additional countries have likely lost market access, and debt distress pressures have become more pronounced.

In addition to banking sector turmoil and fragile investor confidence, macro-financial volatility could also be exacerbated by geopolitical fragmentation, as we document in Chapter 3. In the current global context, global financial stability will be further tested.

Faced with such heightened risks to global financial stability, policymakers must act resolutely to restore confidence. Central banks have tools to separate the actions to maintain financial stability from those taken to maintain price stability. For example, emergency lending facilities and targeted asset purchases can be used to inject liquidity to support financial stability while maintaining a tight stance of monetary policy. The policy toolkit also has to include robust surveillance, well-resourced and appropriately intensive supervision of financial institutions, and strong regulation. In addition, the prompt intervention and resolution of nonviable banks are crucial for effective crisis management.

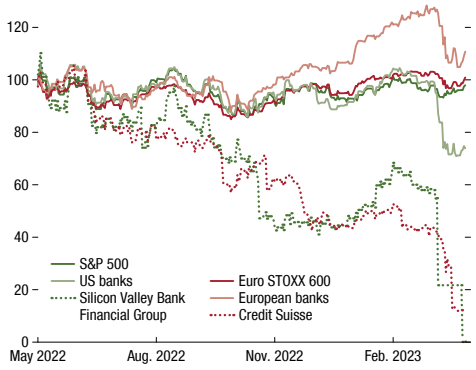
If financial sector distress was to have severe repercussions affecting the broader economy, clean separation between price stability and financial stability objectives could become more tenuous. In acute, macro-critical crises, policymakers may need to adjust the stance of monetary policy to support financial stability. If so, they should clearly communicate their continued resolve to bring inflation back to target as soon as possible once financial stress lessens.

Global cooperation among central banks, financial regulators, and finance ministries is essential. Timely and resolute policy action will be key to contain any further bouts of instability.

Tobias Adrian
Financial Counsellor

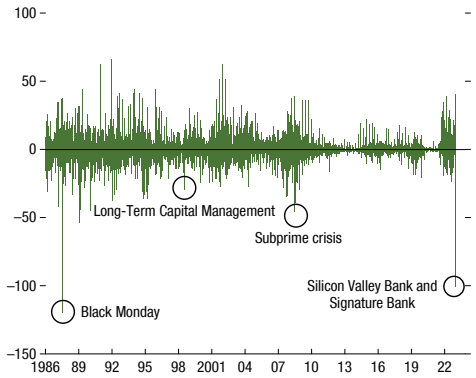
EXECUTIVE SUMMARY

Figure ES.1. Performance of US and European Equities
(Prices, indexed, May 1, 2022 = 100)



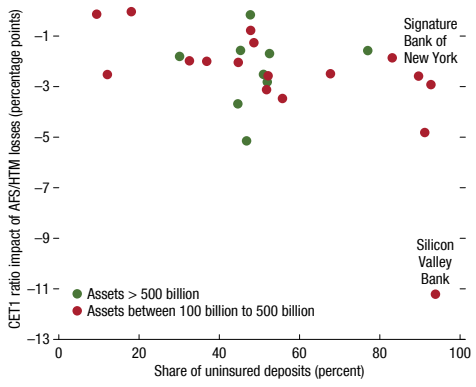
Source: Bloomberg Finance L.P.

Figure ES.2. US Near-Term Policy Rate Expectations
(Basis points)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: Estimated using near-term money market forward with a maturity of around 9 months.

Figure ES.3. Share of Uninsured Deposits versus Equity Impact of Mark-to-Market Losses of Select US Banks
(Percentage points of CET1 ratio)



Sources: Federal Reserve; and IMF staff calculations.
Note: AFS = Available for Sale; CET1 = Common Equity Tier 1; HTM = Held to Maturity.

A Financial System Tested by Higher Inflation and Interest Rates

Financial stability risks have risen significantly as the resilience of the global financial system has faced a number of severe tests since the October 2022 *Global Financial Stability Report*. 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 employing financial leverage to boost returns—vulnerabilities repeatedly flagged in previous issues of the *Global Financial Stability Report*.

The sudden failures of Silicon Valley Bank and Signature Bank in the United States, and the loss of market confidence in Credit Suisse, a global systemically important bank (GSIB) 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. 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 quickly spread to banks and financial markets across the world, causing a sell-off of risk assets (Figure ES.1). It also led to a significant repricing of monetary policy rate expectations, with magnitude and scale comparable to that of Black Monday in 1987 (Figure ES.2).

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 liquidity through a new Bank Term Funding Program to prevent further bank runs. In Switzerland, the Swiss National Bank provided emergency liquidity support to Credit Suisse, which was then taken over by UBS in a state-supported acquisition. But market sentiment remains fragile, and strains are still evident across a number of institutions and markets, as investors reassess the fundamental 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, not just at banks but also at nonbank financial intermediaries (NBFIs).

In the United States, investors' fears about losses on interest rate–sensitive assets led to the banking sell-off, especially for banks with concentrated deposit bases and large mark-to-market losses (Figure ES.3). In Europe, the impact was greatest on banks that trade at significant discounts to their book values, in which there are long-term concerns regarding profitability and their ability to raise capital.

Emerging market banks appear to have avoided significant losses in their securities portfolios so far, while deposit funding has been stable. IMF staff estimates that the impact on regulatory ratios of unrealized losses in held-to-maturity portfolios for the median bank in Europe, Japan, and emerging markets would likely be modest, although the impact for some other banks could be material (Figure ES.4). That said, many countries have low levels of deposit insurance coverage, and emerging market banks generally have assets with lower credit quality than in advanced economies. In addition, emerging market banks generally play a larger role in the financial system than in advanced economies, so the consequences of banking sector distress could be more severe.

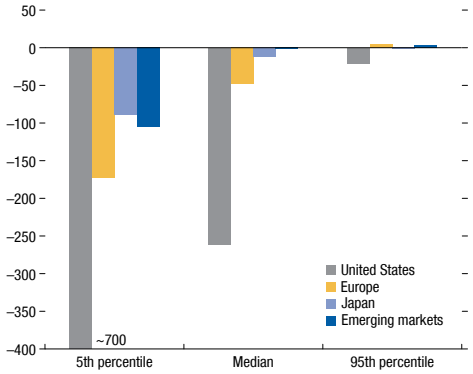
These events have been a reminder that funding can disappear rapidly amid widespread loss of confidence. Shifting patterns of deposits across different institutions could raise funding costs for banks which could restrict their ability to provide credit to the economy. These concerns are particularly pertinent for US regional banks. With the recent fall in bank equity prices, lending capacity of US banks could decline by almost 1 percent in the coming year, reducing real GDP by 44 basis points, all else being equal.

The Challenges Ahead

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. Before 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, investors have sharply repriced downward the expected path of monetary policy in advanced economies (Figure ES.5). They now anticipate central banks to begin easing monetary policy well in advance of what was previously forecast. Inflation, however, has remained uncomfortably well above target.

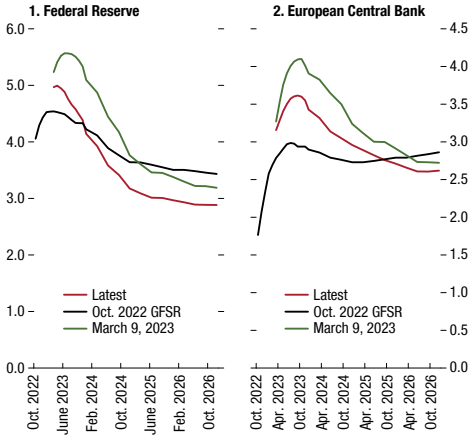
After having significantly increased their securities holdings during the pandemic, central banks have started to reduce their balance sheets. This normalization process could pose challenges for sovereign debt markets at a time when liquidity is generally poor, debt levels are high, and additional supply of sovereign debt will have to be absorbed by private investors. In the United States, for example, net issuance of the US Treasury securities is projected to increase in 2023 and 2024, while quantitative

Figure ES.4. Equity Impact of Unrealized Losses on Held-to-Maturity Securities for a Select Sample of Banks
(Basis points of CET1 ratio)



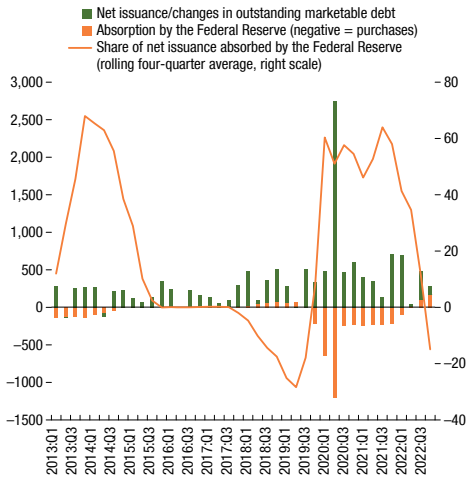
Sources: SNL Financials; and IMF staff calculations.
Note: CET1 = Common Equity Tier 1.

Figure ES.5. Policy Rate Expectations
(Percent)



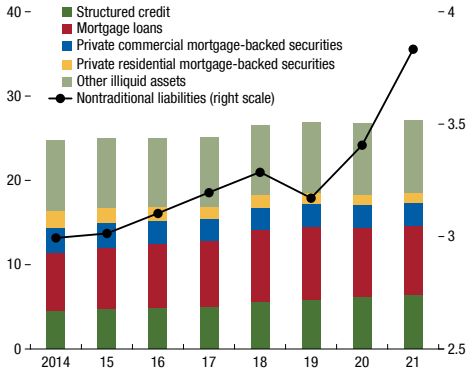
Sources: Bloomberg Finance L.P.; European Central Bank; national authorities; US Federal Reserve; and IMF staff calculations.
Note: GFSR = Global Financial Stability Report.

Figure ES.6. Net Issuance of Treasury Debt and Absorption by the US Federal Reserve
(Billions of US dollars, left scale; percent, right scale)



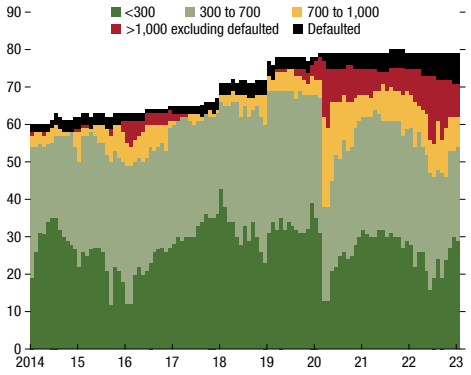
Sources: US Federal Reserve System Open Market Account data; US Flow of Funds; US Monthly Statistics of Public Debt; and IMF staff calculations.

Figure ES.7. US Insurers Illiquid Assets/Share of Nontraditional Liabilities
(Percent)



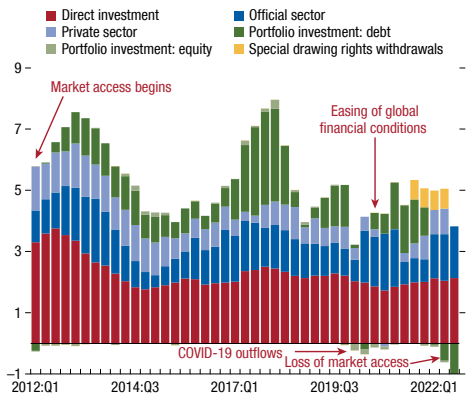
Sources: Bloomberg Finance L.P.; Goldman Sachs; Haver Analytics; ICE Bond Indices; National Association of Insurance Commissioners; PitchBook Leveraged Commentary and Data; Preqin; S&P Capital IQ; St. Louis Fed; UBS; US Flow of Funds; and IMF staff calculations.

Figure ES.8. Number of Sovereigns, by Spread in Basis Points



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: ">1,000 excluding defaulted" refers to the number of sovereigns trading with spreads over 1000 basis points that have not defaulted.

Figure ES.9. Frontier Market Nonresident Balance of Payment Capital Flows
(Four-quarter rolling sum to GDP)



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF Balance of Payments data; and IMF staff calculations.

tightening is reducing the share absorbed by the Federal Reserve's balance sheet (Figure ES.6).

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. For example, in an effort to increase returns, life insurance companies have doubled their illiquid investments over the last decade and also make increasing use of leverage to fund illiquid assets (Figure ES.7).

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. However, they could face significant challenges should current strains in financial markets fail to subside and cause a pullback from global risk taking and associated capital outflows.

Sovereign debt sustainability metrics continue to worsen around the world, especially in frontier and low-income countries, with many of the most vulnerable already facing severe strains. There are now 12 sovereigns trading at distressed spreads and an additional 20 at spreads of more than 700 basis points, a level at which market access has historically been very challenging (Figure ES.8).

In frontier markets, brisk debt issuance evaporated in 2021 and may not resume at the same scale, given ongoing challenges with sovereign defaults and macro vulnerabilities (Figure ES.9). Low-income countries have been significantly affected by high food and energy prices, have little to no access to market financing, and have concerns about the availability of official concessional financing. They continue to face extremely challenging debt conditions, with more than half (37 out of 69) in, or at high risk of, debt distress.

Looking beyond financial institutions, households accumulated significant savings during the pandemic thanks in part to the fiscal support and monetary easing rolled out during the pandemic. However, they are facing heavier debt-servicing burdens, eroding their savings and leaving them more vulnerable to default. The steep increase of residential mortgage rates has cooled global housing demand. Average house prices fell in 60 percent of the emerging markets in the second half of 2022, while in advanced economies price increases have slowed. Economies with larger shares of adjustable-rate mortgages have recorded the largest declines in real prices. Valuations remain stretched in many countries, increasing the risk of a sharp price correction if interest rates rise quickly (Figure ES.10).

Concerns have been growing about conditions in the commercial real estate (CRE) market, which has been under pressure from a worsening of fundamentals 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 bank lending appetite. In addition, NBFIs play an important role in the real estate investment trusts (REITs) sector and commercial mortgage-backed securities markets, so there are broader implications stemming from stress in the CRE market, both for financial stability and for economic growth. Global transaction activity has decreased by 17 percent from the previous year, and REITs have seen price corrections up to 20 percent. Losses have been particularly elevated in the office sector, as demand and occupancy rates are more anemic in the post-pandemic environment.

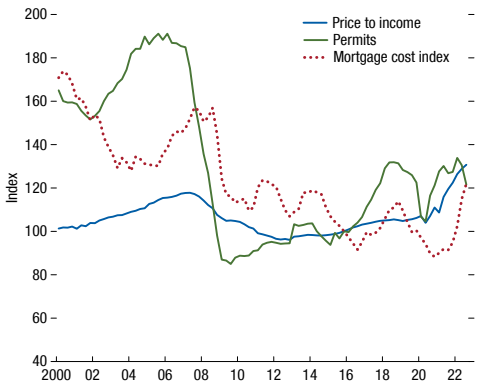
For firms, default rates have remained low, as the sector's substantial cash buffers built during the pandemic have provided financial cushioning (Figure ES.11). However, declining corporate earnings and tighter funding conditions have started to erode these buffers and could lead to repayment difficulties down the road and expose firms to defaults. Small firms and emerging market corporates would likely be more adversely affected because they lack alternative sources of financing to bank lending, the standards of which have already started to tighten.

China's housing market remains sluggish despite its reopening. Although financing conditions have improved for some property developers, home buyers continue to avoid purchasing from weaker private developers, underscoring the limited progress in restoring confidence in the broader housing market. Concerns about debt sustainability of local government financial vehicles (LGFVs)—which are heavily involved in the property market—intensified in 2022; with total LGFV debt estimated at about 50 percent of China's GDP, a broadening of LGFV debt distress could impose significant losses on some banks, particularly in low-income regions with higher local government debt and large stocks of unfinished housing (Figure ES.12).

Chapter 2 shows that NBFIs are increasingly interconnected with banks globally (Figure ES.13). Case studies show that nonbank financial intermediary stress tends to emerge with elevated leverage, poor liquidity, and high levels of interconnectedness, and that it can spill across jurisdictions, including to emerging market and developing economies. These vulnerabilities may be heightened in the current high-inflation environment, as the provision of liquidity by central banks for financial stability purposes becomes more challenging, including from a communications standpoint, and it could undermine the fight against inflation.

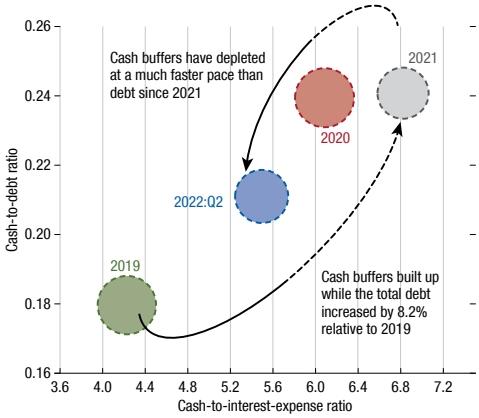
Chapter 3 documents how rising geopolitical tensions among major economies could raise financial stability risks by increasing global economic and financial fragmentation and adversely affect the cross-border allocation of capital (Figure ES.14). This could cause capital flows to suddenly reverse and could threaten

Figure ES.10. Global Housing Affordability and Supply Conditions
(Index, 2015 = 100)



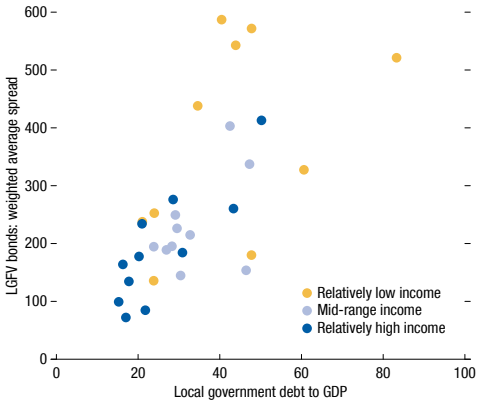
Sources: Bloomberg Finance L.P.; Federal Reserve Bank; Haver Analytics; MSCI Real Estate; and IMF staff calculations.

Figure ES.11. Corporate Cash-to-Interest-Expense Ratio and Cash-to-Debt Ratio
(Ratio; size of bubble corresponds to the debt level)



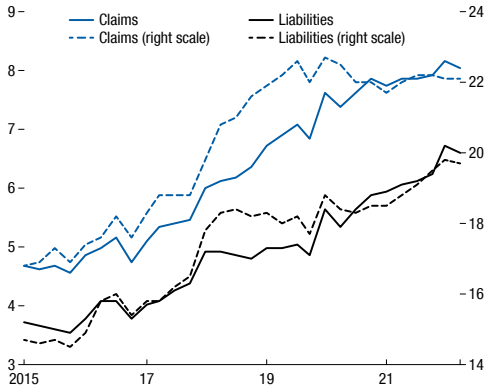
Sources: Bloomberg Finance L.P.; S&P Capital IQ; and IMF staff calculations.

Figure ES.12. China Local Government Financing Vehicle Spreads versus Local Government Debt
(Percent, basis points)



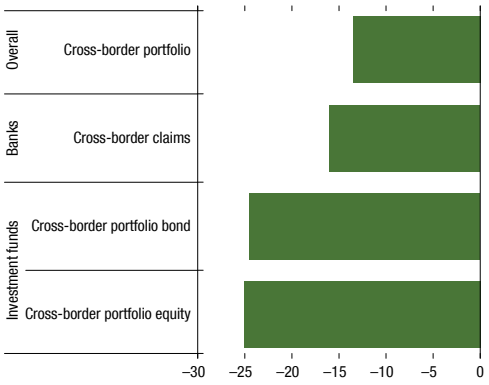
Sources: Bloomberg Finance L.P.; China Banking and Insurance Regulatory Commission; CEIC; JPMorgan Chase & Co.; and IMF staff calculations.
Note: LGFV = local government financing vehicle.

Figure ES.13. Banks' Cross-Border Linkages with Nonbank Financial Intermediaries across Jurisdictions
(Trillions of US dollars, left scale; percent of total cross-border liabilities, right scale)



Sources: Bank for International Settlements; and IMF staff calculations.

Figure ES.14. Rise in Geopolitical Tensions and Change in Cross-Border Capital Allocation
(Percent)



Sources: Bank for International Settlements, Locational Banking Statistics by Residence (restricted version); EPFR Global; FinFlows; IMF, Coordinated Direct Investment Survey; IMF, Coordinated Portfolio Investment Survey; and IMF staff calculations.

macro-financial stability by increasing banks' funding costs. These effects are likely to be more pronounced for emerging markets and for banks with lower capitalization ratios. Fragmentation could also exacerbate macro-financial volatility by reducing international risk diversification, particularly in countries with lower external buffers.

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. 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.

The recent turmoil in the banking sector has highlighted failures in internal risk management practices with respect to interest rate and liquidity risks at banks, as well as supervisory lapses. 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. For NBFIs, policymakers should close data gaps, incentivize proper risk management practices, set appropriate regulation, and intensify supervision.

Adequate minimum capital and liquidity requirements including for smaller institutions that, individually, are not considered systemic, are essential to contain financial stability risks. Prudential rules should ensure that banks hold capital for interest rate risk and guard against hidden losses that could materialize abruptly in the event of liquidity shocks. 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.

Some of the recent responses by policymakers 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.

According to the IMF's Integrated Policy Framework, foreign exchange interventions may be appropriate in the case of illiquid foreign exchange markets, balance sheet mismatches, and weakly anchored inflation expectation, 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 imminent crises, capital outflow measures may be an option to lessen outflow pressures, although they should be part of a comprehensive policy package that tackles underlying macroeconomic imbalances and be lifted once crisis conditions abate.

Sovereign borrowers in developing economies and frontier markets 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. Enacting credible medium-term fiscal consolidation plans could help contain borrowing costs and alleviate debt sustainability concerns. For countries near debt distress, bilateral and private sector creditors should coordinate on preemptive restructuring, using the G20 Common Framework where applicable.

Providing nonbank financial institutions with direct access to central bank liquidity could prove necessary in times of stress, but implementing appropriate guardrails is paramount. As a first line of defense, robust surveillance, regulation, and supervision of nonbank financial institutions are vital. If financial stability is threatened, situationally appropriate central bank liquidity support for nonbank financial institutions can be considered—discretionary marketwide operations, standing lending facilities, or lender of last resort—but such support needs to be carefully designed to avoid moral hazard.

Policymakers should devote resources to assessing, managing, and mitigating financial stability risks caused by geopolitical tensions rising. Financial institutions may need to hold adequate capital and liquidity buffers to mitigate such geopolitical risks. Policymakers should also ensure that the global financial safety net is adequate. Given the significant risks to global macro-financial stability, multilateral efforts should be strengthened to diplomatically resolve geopolitical tensions and prevent economic and financial fragmentation.

IMF EXECUTIVE BOARD DISCUSSION OF THE OUTLOOK, MARCH 2023

The following remarks were made by the Chair at the conclusion of the Executive Board's discussion of the Fiscal Monitor, Global Financial Stability Report, *and* World Economic Outlook *on March 30, 2023.*

Executive Directors broadly agreed with staff's assessment of the global economic outlook, risks, and policy priorities. They considered that the persistence of high inflation in many countries and recent financial sector stresses increase the challenges to global economic prospects and leave policymakers with a narrow path to restore price stability, while avoiding a recession and maintaining broad financial stability. In addition, Directors generally concurred that many of the forces that shaped the world economy in 2022—including Russia's war in Ukraine and geopolitical tensions, high debt levels constraining fiscal responses, and tighter global financial conditions—appear likely to continue into this year. In this context, they expressed concern that the mediumterm growth projections for the global economy remain the lowest in decades.

Directors agreed that risks to the outlook have increased and are tilted to the downside. They noted that core inflation could turn out more persistent than anticipated, which would call for even tighter monetary policies. They also emphasized that recent stresses in the banking sector could amplify with contagion effects, pockets of sovereign debt distress could become more widespread as a result of wider exchange rate movements and higher borrowing costs, and the war in Ukraine and geopolitical conflicts could intensify and lead to more food and energy price spikes as well as further geoeconomic fragmentation.

Directors reiterated their strong call for multilateral cooperation to help defuse geopolitical tensions and respond to the challenges of an interconnected world. They emphasized the criticality of multilateral actions to safeguard the functioning of global financial markets, manage debt distress, foster global trade and reinforce the multilateral trading system, ensure food and energy security, advance with the green and digital transitions, and improve resilience to future pandemics. Most Directors also agreed that fragmentation into geopolitical blocs could generate large output losses, including through effects on foreign direct investment, and especially affecting emerging market and developing economies; a few Directors emphasized the need to build resilience and diversification in supply chains. Noting that many countries are contending with tighter financial conditions, high debt levels, and pressures to protect the most vulnerable segments from high inflation, Directors stressed the need for multilateral institutions to stand ready to provide timely support to safeguard essential spending and ensure that any crises remain contained. They also stressed the importance of improving debt transparency and of better mechanisms to produce orderly debt restructurings—including a more effective Common Framework—in cases where insolvency issues prevail. In this context, Directors encouraged the newly established Global Sovereign Debt Roundtable to become an effective venue for solving coordination impediments in debt restructuring operations.

Directors agreed that policy responses—monetary, fiscal, and financial—differ across countries, reflecting their own circumstances and exposures. For most economies, they generally considered that policy tightening is necessary to durably reduce inflation, while standing ready to take appropriate actions to mitigate financial sector risks as needed. Directors also emphasized that structural reforms remain essential to improve productivity, expand economic capacity, and ease supplyside constraints. They acknowledged that many emerging market and developing economies face tougher policy choices, as rising costs of market financing, higher food and fuel prices, and the need to support the recovery and vulnerable populations can pull in different directions, necessitating a difficult balancing act.

Directors agreed that central banks should maintain a sufficiently tight, datadependent monetary policy

stance to durably reduce inflation and avoid a deanchoring of inflation expectations. At the same time, they called on policymakers to stand ready to take strong actions to restore financial stability and reinvigorate confidence as developments demand. With respect to the future path of monetary policy, Directors stressed that clear communication about policy reaction functions and objectives and the need to further normalize policy would help avoid unwarranted market volatility.

Directors stressed that fiscal and monetary policies need to be closely aligned to help deliver price and financial stability. They emphasized that tighter fiscal policy is needed to help contain inflationary pressures, making it possible for central banks to increase interest rates by less than otherwise, help contain governments' borrowing costs, and ease potential tradeoffs between price and financial stability. At the same time, Directors agreed that fiscal restraint should be accompanied by temporary and carefully targeted measures to protect the most vulnerable segments. Given the heightened uncertainty, they generally concurred that fiscal policy should remain flexible to respond if risks materialized. To tackle the elevated debt vulnerabilities and rebuild fiscal buffers to cope with future crises, Directors called for credible mediumterm fiscal frameworks, while also cautioning against relying on high inflation for public debt reduction. In lowincome developing countries, they stressed the need for further efforts to increase tax capacity, given the importance of addressing heightened debt vulnerabilities, protecting the poorest, and advancing the Sustainable Development Goals.

Directors commended the decisive responses by policymakers to stem recent financial instability. They noted that the recent stress in the banking sector has highlighted failures in internal riskmanagement practices with respect to interestrate and liquidity risks in some banks, as well as supervisory lapses. Against this backdrop, Directors stressed the importance of closely monitoring financial sector developments, including in nonbank financial intermediaries (NBFIs); improving banking regulation, supervision, and resolution frameworks; and a swift and appropriate use of available policies, including macroprudential policies, if further vulnerabilities materialize, while mitigating moral hazard. Directors noted that NBFIs play an important role in financial markets and are increasingly interconnected with banks and other financial institutions. In this context, many Directors considered that the provision of central bank liquidity to NBFIs could lead to unintended consequences. In the event that liquidity provision to NBFIs should be needed to address systemic risks threatening the health of the financial system, Directors emphasized that appropriate guardrails, including robust regulation and supervision, should be in place and that progress in closing regulatory data gaps in this sector remains vital.

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.

Prepared by staff from the Monetary and Capital Markets Department (in consultation with other departments): The authors of this chapter are Jason Wu (Assistant Director), Nassira Abbas (Deputy Division Chief), Charles Cohen (Deputy Division Chief), Antonio Garcia Pascual (Deputy Division Chief), Mustafa Oguz Caylan, Yingyuan Chen, Fabio Cortes, Reinout De Bock, Andrea Deghi, Torsten Ehlers, Charlotte Gardes-Landolfini, Deepali Gautam, Sanjay Hazarika, Shoko Ikarashi, Phakawa Jeasakul, Esti Kemp, Johannes S. Kramer, Harrison Samuel Kraus, Yiran Li, Corrado Macchiarelli, Sheheryar Malik, Aurelie Martin, Kleopatra Nikolaou, Gurnain Kaur Pasricha, Natalia Pavlovna Novikova, Thomas Piontek, Silvia Loyda Ramirez, Patrick Schneider, Jeffrey David Williams, Ying Xu, Dmitry Yakovlev, and Aki Yokoyama, under the guidance of Fabio Natalucci (Deputy Director).

- 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.

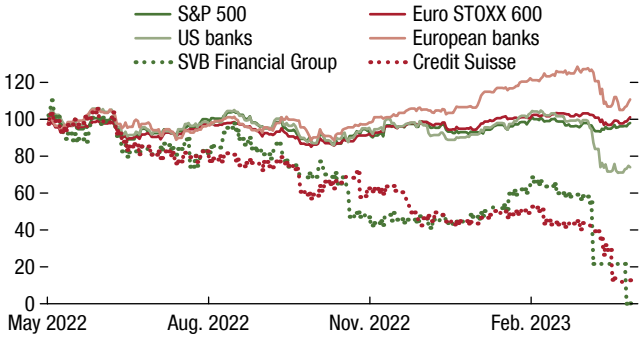
After persistent deposit outflows in recent months, SVB revealed on March 6 a $1.8 billion loss on sales of Treasuries and agency mortgage-backed securities (MBS) and announced on March 8 a plan to raise funds through a $2.25 billion stock offering. A $42 billion of deposit withdrawals followed on March 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

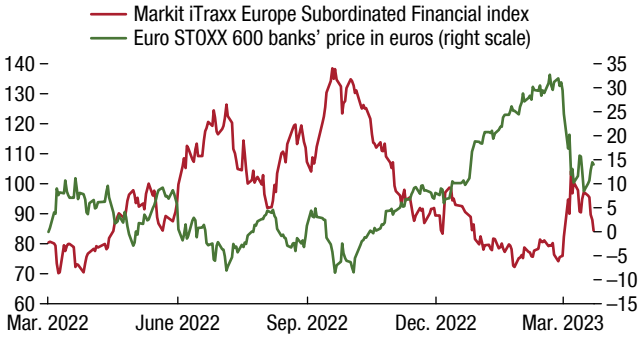
The loss of confidence and subsequent runs on Silicon Valley Bank and Credit Suisse quickly reverberated throughout the financial system.

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



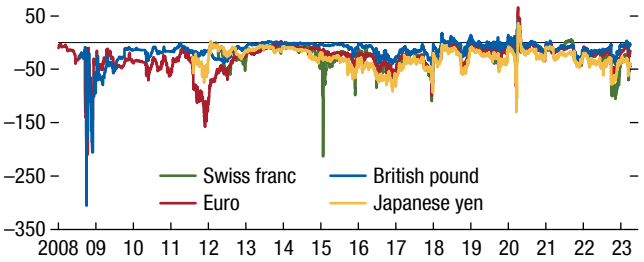
European banks have sold off dramatically on the back of the US regional and European bank turmoil.

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



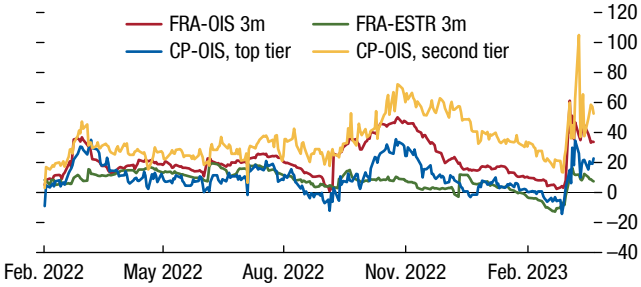
These developments have shaken international dollar funding markets ...

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



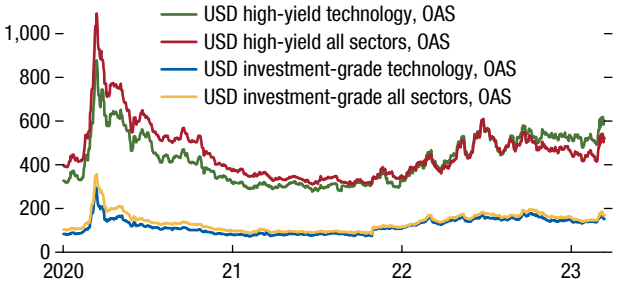
... and interbank as well as commercial paper funding markets.

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



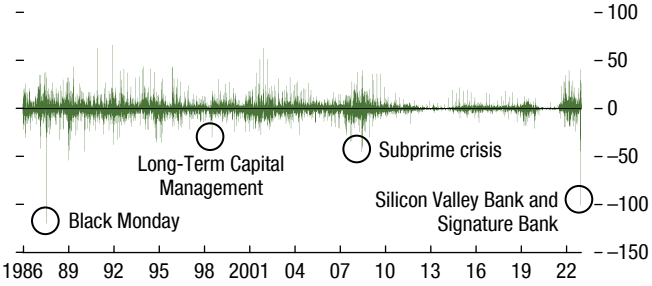
Credit markets came under some pressure.

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).

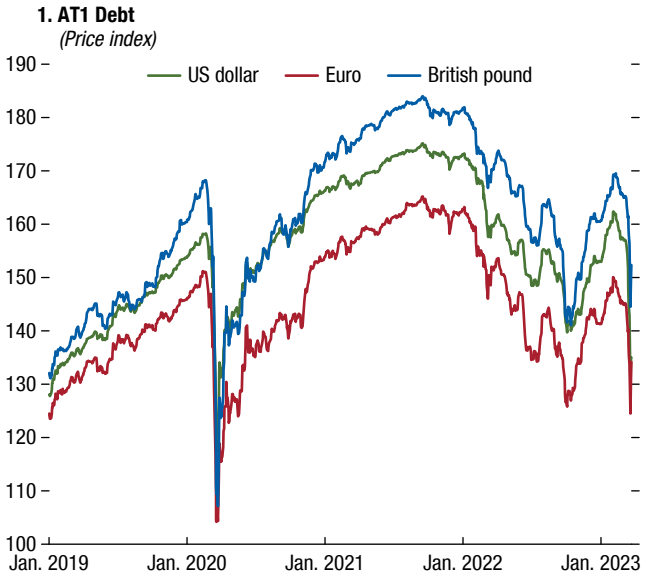
Bank borrowing from the Federal Reserve's discount window's standing Primary Credit facility surged to an all-time high of 153 billion on March 15, while the take-up at the new Bank Term Funding Program was 12 billion (Figure 1.3, panel 1). Borrowing by one regional bank reportedly accounted for the 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.

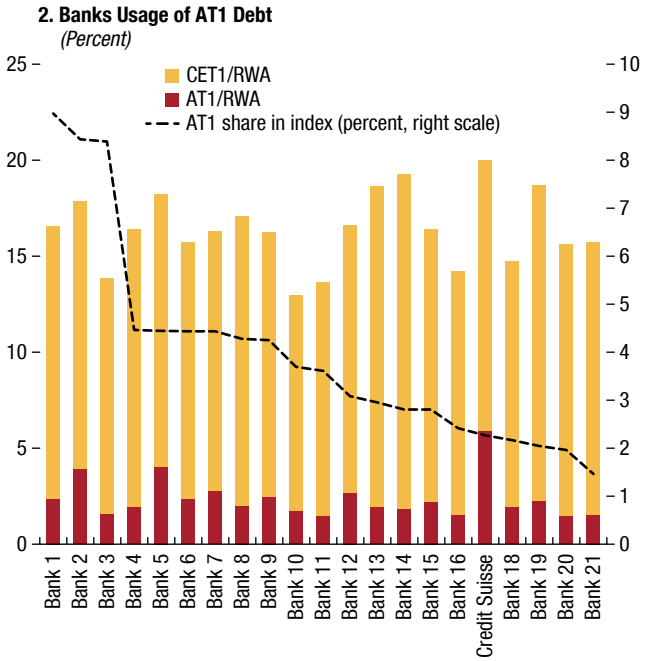
[4]The Federal Reserve also had $143 billion in loans outstanding to the two FDIC-created bridge banks as part of the resolution of SVB and SBNY.

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.

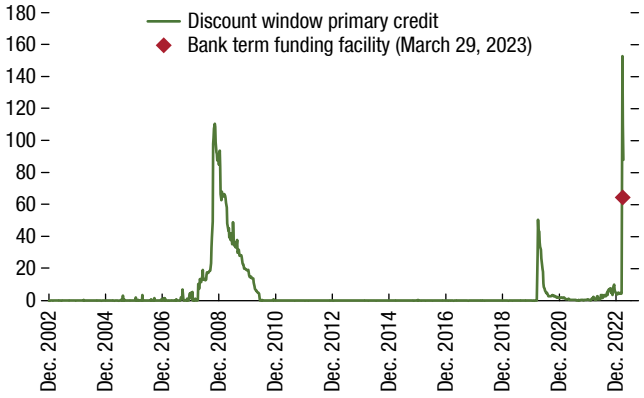
After the Credit Suisse fallout, the Swiss authorities and the Federal Reserve announced a series of new liquidity measures. The Swiss authorities announced extraordinary liquidity assistance for Credit Suisse and UBS for a total of up to 200 billion Swiss francs (an amount close to the remaining deposit 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

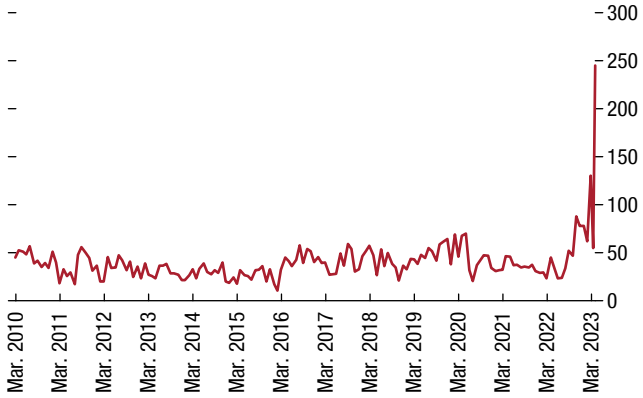
Usage at the Federal Reserve's discount window borrowing reached an all-time high, and banks also tapped the Bank Term Funding Program ...

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



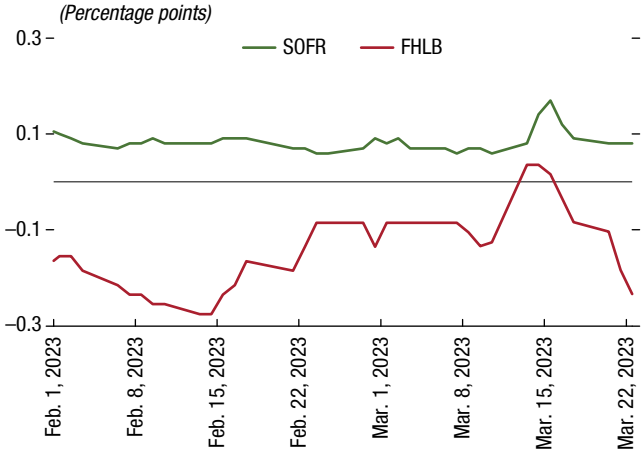
... and the FHLB system issued a record level of debt securities to provide liquidity to banks in March.

2. FHLB Debt Issuance
(Billions)



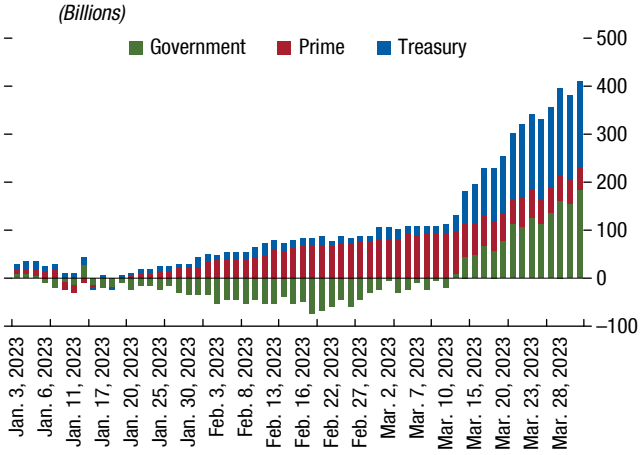
Increased supply drove overnight rates on FHLB notes above the OIS rate, while funding pressures creeped into repo markets ...

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



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

4. Daily 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.

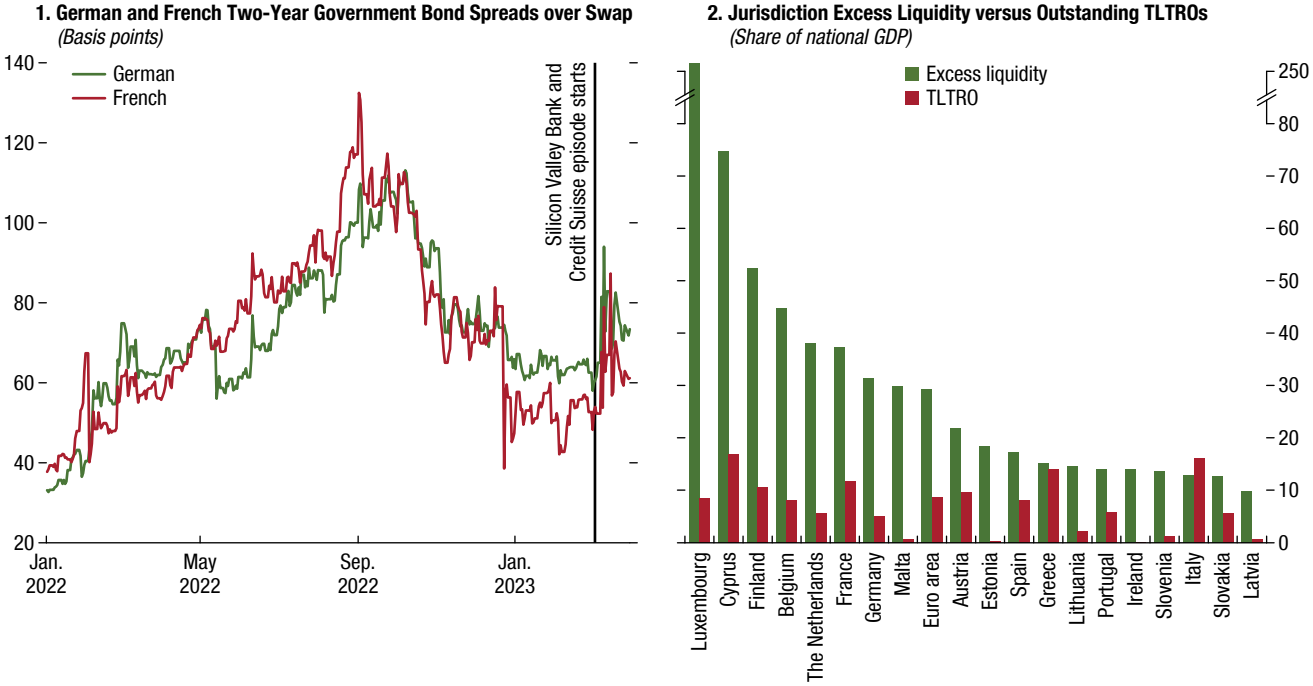
in addition, the Swiss National Bank can grant Credit Suisse another loan of up to 100 billion Swiss francs backed by a federal default guarantee.

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.

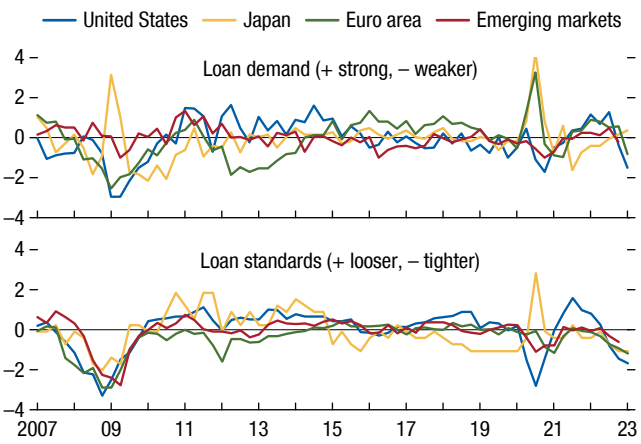
In Europe, concerns about the possible economic impact of stress in the banking sector pushed the spread of swaps over French and German short-dated bonds sharply higher (Figure 1.4, panel 1). This likely reflected investors' preference to hold high-quality cash securities in a context of a shortage 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

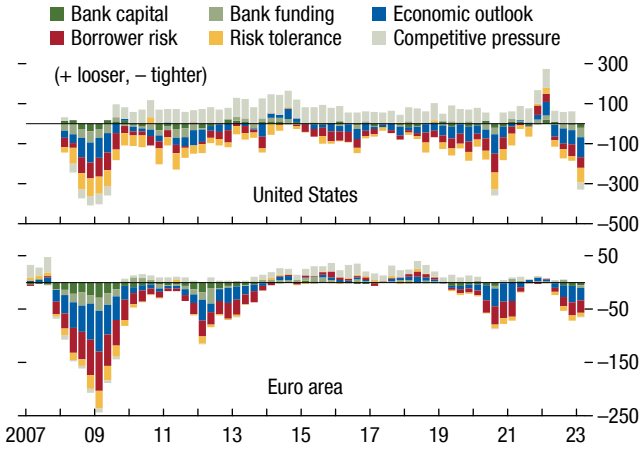
Global banks in some jurisdictions have already tightened lending standards considerably ...

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



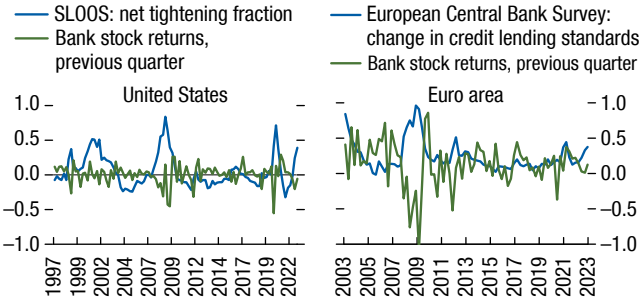
... on rising concerns about economic outlook and borrower risks.

2. Contributor Factors to Lending Standards
(Index)



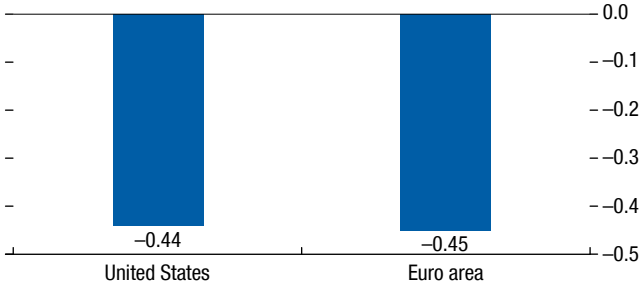
Bank stock declines could further tighten lending standards ...

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



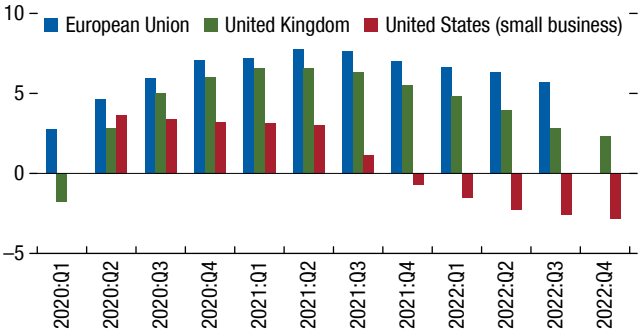
... which adversely impacts real GDP growth.

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



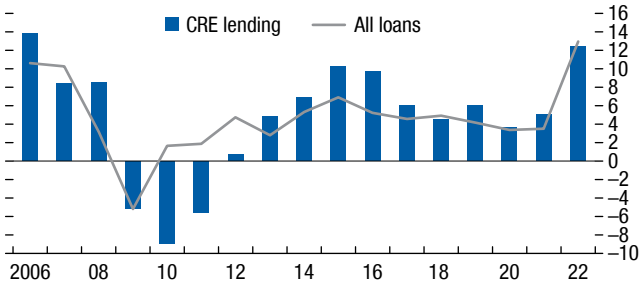
Small and medium enterprises likely affected the most ...

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.

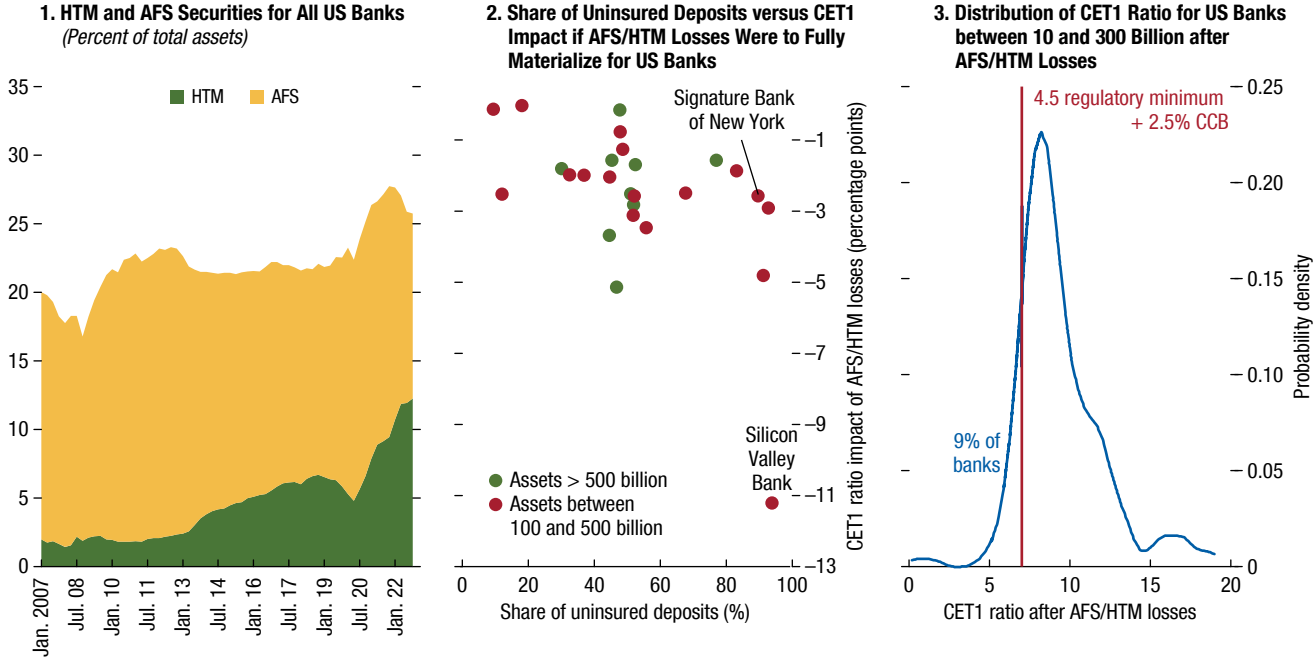
As interest rates started to rise sharply, the market values of the Treasuries and agency MBS held by banks declined substantially. For most banks, the unrealized losses sitting in their AFS and HTM portfolio would have material but manageable impact on their Common Equity Tier 1 (CET1) capital ratios 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.

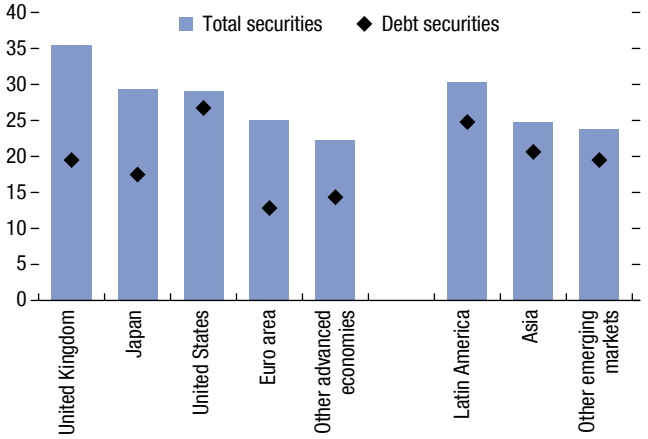
Banks in other advanced economies and emerging markets are also exposed to interest rate risk in an environment of tighter monetary policy, but they appear less vulnerable than US banks. While they also heavily invest in securities, most appear to hold less debt securities that are likely sensitive to 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

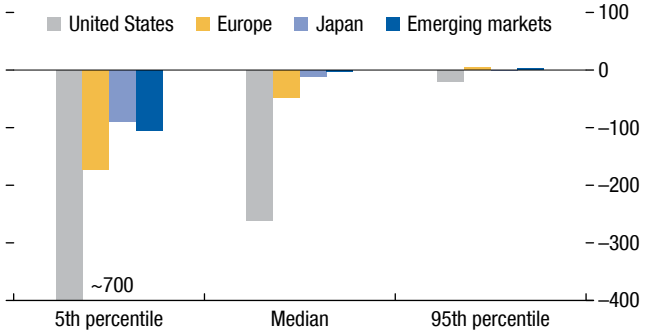
Securities holdings account for a large share of banks' assets, but US banks appear most exposed to interest rate risks.

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



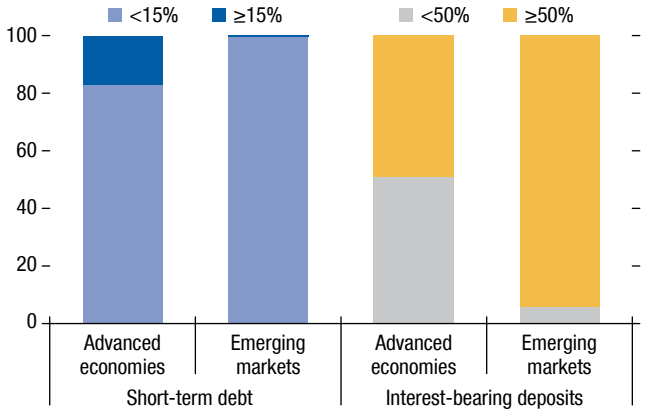
Valuation losses on securities holdings are sizable for some banks.

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



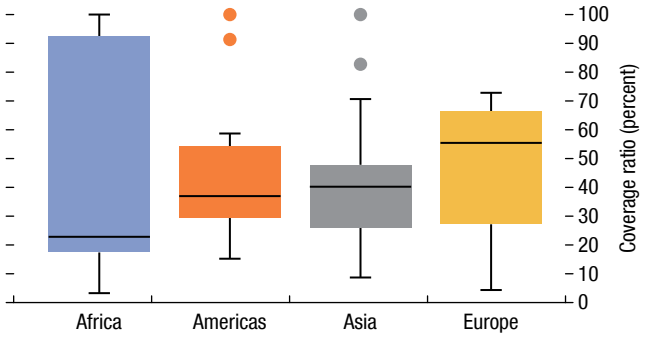
Emerging market banks are less reliant on short-term funding and nonstable deposits than advanced economy banks.

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.

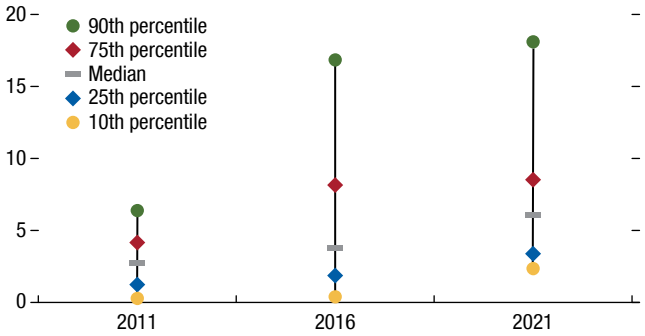
almost one-eighth in advanced economy banks. However, the share of banks that have at least half of their deposit base in interest-bearing deposits—including time deposits—is far higher in emerging markets than advanced economies (Figure 1.7, panel 3), possibly reflecting decades of high inflation and 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

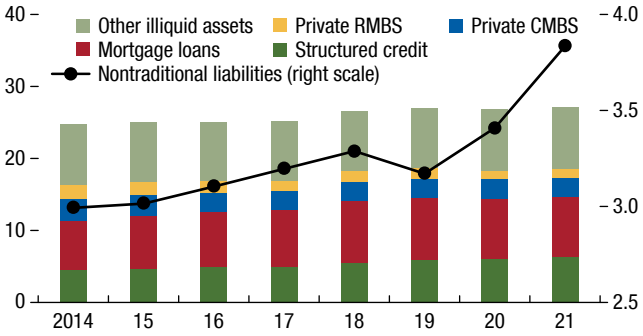
Reaching for yield, insurers have increased their exposure to illiquid credit investments over the past decade ...

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



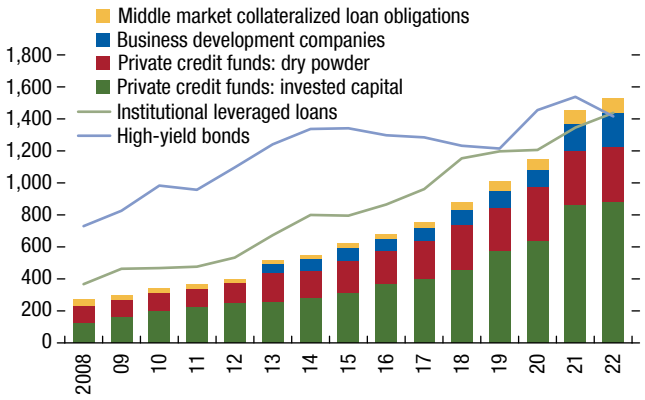
... of which a rising share is invested in structured and private credit while relying more on nontraditional liabilities.

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



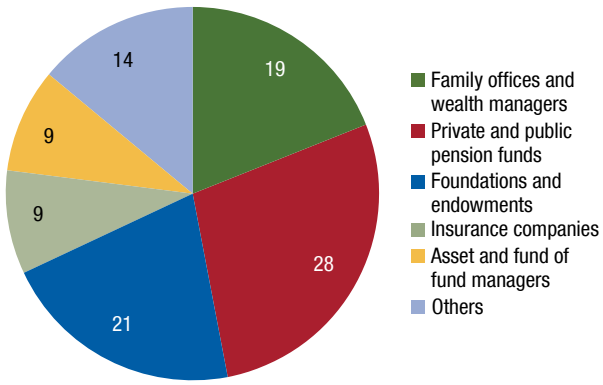
Private credit has grown significantly and has become a significant source of funding for risky firms ...

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).

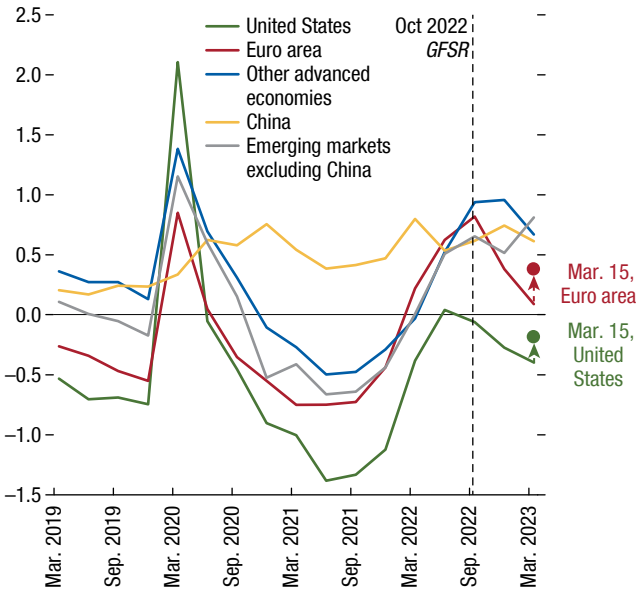
In addition to the fallout of the banking turmoil, a deteriorating corporate earnings outlook could challenge investor risk appetite. The strong performance of the S&P 500 from October last year to January of this one was largely supported by a narrowing of the equity risk premium, the compensation that 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

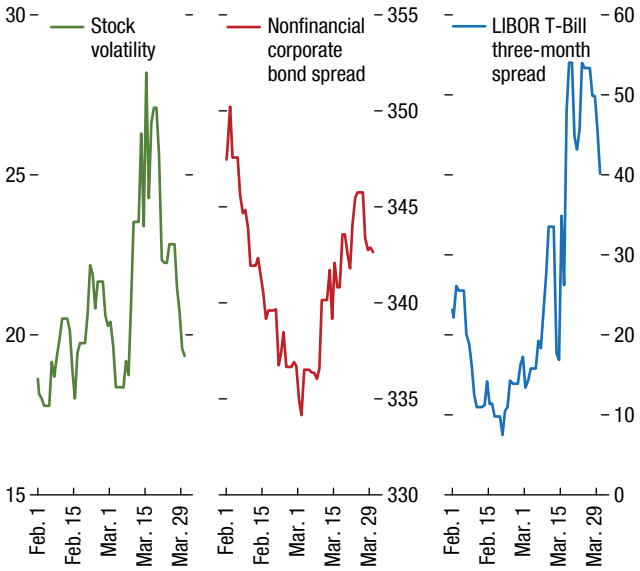
Financial conditions had broadly eased between October 2022 and early March, when the market turmoil began ...

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.

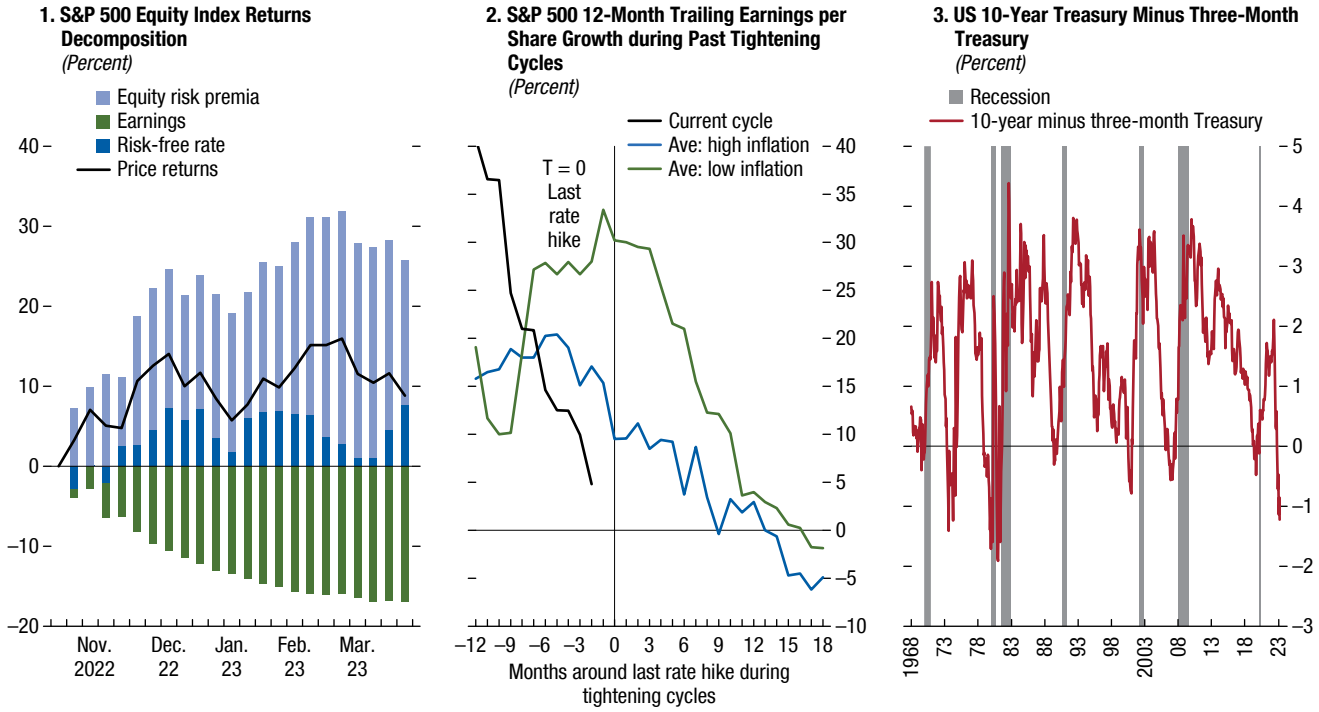
[12]The debt ceiling is the limit on the total amount of federal debt the government can hold. The debt ceiling is set at $31.4 trillion, which was reached on January 19, 2023.

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 8, 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 at or near crisis levels, even in performing names (Figure 1.13, panel 2).

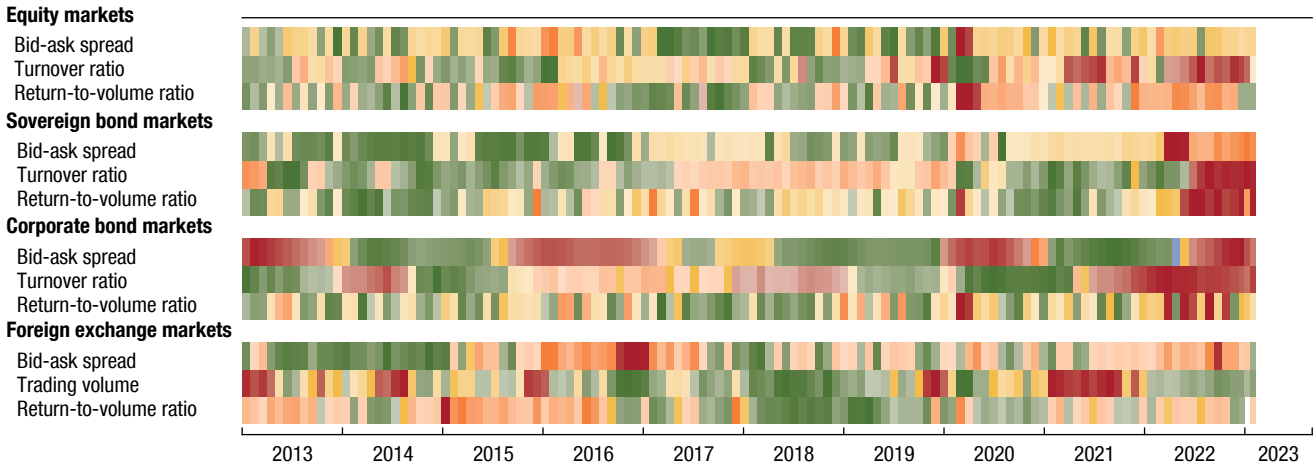
Issuance conditions for sovereign hard-currency debt have deteriorated since January, and many B-rated and lower issuers are facing serious challenges accessing the market. Eight emerging market

[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

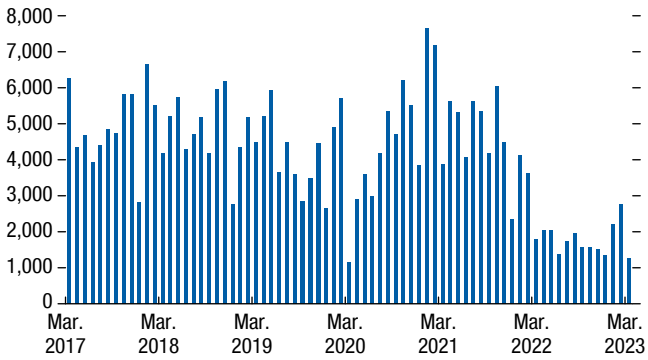
Market liquidity conditions have deteriorated in bond markets.

1. Global Liquidity Heatmap



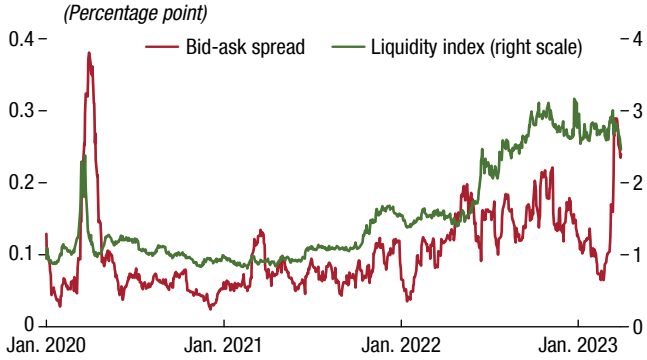
Treasury market depth became shallower ...

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).

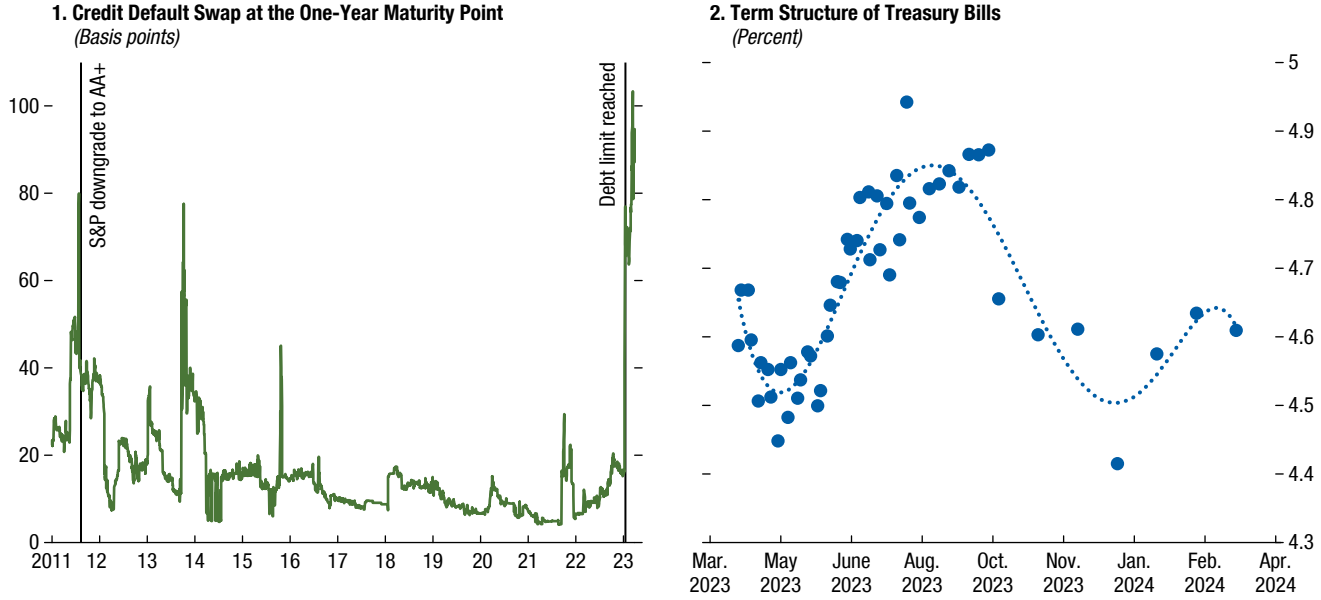
Financial Stability Risks Are Elevated

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

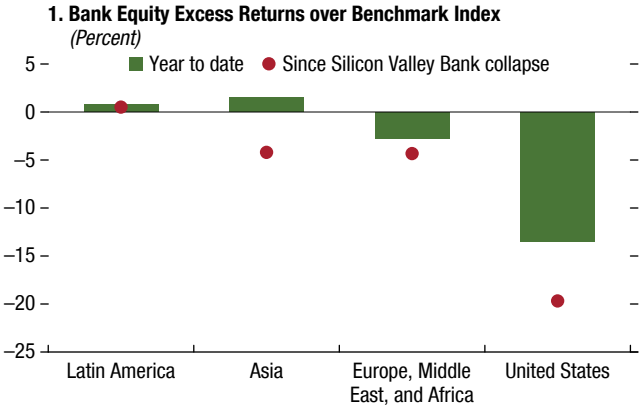
The market-implied path of monetary policy has gyrated wildly in advanced economies since the October 2022 *Global Financial Stability Report.* After moving sharply higher (with the exception of that for the United Kingdom) on expectations that monetary policy would be tighter for longer to tackle persistent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

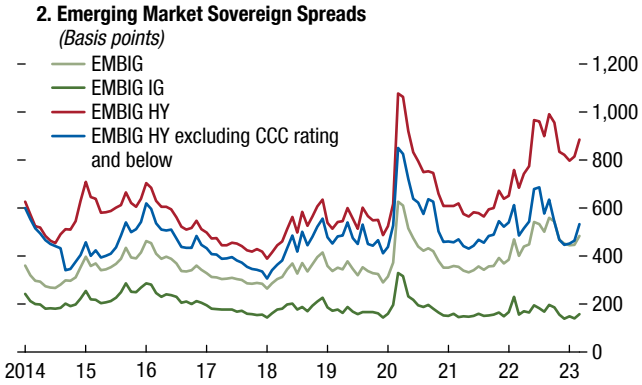
[15]Assumptions underlying this scenario pertain, broadly, to a widening in corporate and sovereign spreads by varying magnitudes across countries, and decline in equity prices globally. See Box 1.3 in the April 2023 *World Economic Outlook* for details of the scenario.

Figure 1.13. Emerging Market Economies' Financial Market Developments

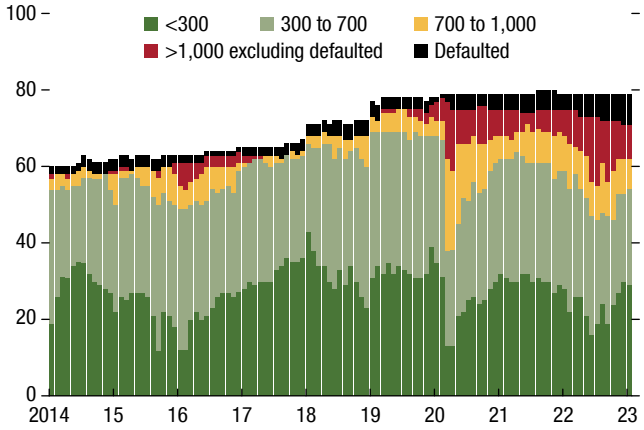
Emerging market banks have been relatively unaffected by recent events.



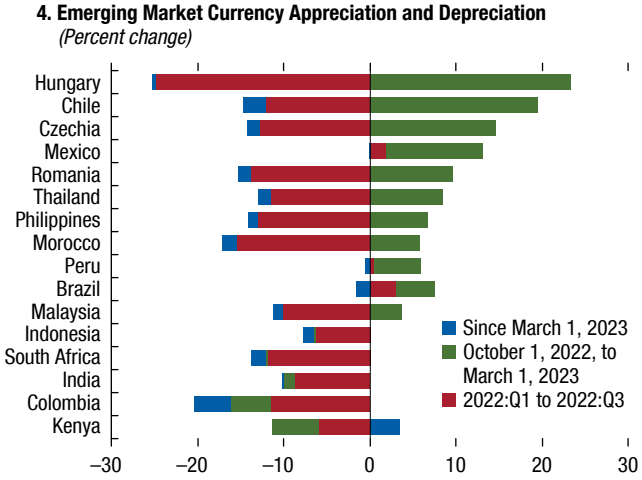
International funding costs have spiked again for risky issuers.



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 of strengthened on net since the October 2022 *Global Financial Stability Report.*



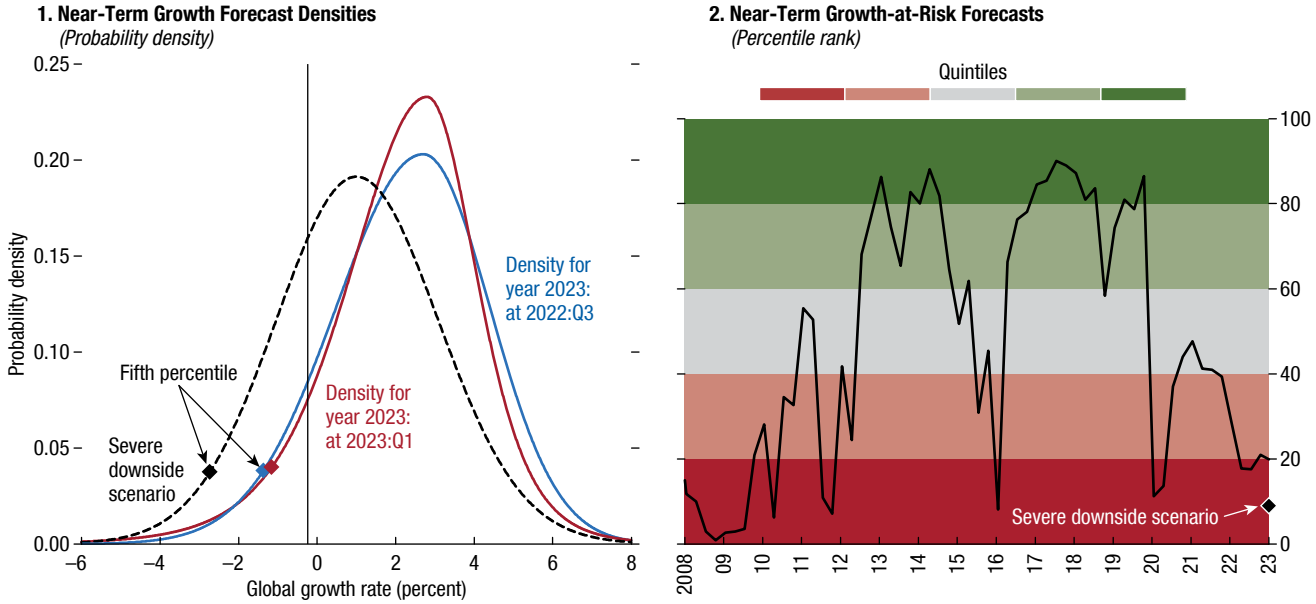
Sources: Bloomberg Finance L.P.; JPMorgan Chase & Co.; MSCI; and IMF staff calculations.
Note: Panel 1 is based on a sample 320 listed banks in 18 emerging market countries. Panel 2 uses weights from the previous month for any missing data point. In panel 3, ">1,000 excluding defaulted" refers to the 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

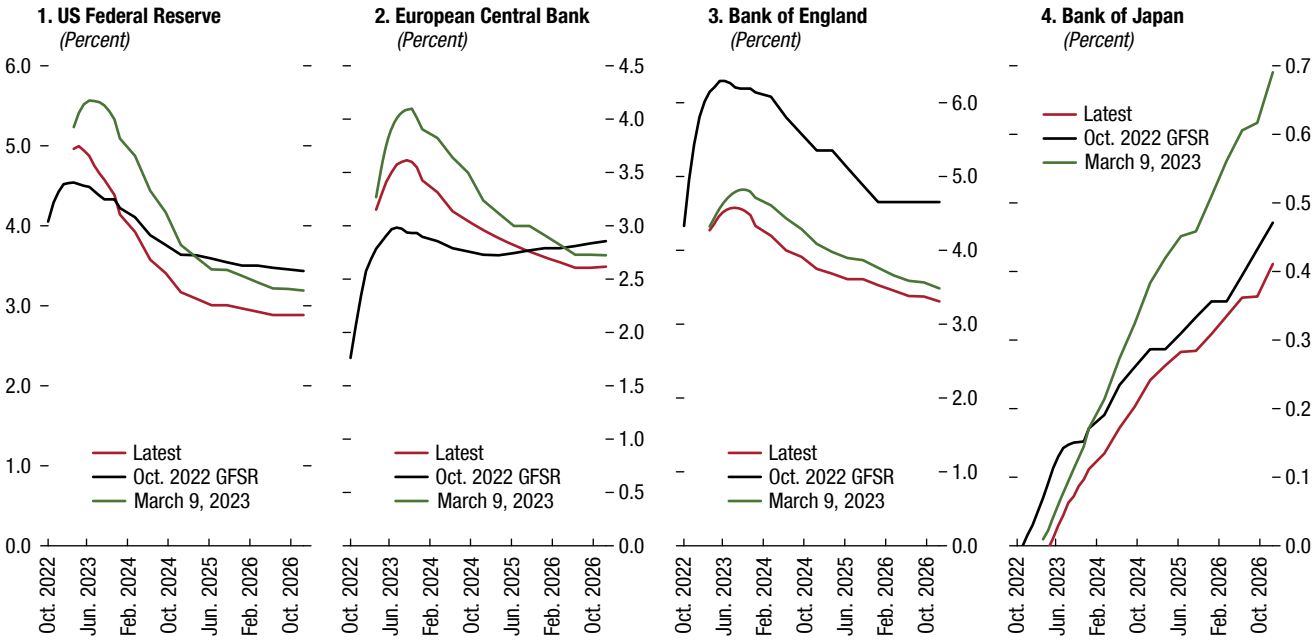
On balance, risks to growth are skewed moderately to the downside ... ... but remain somewhat elevated compared with historical norms.



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

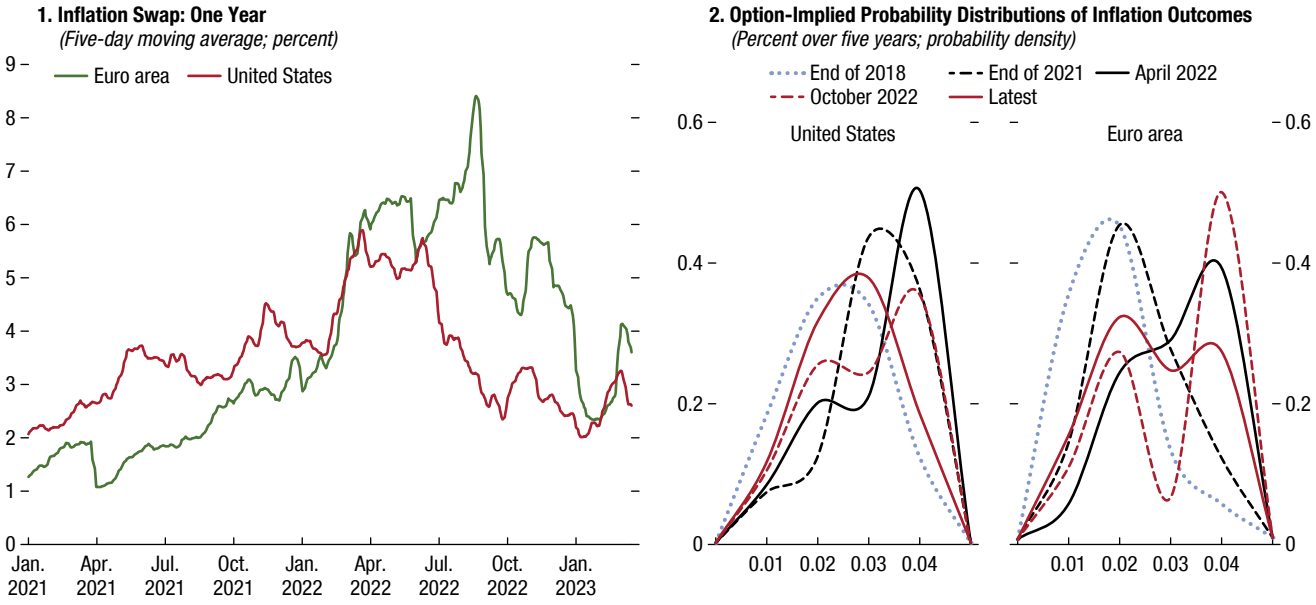
Market-implied paths for policy rates have shifted significantly lower over recent weeks, driven by investors' reassessment of the future course of policy amid turmoil in the banking sector.



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.

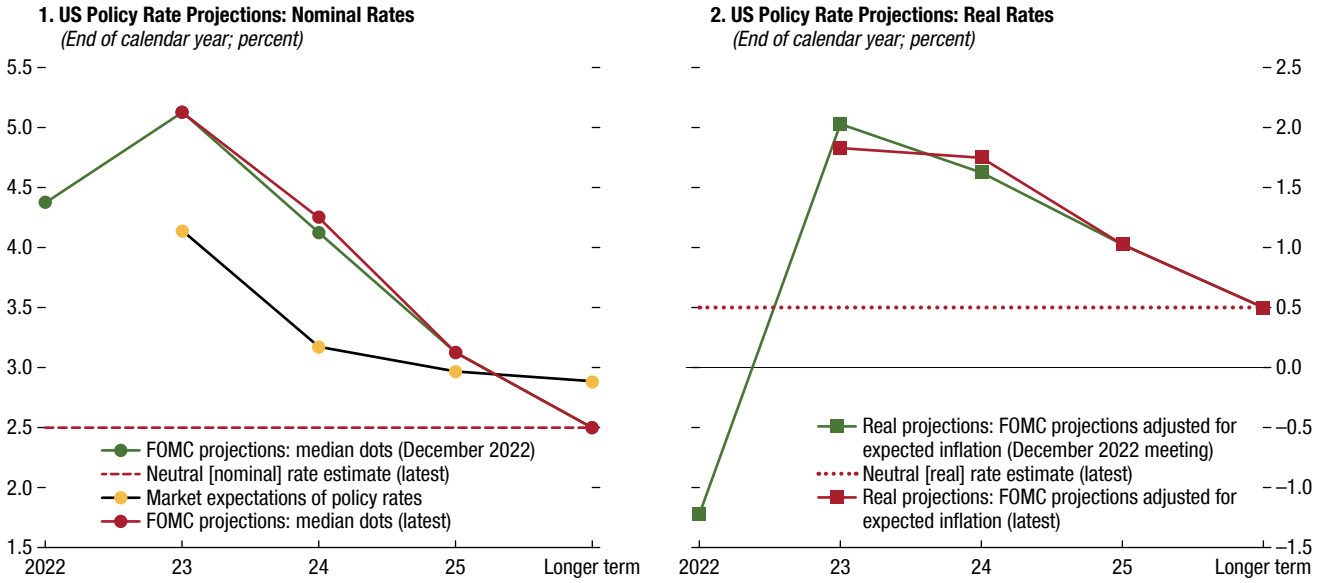
In the United States, the Federal Reserve has continued to raise the federal funds rate since the October 2022 *Global Financial Stability Report*, bringing the latest target range to 4.75 percent to 5 percent. In March, the median Federal Open Market Committee (FOMC) participant anticipated the policy 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

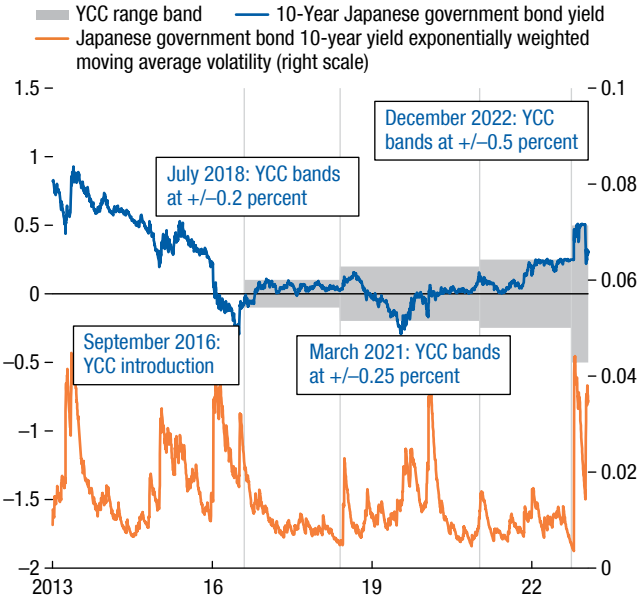
After having significantly increased their securities holdings during the pandemic, the US Federal Reserve, Bank of England, and European Central Bank have started to reduce their balance sheets. This normalization process could pose challenges for sovereign debt markets at a time when liquidity is generally 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

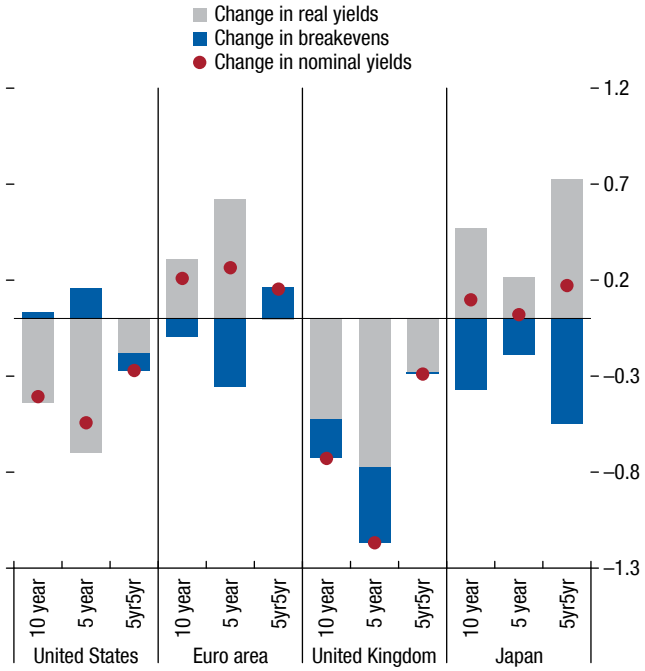
The unexpected adjustment in the YCC led to higher volatility in the Japanese government bond market.

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.

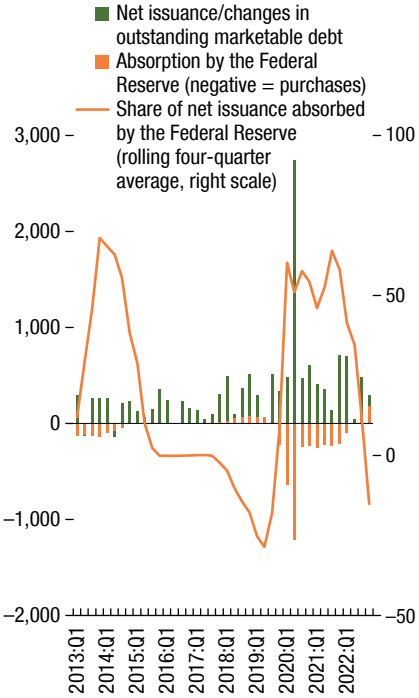
[18]See the October 2022 *Global Financial Stability Report* for more details.

[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

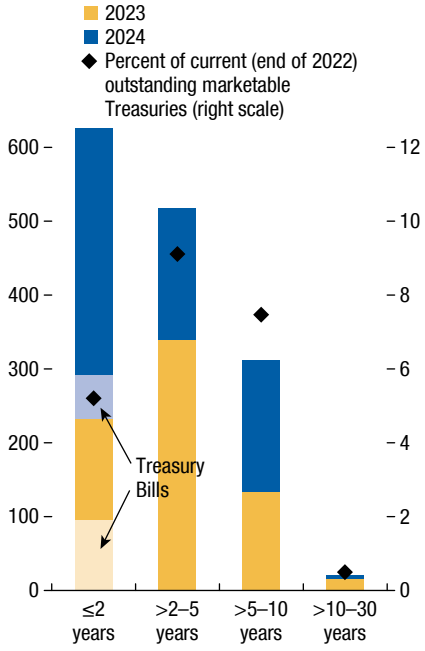
With quantitative tightening, the Federal Reserve stops absorbing a large share of Treasury net issuance ...

1. Net Issuance of Treasury Debt and Absorption by the Federal Reserve
(Billions of US dollars, left scale; percent, right scale)



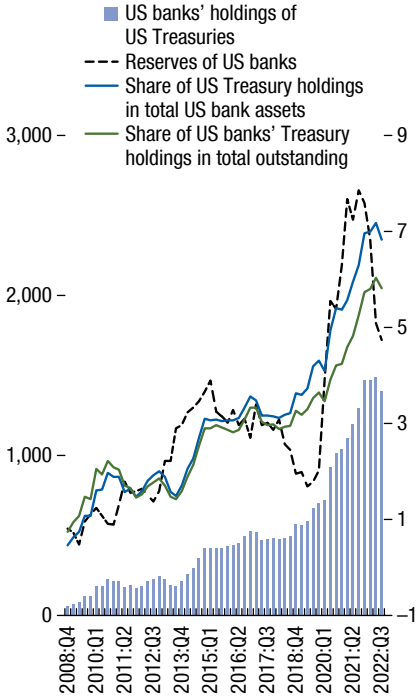
... particularly in short- and medium-term securities.

2. Original Maturities of US Treasury Securities Projected to Be Run Off by the Federal Reserve
(Billions of US dollars, left scale; percent, right scale)



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

3. US-Chartered Banks' Holdings of US Treasury Securities
(Billions of US dollars, left scale; percent, right scale)



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

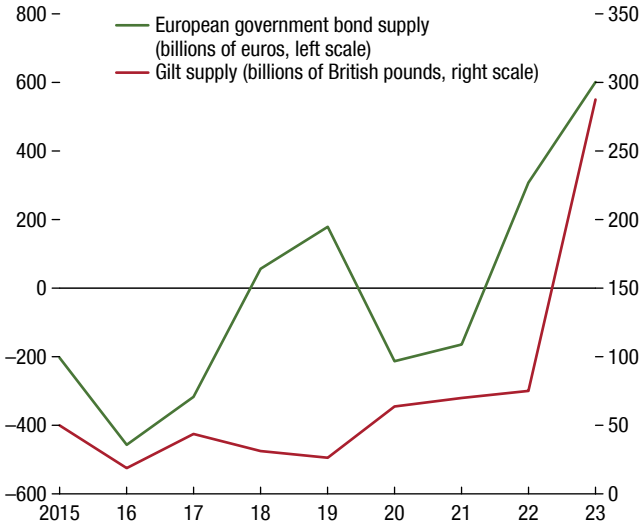
Since the pandemic, G10 central banks have injected massive amounts of liquidity into the financial system, leading to a surge in banks' reserves, a liability item on central bank balance sheets (Figure 1.22, panel 1). As these moves are unwound by quantitative tightening, reserves are drained from the 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

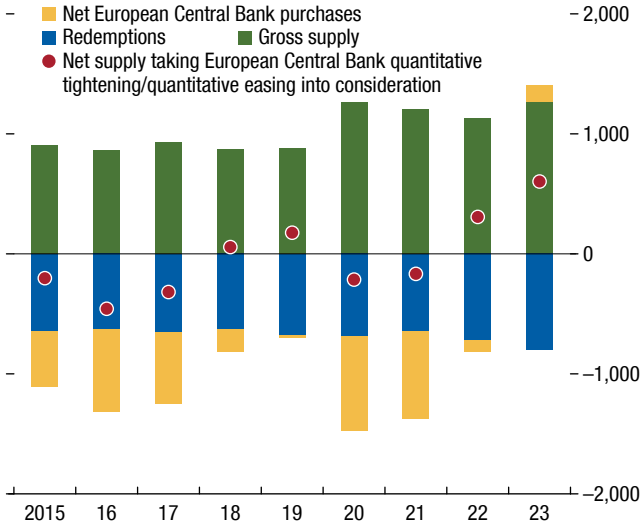
Gilt and European government bonds net supply to the private sector is set to increase significantly this year.

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.

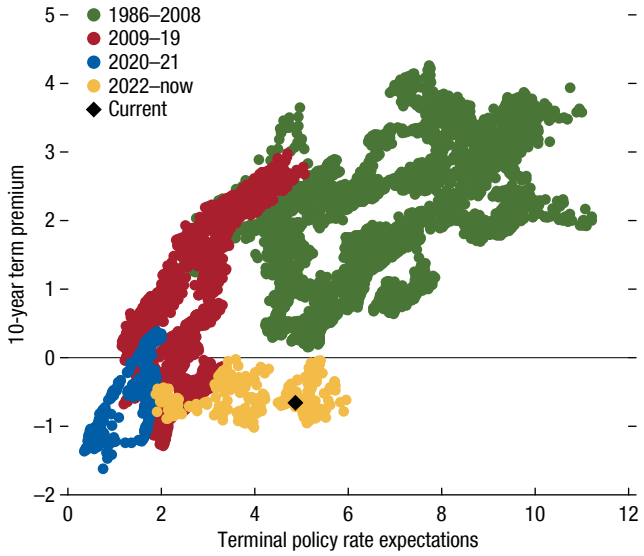
Reserve dynamics have changed substantially with the recent turmoil, reversing in part the impact of quantitative tightening so far. In the United States, bank reserves had declined significantly in the months before quantitative tightening (about $725 billion), and by about $330 billion from the beginning 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

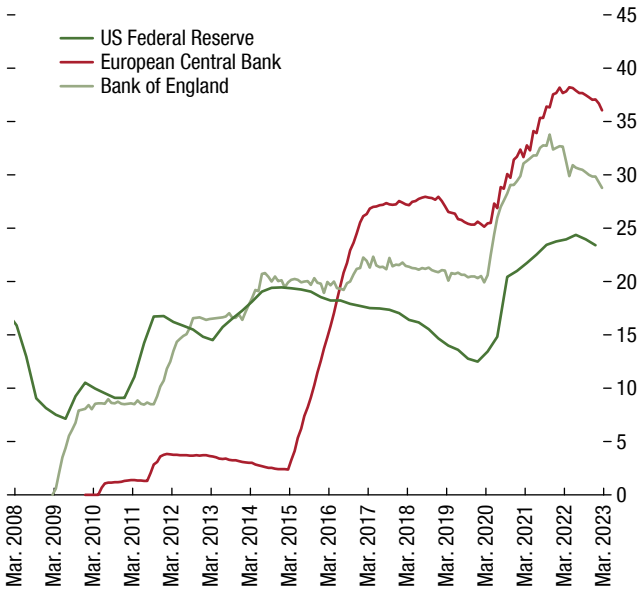
Notwithstanding advanced stage of tightening, term premiums at present remain compressed ...

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.

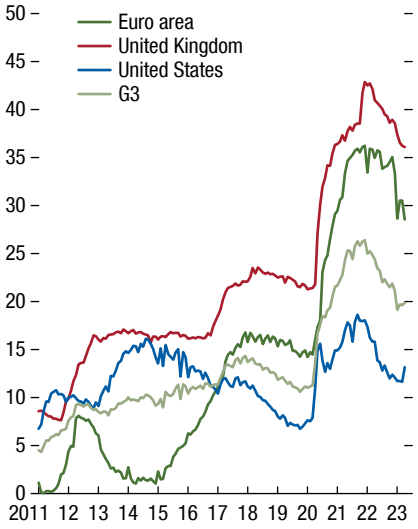
On net since October, higher-quality emerging market bonds have rallied to levels at which new issuance in international markets is reasonably easy, whereas frontier and other lower-rated issuers will likely face continued difficulties. Low-income countries, which have been adversely affected by high 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

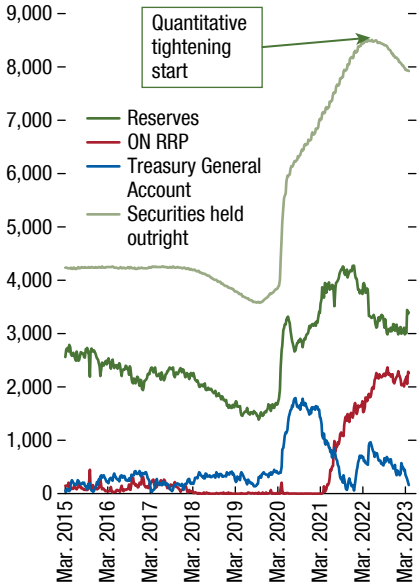
Central banks' balance sheets have swollen during the pandemic, leading to a massive increase of bank reserves.

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



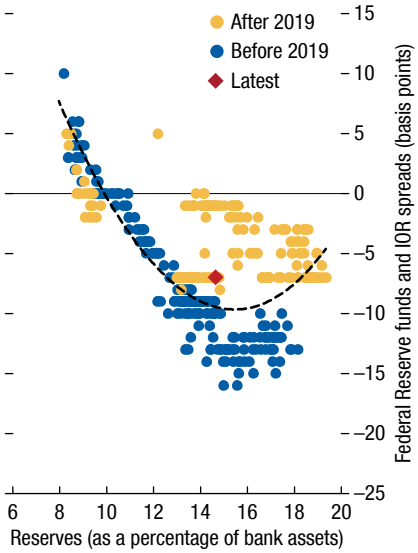
In the United States, the effect of quantitative easing on reserves so far has been small, despite reverse repurchases remaining high.

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.

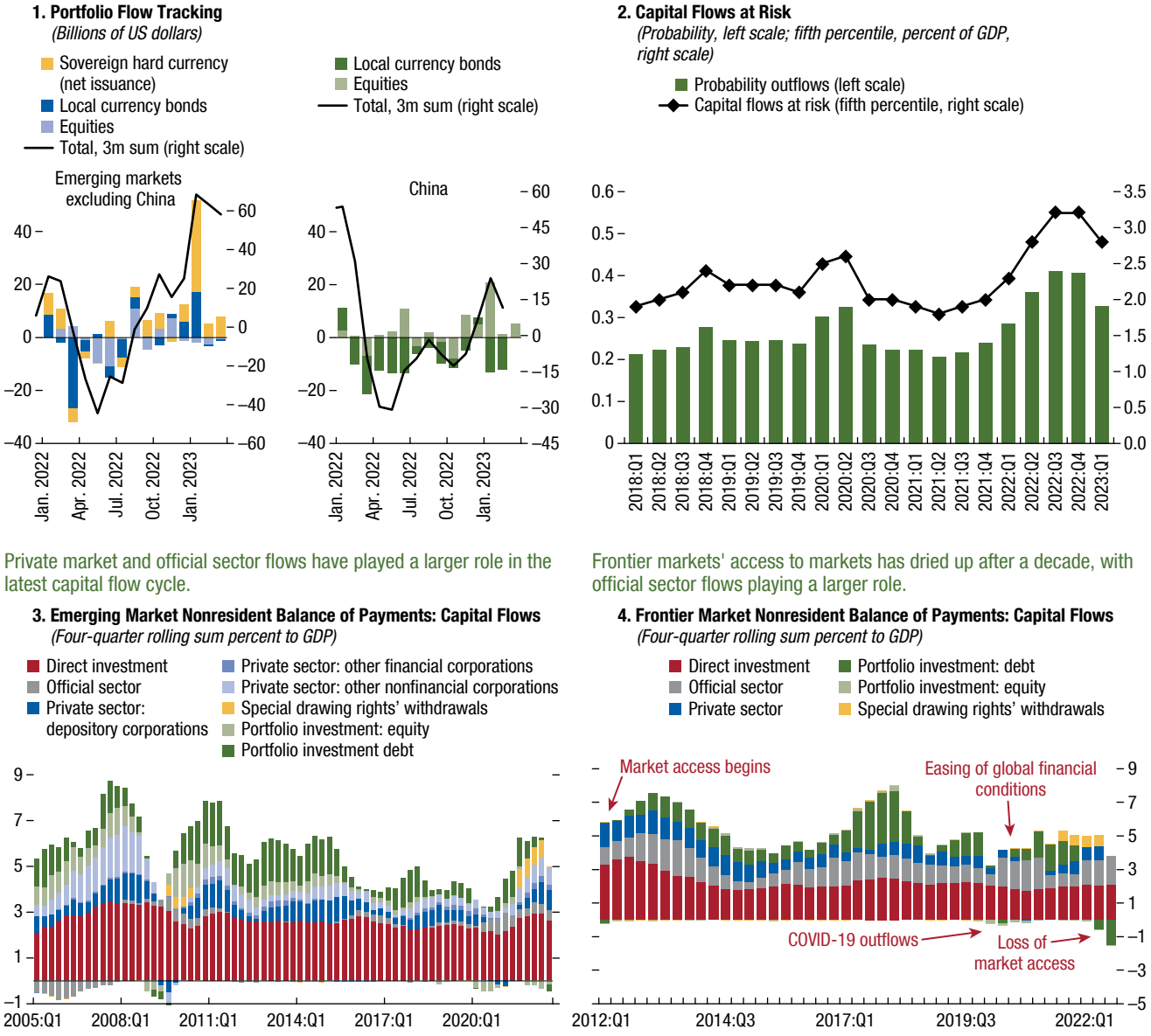
[23]Findings refer to a sample of 18 emerging and frontier markets excluding China and Russia.

[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 rebounded in late 2022 but have become tepid since February 2023.

Capital flows at risk have improved.



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.

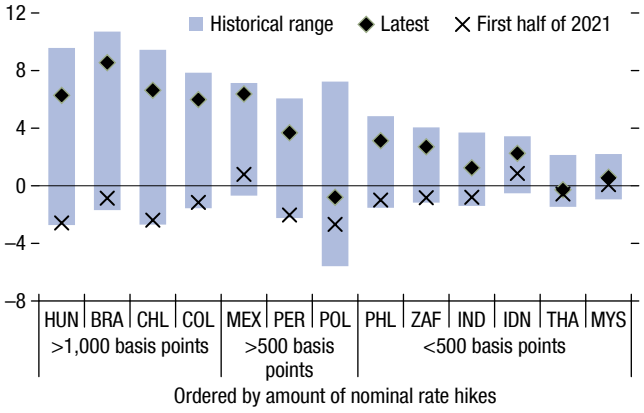
with sovereign defaults and macro-vulnerabilities (Figure 1.23, panel 4).

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

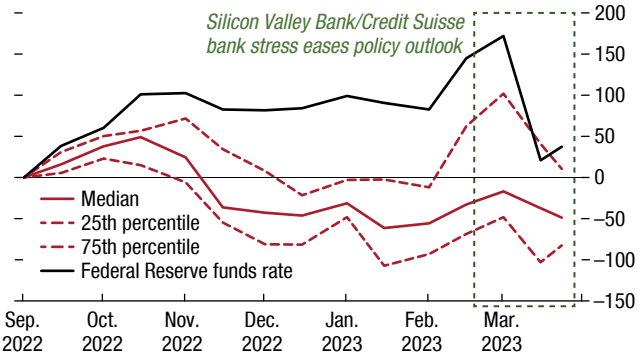
Real policy rates have tightened substantially.

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



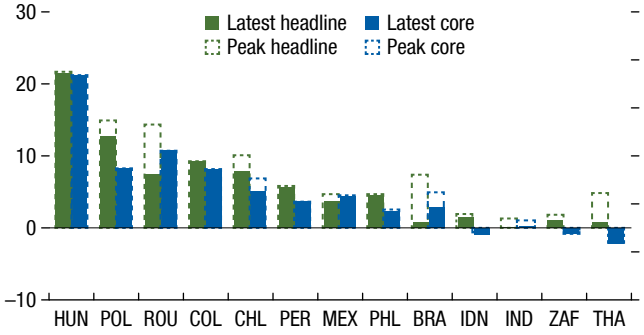
Recent stress in advanced economies and easing policy expectations has spilled over into emerging markets.

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)



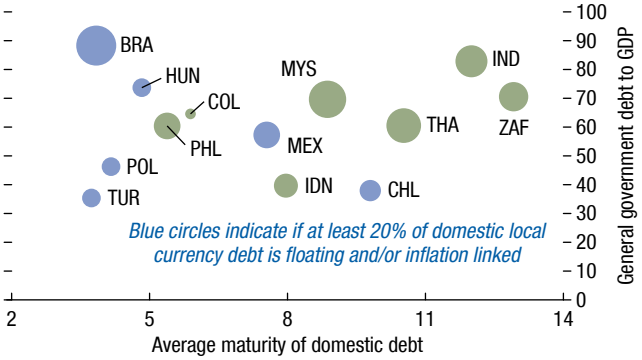
Recent stress in advanced economies and easing policy expectations has spilled over into emerging markets.

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. 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 at crisis levels, even for performing countries, 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.

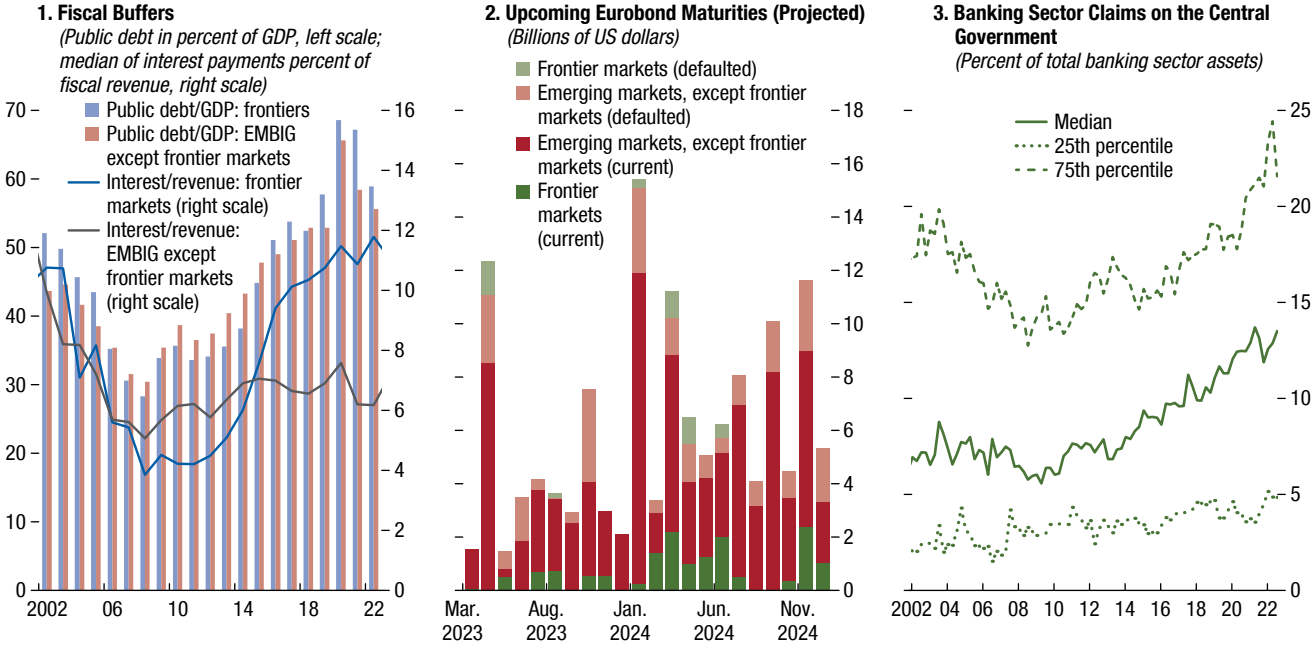
[29]Sixty-nine low-income countries are eligible under the G20 Common Framework, for which an IMF-supported program is a precondition.

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

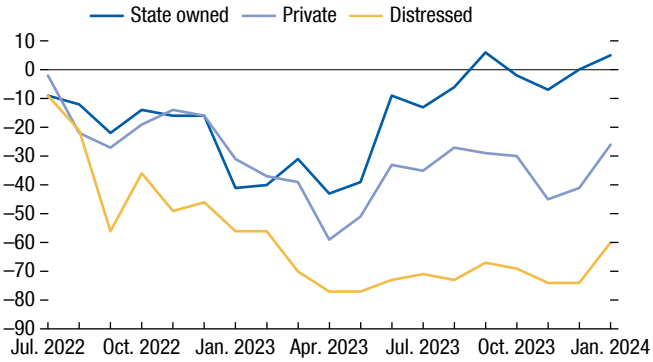
The reopening of the Chinese economy—with the steady recovery in mobility—and the announcement of enhanced policy support for the country's real estate sector[31] have boosted investor sentiment. Financial markets staged a sharp rally beginning in October 2022, with domestic market equities up 17 percent 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

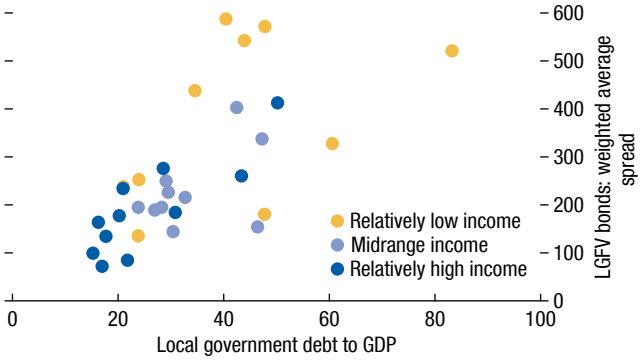
Housing market activities remain weak, and nascent recovery is uneven, favoring top-tier cities and state-owned developers.

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



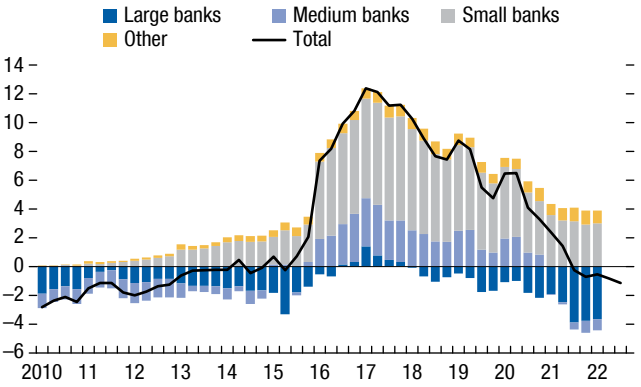
Strained local government fiscal capacity raises concerns for the sustainability of debt issued by LGFVs ...

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



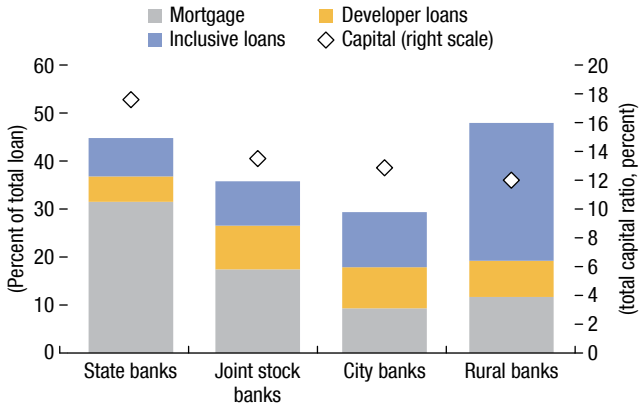
... and indirect exposures to nonbank financial sectors that remain key funding sources for the real estate markets.

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.

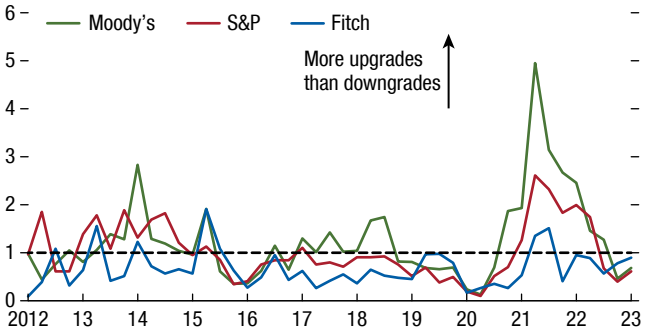
[33]The estimate is based on the following assumptions. Wealth management products allocate 53 percent of assets to bonds and 7 percent to nonstandard credit assets. Within bonds, 1.5 percent is assumed to be developer bonds and 11.2 percent to be LGFV bonds, proxied by the share of developer and LGFV 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

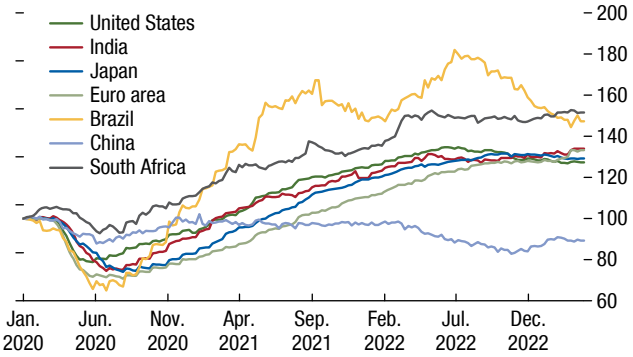
Rating agencies have downgraded US corporates more than upgraded them.

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



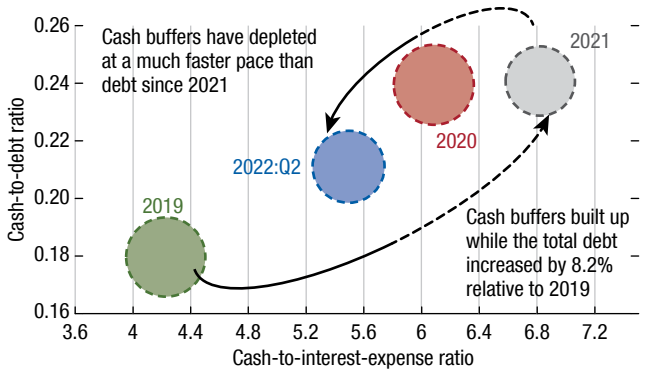
Corporate profitability prospects have likely peaked out and are expected to slow down.

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



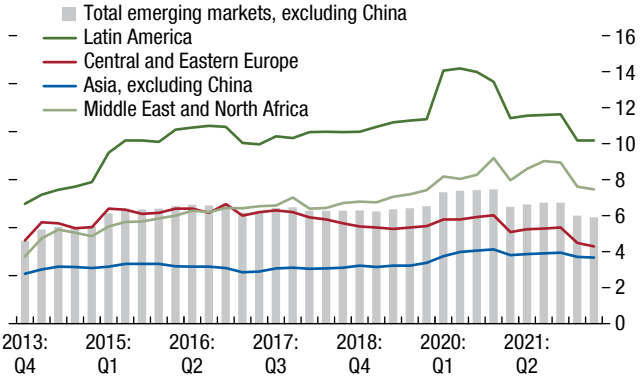
Liquidity buffers have been eroded relatively quickly, implying a more challenging environment for corporate borrowers to come.

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.

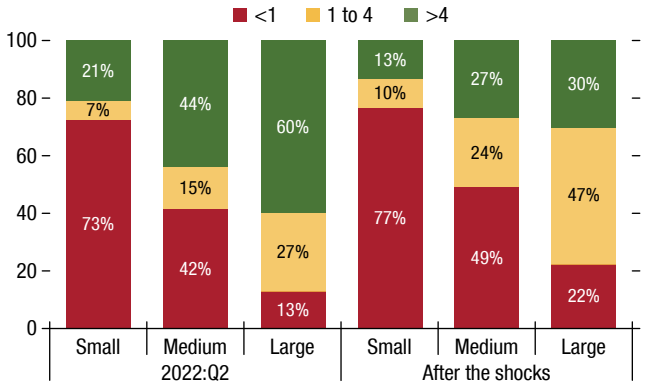
[38]In the third quarter of 2022, the annual growth in real house prices remained flat globally, although regional differences persisted. Following widespread price declines, the aggregate real house price growth for advanced economies was significantly slower than during the previous two quarters (0.9 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

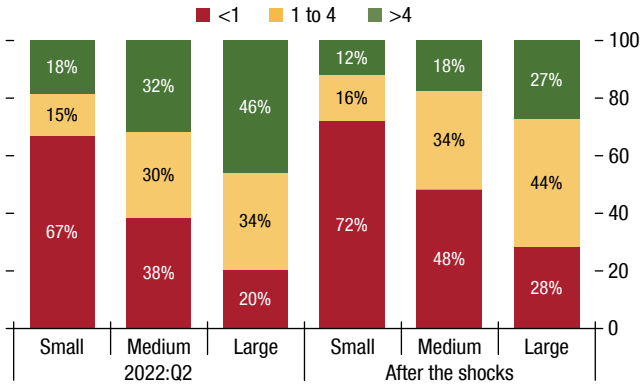
Lower earnings and higher funding costs would further worsen leverage metrics, including those for large firms ...

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



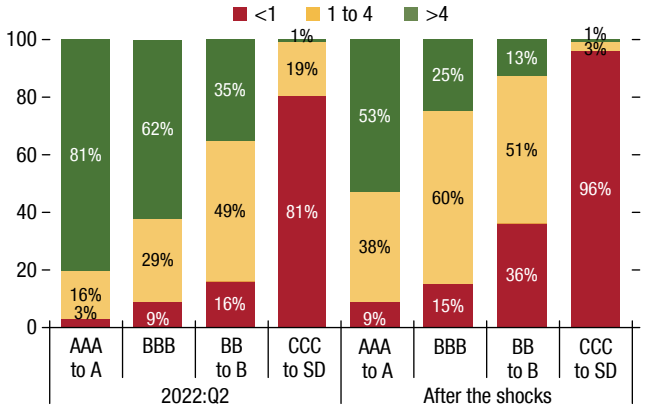
... with the ratings for the majority of firms facing a risk of rating downgrade (interest coverage ratios below 4).

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)



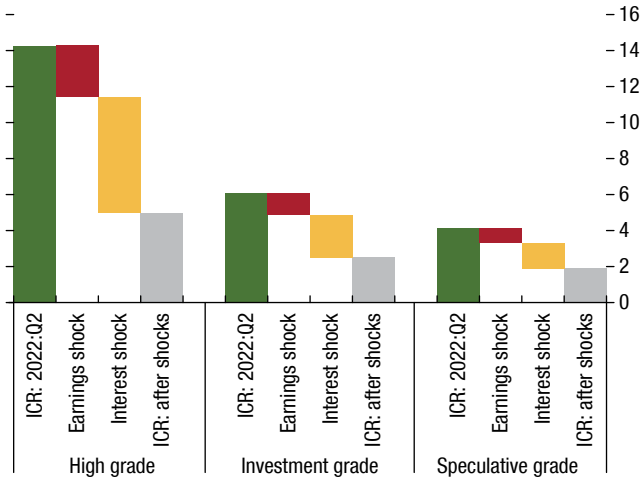
In advanced economies, more than 70 percent of triple BBB-rated investment-grade corporations could face a rating downgrade to speculative grade.

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.

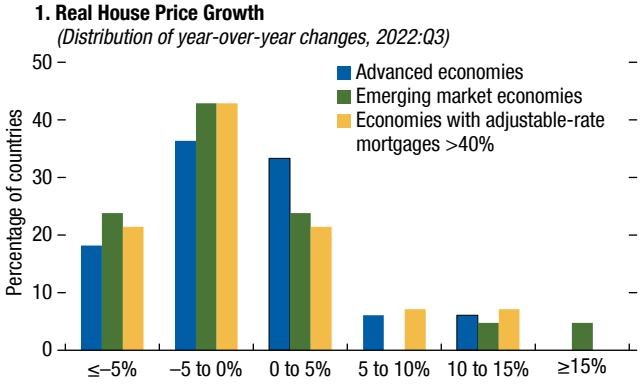
4. Earning and Interest Expense Shocks on Interest Coverage Ratio of Firms in Advanced Economies by Rating Group
(Ratio, average across countries)



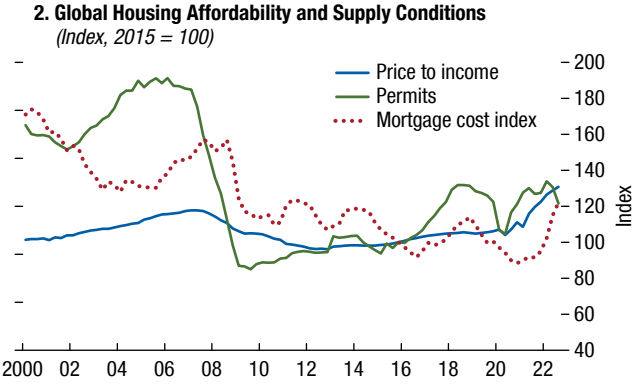
Sources: S&P Capital IQ; and IMF staff calculations.
Note: A partial sensitivity analysis was run to estimate the increase in debt at risk in response to a combined shock to earnings and interest expense. The shock scenario assumes that earnings before interest and taxes decline by 20 percent, and the 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

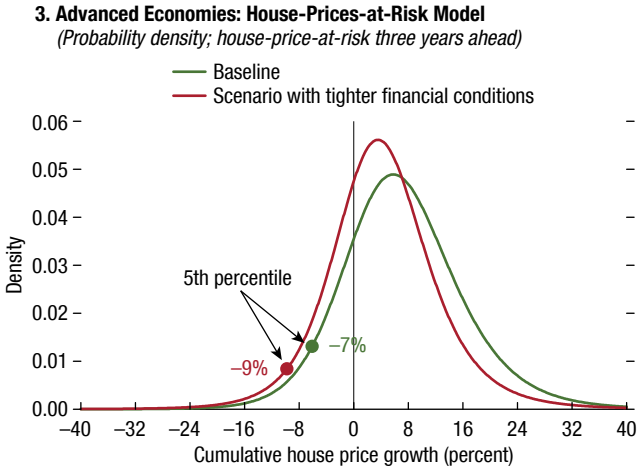
Housing markets are feeling the effect of the higher interest rate environment ...



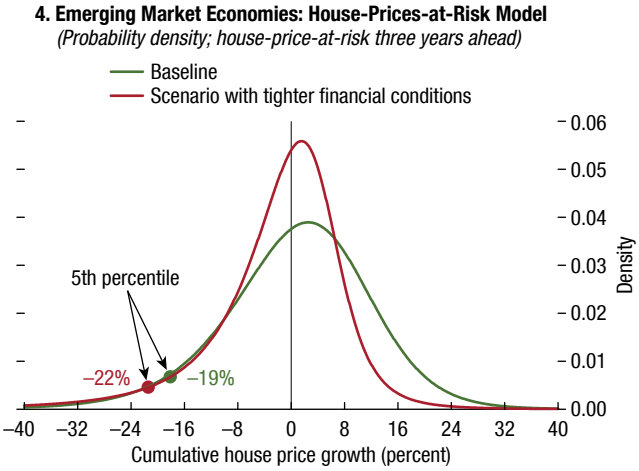
... but housing supply constraints and affordability pressures persist.



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.

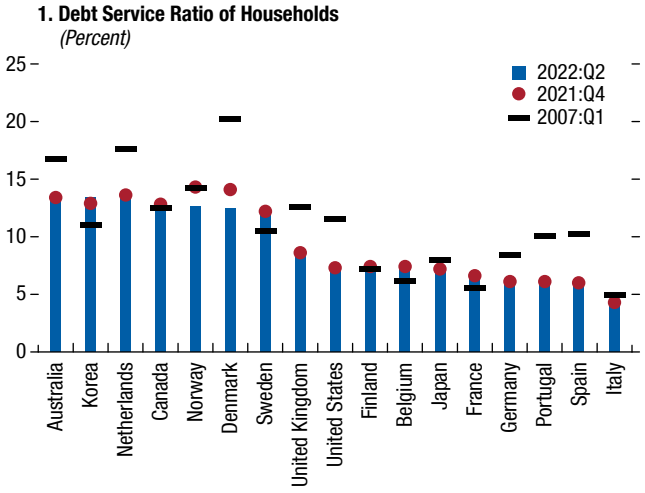
[44]Volumes have decreased across all regions, with a 26 percent decrease in North, Central, and South America and declines of 30 percent and 18 percent in Europe and the Asia and Pacific region, respectively.

[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.

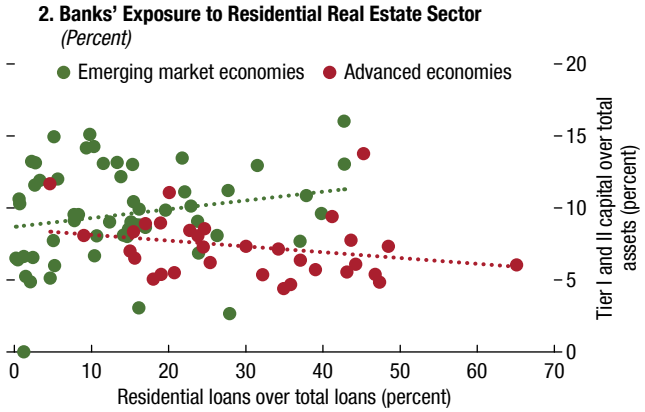
[46]The US national office vacancy rate reached a nearly 30-year high of 17.1 percent in the third quarter of 2022. The use of subleases is rising as occupiers attempt to shed underused office space. The combination of challenging occupancies for commodity space and the deterioration of liquidity that 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

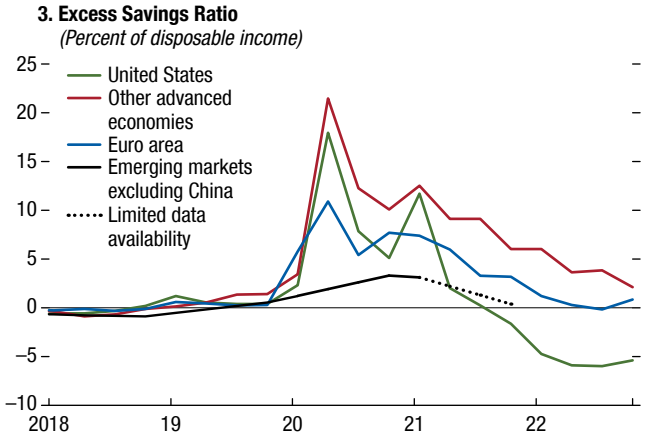
Debt service ratio of households has decreased since the global financial crisis because of lower mortgage costs ...



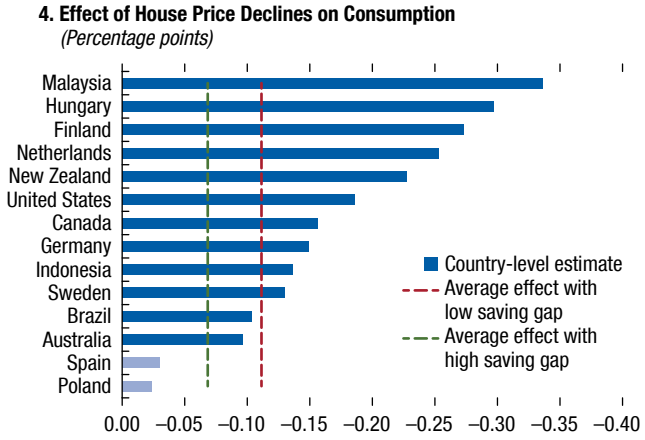
... but banks remain exposed to the real estate sector, particularly in advanced economies ...



... 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.

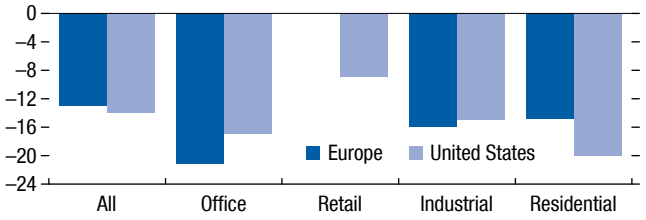
Note: In panel 2, data refers to the average for 2022. In panel 3, excess savings ratios are calculated as current savings in percent of disposable income in deviation from a linear trend based on the prepandemic average for 2015–19. In panel 4, the bars represent the estimated effect for selected economies 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

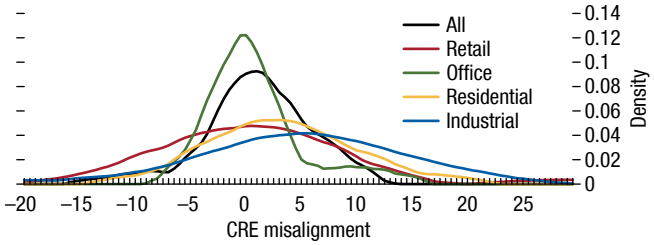
The correction in real estate investment fund trusts' pricing has been sizable across sectors.

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



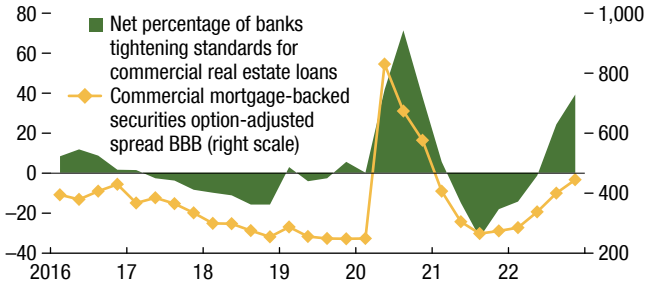
Trends in commercial real estate capitalization rates suggest significant overvaluation in some segments of the market.

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



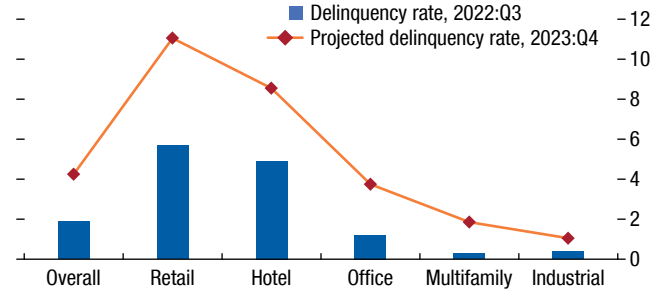
Lending standards for real estate collateralized loans have tightened significantly, increasing the cost of capital.

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



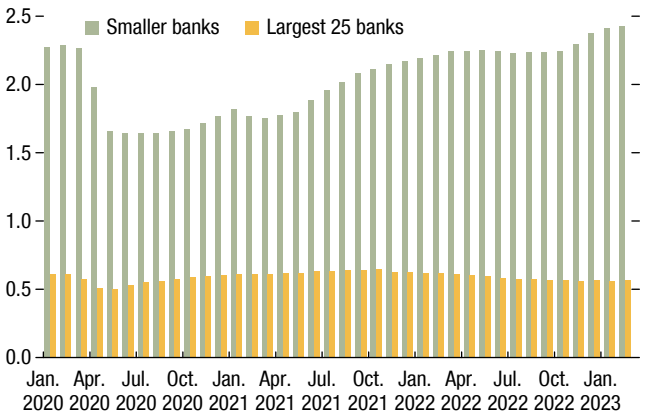
Shifting capital markets amid higher interest rates could create refinancing challenges and lead to borrowers' insolvencies in a downside scenario.

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



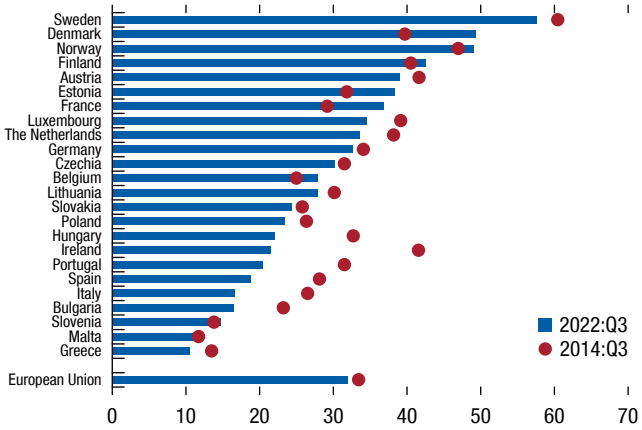
Small banks have grew their CRE portfolio more aggressively than large banks since the pandemic

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.

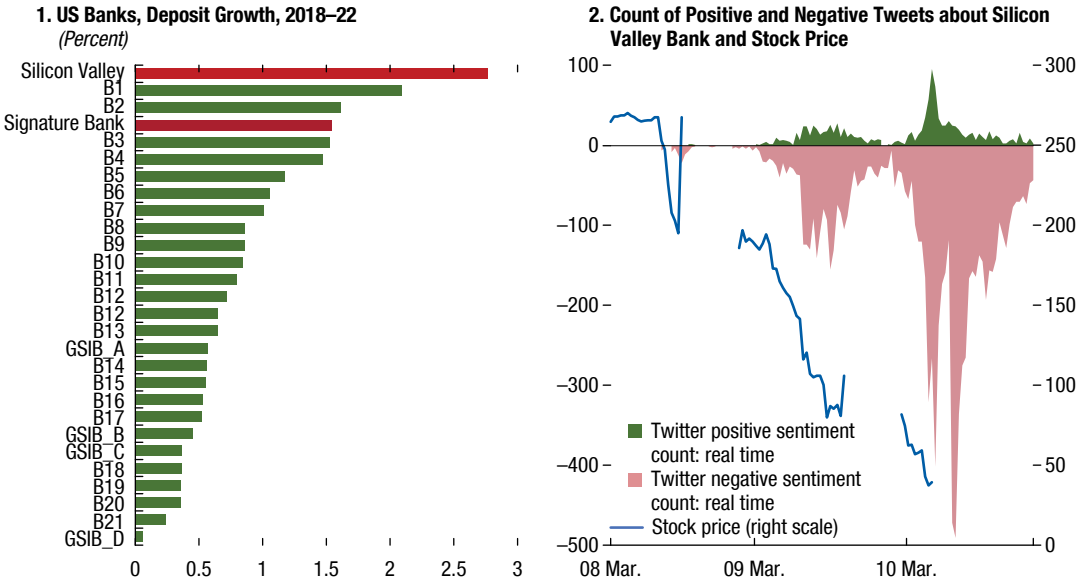
The deposit run on SVB reportedly led to intense investor focus on other banks with similar funding profiles also serving the same sectors as SVB. Stock in Signature Bank of New York (SBNY), a $110 billion bank that served technology and crypto clients—30 percent of its deposits were from the crypto 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.

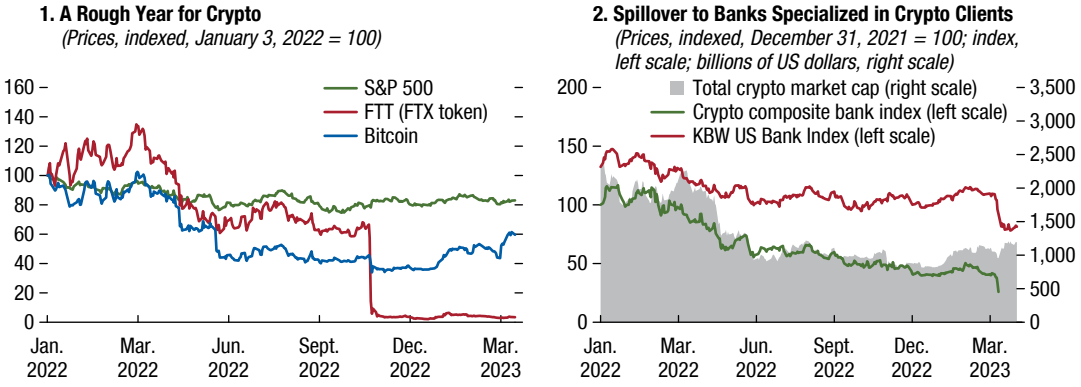
The bankruptcy marked the end of a series of events that exposed grave liquidity and solvency problems at FTX. Reports that Alameda Research, a hedge fund affiliated with FTX, had significant holdings of FTT, the unbacked crypto token issued by FTX, ignited market pressures on November 2, 2022. Subsequently, 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

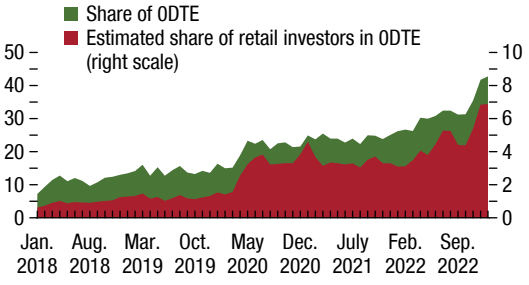
[1]0DTE options were originally available only on the last trading day of the week. In April and May 2022, the Chicago Board Options Exchange added new expiration dates, allowing 0DTE options to be traded throughout the week. This has sparked the growth in trading volumes.

Figure 1.3.1. Zero-Day to Expiry Options

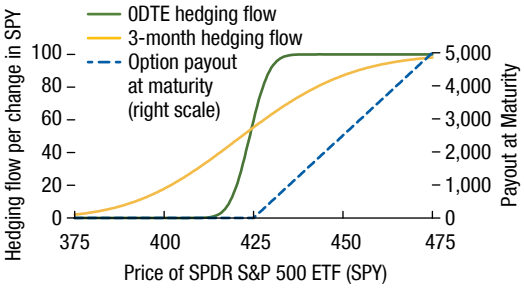
In derivatives markets, 0DTE have gained a growing market share.

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.

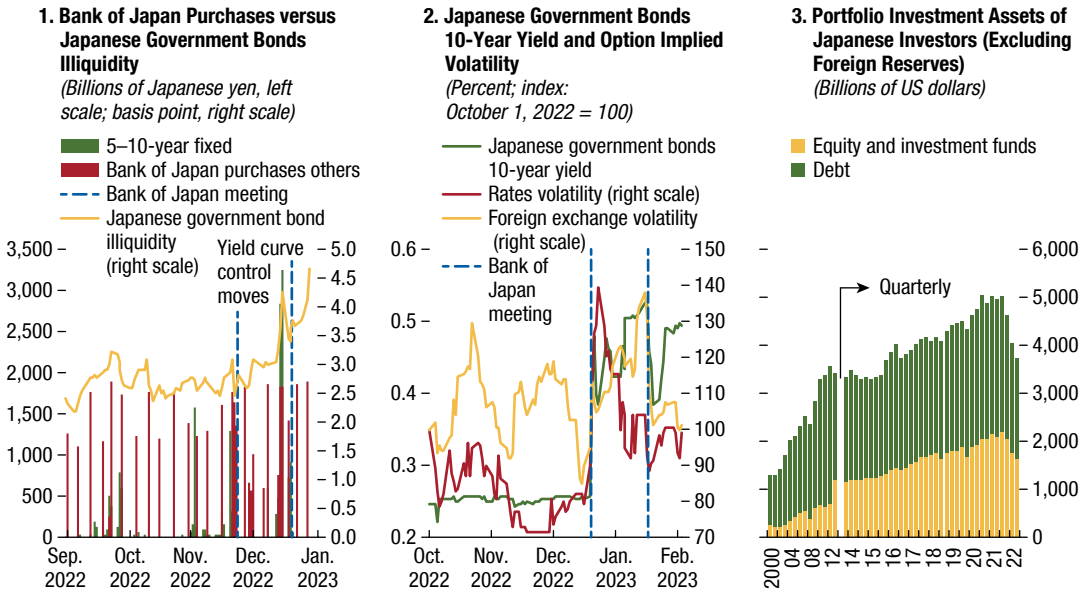
Ten-year Japanese government bond yields have recently declined in sympathy with global yields as strains have emerged in US and European banking sectors. Prior to that, the monetary policy tightening in other advanced economies and rising domestic inflation had put upward pressure on Japanese bond yields, 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)*

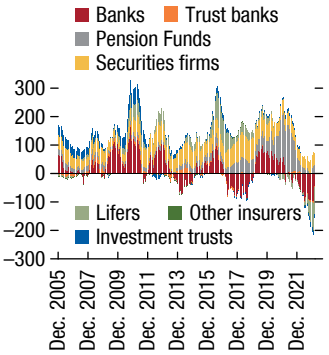
Figure 1.4.2. Japanese Investor Holdings Abroad

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

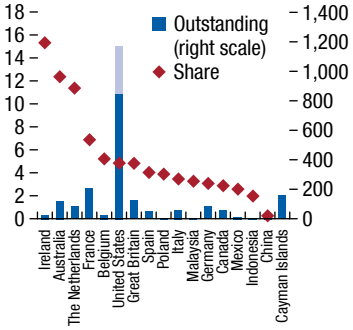
Japanese investors are heavily positioned, particularly in the euro area, the United States, and Australia.

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

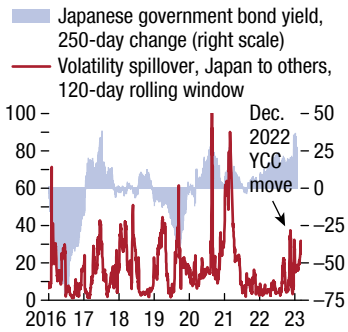
1. Japanese Investors' Cumulative Flows into Foreign Bonds
(Billions of US dollars, trailing 12-month sums)



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.

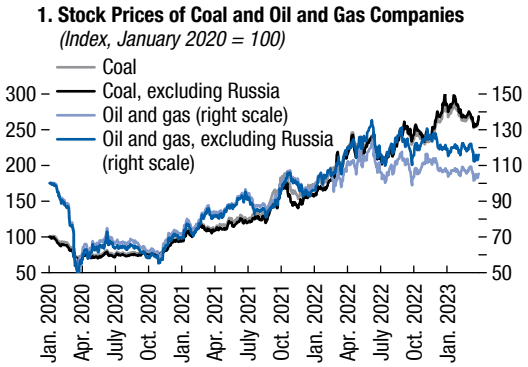
Despite positive policy developments,[2] current investments in the low-carbon transition remain insufficient to meet Paris Agreement temperature targets, thus increasing climate-related financial stability risks.

[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).

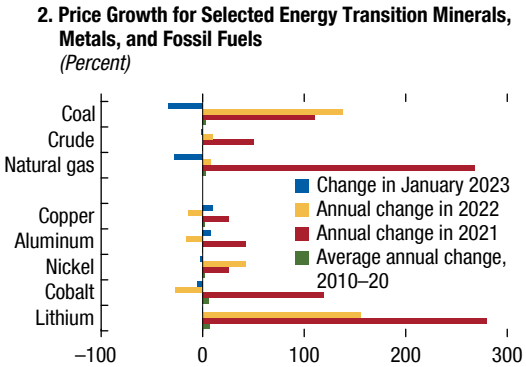
[2]The upsurge took place amid higher fossil fuel prices—and subsequent windfall profits for electricity producers—as well as policy measures to ensure market resilience and diversification and enhance supply security. Policies included the 2022 REPowerEU and the 2023 Green Deal Industrial Plan in the 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.

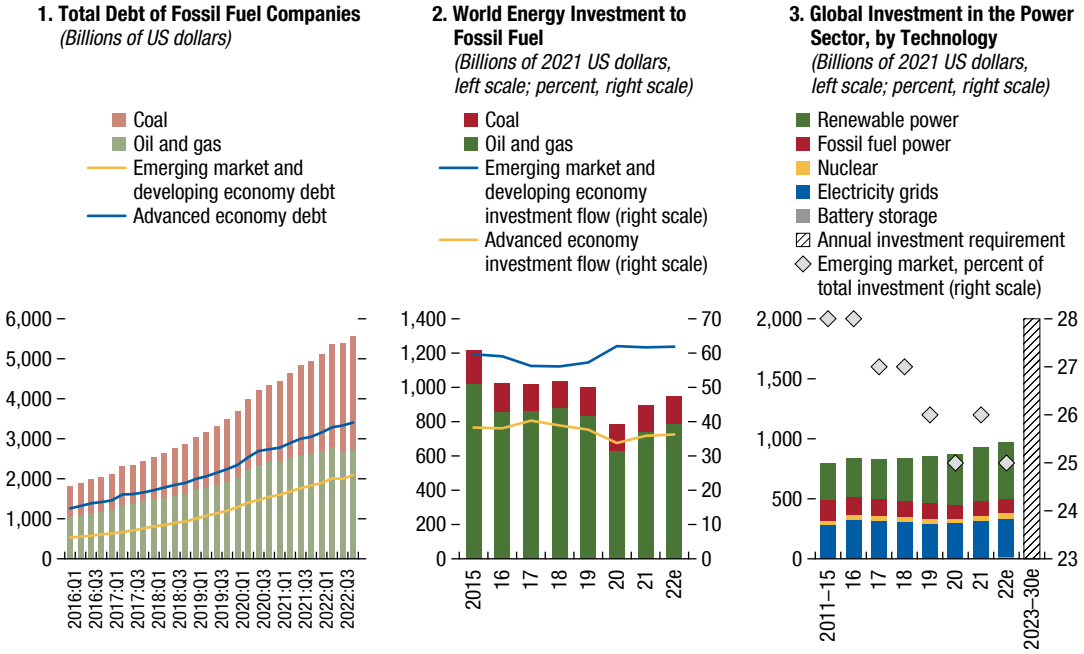
[3]New oil and gas fields, coal mines, and coal-fired power production. This is contrary to the IEA's net-zero scenario (2022) allowing investment during the energy transition only in existing fossil fuel infrastructure.

[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.

CHAPTER 2

NONBANK FINANCIAL INTERMEDIARIES: VULNERABILITIES AMID TIGHTER FINANCIAL CONDITIONS

Chapter 2 at a Glance

Nonbank financial intermediaries (NBFIs) play a key role in the global financial system, enhancing access to credit and supporting economic growth. Also, NBFIs' financial vulnerabilities might have increased in recent years, amid low interest rates. Case studies presented in this chapter show that NBFI stress tends to emerge with elevated leverage, liquidity mismatches, and high levels of interconnectedness that can spill over to emerging markets. In the current environment of high inflation and tighter financial conditions, central banks can face complex and challenging trade-offs during market stress, between addressing financial stability risks and achieving price stability objectives. Policymakers need appropriate tools to tackle the financial stability consequences of NBFI stress. NBFI direct access to central bank liquidity could prove necessary in times of stress, but implementing appropriate guardrails is paramount.

- **As a first line of defense, robust surveillance, regulation, and supervision of NBFIs are vital**. Priorities should be to close key data gaps, incentivize risk management by NBFIs, set appropriate regulation, and intensify supervision.
- **Central bank liquidity support involves three broad types:**
  (1) **Discretionary marketwide operations** should be temporary, targeted to those NBFI segments where further market dislocation and disintermediation could have adverse financial stability implications, and designed to restore market functioning while containing moral hazard. The timing of a market-wide operation is critical—a framework should be in place based on what can be referred to as "discretion under constraints." Data-driven metrics trigger the potential intervention (the constraints), while policymakers ultimately retain the discretion of whether to intervene.
  (2) **Access to standing lending facilities** could be granted to reduce spillovers to the financial system, although the bar for such access should be very high to avoid moral hazard. Access should not be granted without the appropriate regulatory and supervisory regimes for the different types of NBFIs (some of which may not qualify).
  (3) **Central banks as a lender of last resort** may need to step in if a systemic NBFI comes under stress. Lending to a systemic NBFI should be at the discretion of the central bank, at a penal rate, fully collateralized, and accompanied by more supervisory oversight. A clear timeline should be established for restoring the liquidity of the institution.
- **Clear communication is critical** so that central banks are not perceived as working at cross-purposes, such as purchasing assets to restore financial stability while continuing with quantitative tightening to bring inflation back to target. Announcements of central bank liquidity support should clearly explain the financial stability objective and the parameters of the program.
- **Coordination between the central bank and financial sector regulators is essential** not only for the identification of risks but also for the management of crisis situations as well as for an assessment of supervisory and regulatory deficiencies.

The authors of this chapter are Fabio Cortes, Cristina Cuervo, Torsten Ehlers, Antonio Garcia Pascual (co–team lead), Phakawa Jeasakul, Esti Kemp, Nila Khanolkar, Darryl King, Kleopatra Nikolaou, Thomas Piontek (co–team lead), Felix Suntheim, and Romain Michel Veyrune, under the guidance of Fabio Natalucci.

Introduction

Nonbank and market-based finance has experienced spectacular growth since the global financial crisis. During this period, the share of global financial assets held by nonbank financial intermediaries (NBFIs) has grown from about 40 to nearly 50 percent (Financial Stability Board 2022c), in part a consequence of regulatory and supervisory initiatives that have made the banking system more resilient and have effectively pushed activities to other segments of the financial system. NBFIs include a broad universe of intermediaries. This chapter focuses on a subset that comprises (1) asset managers, such as open-ended investment funds; (2) insurance companies and pension funds; (3) critical financial market infrastructures, such as central counterparties; and (4) other NBFIs, such as structured finance vehicles.[1] NBFIs have become vital to the intermediation of core financial markets, such as government and corporate bonds, and are a crucial driver of global capital flows to emerging market and developing economies. These flows bring benefits to recipient countries and higher returns and portfolio diversification for international investors. Recent empirical studies show that NBFIs may also play a role as shock absorbers by providing credit during stress episodes as bank lending to firms declines, although credit availability comes at a higher price (Adrian, Colla, and Shin 2012; Elliott, Meisenzahl, and Peydró 2023).

At the same time, vulnerabilities related to financial leverage, liquidity, and interconnectedness have built up in certain segments of the NBFI ecosystem. Particularly dangerous is the interaction of poor liquidity with financial leverage: The unwinding of leveraged positions by NBFIs can be made more abrupt by the lack of market liquidity, triggering spirals of asset fire sales and investor runs amid large swings in asset prices. Because dealer banks provide NBFIs mostly with financial leverage, interconnectedness can also become a crucial amplification channel of financial stress. This can generate spillovers to other markets, including core funding markets, as well as to other intermediaries (both banks and NBFIs) and across borders (for example, NBFIs that intermediate capital flows to emerging market and developing economies). In addition, the extended period of low interest rates and loose financial conditions after the global financial crisis may have also resulted in NBFIs shifting investments to riskier assets to find higher returns (Kashyap and Stein 2023).

As central banks tighten monetary policy to tackle high inflation, strains in financial markets can pose a challenge for policymakers given the tension between price stability and financial stability objectives. In a low-inflation environment, central banks can ease monetary or macroprudential policies to respond to financial stress, supporting market sentiment and thus loosening financial conditions. In the current high-inflation environment, given that price stability is the central bank's main objective, the provision of liquidity for financial stability purposes becomes more challenging, including from a communications standpoint, and could undermine the fight against inflation. That is, addressing financial stability risks while pursuing the price stability mandate could introduce a challenging trade-off for central banks, which may require NBFI access to central bank liquidity to tackle financial stress.

The first of two objectives of this chapter is to assess key NBFI vulnerabilities that have the potential to amplify shocks in the context of the ongoing tightening of financial conditions (Table 2.1). In particular, the analysis focuses on vulnerabilities related to leverage, liquidity, and interconnectedness as well as on emerging market and developing economy vulnerabilities that stem from NBFI intermediation of cross-border flows. These flows tend to be more sensitive to global financial conditions, thus contributing to the procyclicality of capital flows. To illustrate the interaction of these vulnerabilities, this chapter features NBFI case studies and highlights the challenges related to data gaps in order to assess financial stability risks.

The second objective of this chapter is to examine the central bank policy toolbox. Central bank policy tools are important at the current juncture given the potential tensions between price stability and financial stability objectives. Policies such as opening central bank liquidity support to NBFIs may mitigate periods of liquidity stress or dislocations in core funding markets. At the same time, they may make achieving price stability complicated while raising moral hazard concerns.[2] This chapter discusses some desirable design features of central bank liquidity support—discretionary marketwide operations, standing liquidity facilities,

[1]This chapter covers a subset of NBFIs and, given that the NBFI ecosystem is very broad and highly heterogeneous, some institutions and vulnerabilities are inevitably discussed only briefly.

[2]For example, buying sovereign bonds to address dysfunction in that market while raising policy rates and reducing the size of the central bank's balance sheets may create communication and implementation challenges, especially if such measures are prolonged and untargeted.

Table 2.1. Preliminary Assessment of Vulnerabilities of Major NBFIs

NBFI (GFA)	Financial Leverage	Liquidity Risk	Interconnectedness	Currency Mismatches
Investment funds, excluding money market funds and hedge funds ($58 trillion, 12 percent of GFA)	Low, but medium for bond funds with derivative exposures	High for fixed-income funds holding illiquid emerging market/ high-yield assets; medium otherwise	High, cross-border spillovers (emerging market and developing economies) and potential links to banks on derivative exposures	Low, but significant externalities to foreign exchange market
Insurance companies ($40 trillion, 9 percent of GFA)	Low	Low, but medium if subject to policy surrenders	Medium; insurance companies are large holders of bank debt; some exposure to margin calls	Low, but medium is subject to policy surrenders
Pension funds ($43 trillion, 9 percent of GFA)	Low, but medium in jurisdictions with a large share of defined-benefit schemes	Low, but could be high in some jurisdictions with a large share of defined-benefits schemes and negative cash flows	Severe data gap does not allow to make any informed assessment here but could be high in some jurisdictions with a large share of defined-benefits schemes and negative cash flows	Low
Money market funds ($8.5 trillion, 2 percent of GFA)	N/A	Low, but medium for prime funds	High; key players in core funding markets	N/A
Structured finance vehicles ($6 trillion, 1 percent of GFA)	Medium/high	Medium	Medium; insurance and pension funds can be large investors in structured finance vehicles	Low
Hedge funds ($6 trillion, 1 percent of GFA)	Medium/high	Medium; most hedge funds have strengthened liquidity terms	Medium/high	Medium
Central counterparties ($0.7 trillion, 0.1 percent of GFA)	N/A	High, but central counterparties have strong risk and financial management controls to reduce such risk	High, given their systemic position across markets	N/A

Sources: Financial Stability Board 2022c; and IMF staff.
Note: GFA = global financial assets; N/A = not applicable; NBFI = nonbank financial intermediary.

or lender of last resort (LOLR)—that support NBFIs based on recent observations and some longstanding principles. Because robust regulation and supervision are the first line of defense to address and mitigate the systemic risks emerging from the NBFI sector, the chapter briefly discusses key regulatory and supervisory priorities for NBFIs.[3]

Nonbank Financial Intermediaries' Use of Financial Leverage Can Amplify Shocks

Very low rates and asset price volatility since the global financial crisis have incentivized investors and institutions to use financial leverage to boost expected returns. However, vulnerabilities stemming from leverage can sometimes be unknown to both authorities and market participants because they are difficult to measure or because leverage is hidden (Adrian and Jones 2018). Financial leverage can take many forms, including the use of repurchase agreements, margin borrowing in prime brokerage accounts, synthetic leverage associated with the use of various financial derivatives (such as futures or swaps), and leverage embedded in structured finance vehicles that provide a high amount of market exposure with low initial committed equity or mezzanine capital.[4]

Hedge funds are one type of NBFIs that can use complex or concentrated investment

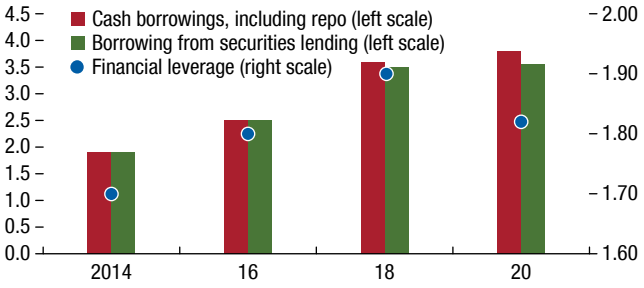
[3]The evolving and growing NBFI sector, the associated financial stability risks, and the regulatory challenges remain topics of key importance. The IMF has done considerable work in this area in recent issues of the *Global Financial Stability Report* (such as Chapter 3 of the October 2022 issue on investment funds, Chapter 3 of the April 2022 issue on fintech, Chapter 3 of the October 2019 issue on institutional investors, and Chapter 3 of the April 2015 issue on insurance). On NBFI regulation, some of the recent detailed proposals are Garcia Pascual, Singh, and Surti (2021), Financial Stability Board (2022a and 2022b), and IOSCO (2019).

[4]Some transactions can use multiple forms of leverage; for example, collateralized loan obligations can have three layers of leverage: debt issued by sub–investment-grade companies, leverage embedded in the collateralized loan obligation vehicle, and the financing on margin of collateralized loan obligation tranches.

Figure 2.1. Financial Leverage of Nonbank Financial Intermediaries

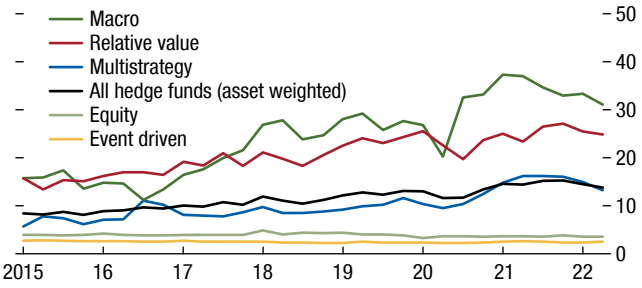
Global hedge funds' cash leverage is more modest in aggregate compared with the use of synthetic leverage.

1. Hedge Funds' Aggregate Secured and Unsecured Borrowing and Financial Leverage
(Trillions of US dollars; relative to net asset value)



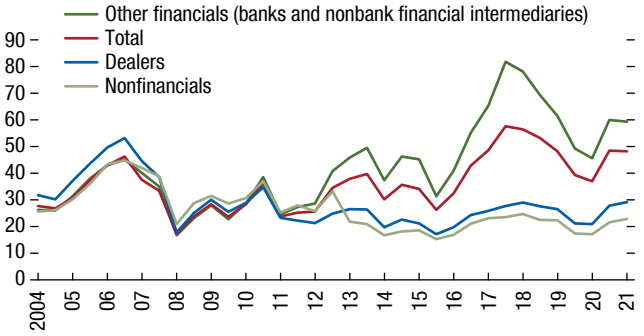
Hedge funds' synthetic leverage through derivatives has risen and is elevated for some strategies.

2. Hedge Funds' Gross Derivative Notional Exposure to Net Asset Value, by Strategy
(Gross notional amount to net asset value)



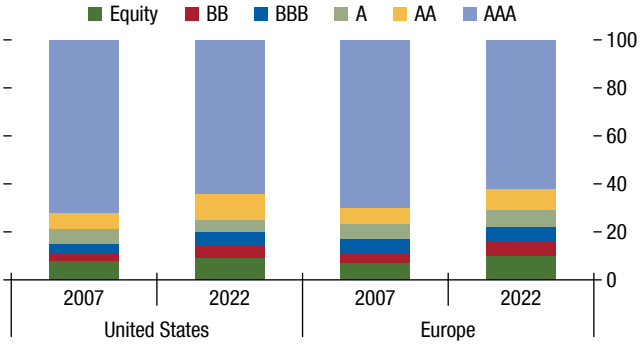
Other financials, such as banks and nonbank financial intermediaries, take on more leverage than others.

3. Proxy for Synthetic Leverage, by Counterparty
(Notional amount to gross market value)



New collateralized loan obligations have a larger equity cushion than those before the global financial crisis.

4. Average US and European Collateralized Loan Obligation Liabilities, by Type and Credit Rating
(Percent)



Sources: Bank for International Settlements; Barclays; IOSCO Hedge Fund Survey; US Securities and Exchange Commission; and IMF staff calculations.
Note: In panel 1, financial leverage is from the IOSCO Hedge Fund Survey and is estimated as the ratio of cash borrowed to net asset value. In panel 2, the data are for US-domiciled hedge funds and are provided by the US Securities and Exchange Commission in its quarterly private fund statistics. In panel 3, "other financials" include central counterparties, banks and securities firms, insurance companies, special-purpose vehicles, hedge funds, and other financial customers. "Dealers" are large commercial and investment banks and securities houses that participate in the interdealer market or have an active business with large customers, such as large corporate firms, governments, and nonreporting financial institutions.

strategies that use leverage. On the basis of available data, regulators in various jurisdictions are making public certain measures of cash and synthetic leverage used by hedge funds. For example, globally, hedge fund cash leverage (in the form of secured and unsecured borrowing) tends to be modest in aggregate at about 1.8 times net asset value, although some individual funds may have much higher multiples (Figure 2.1, panel 1). However, the use of synthetic leverage through derivatives by hedge funds domiciled in the United States has increased from 8 times to 14 times net asset value on an asset-weighted basis, with some investment strategies above 20 times net asset value (Figure 2.1, panel 2). More broadly, the ratio of notional amount to gross market value—a proxy for synthetic leverage—suggests that financial institutions (banks and NBFIs) take much more derivatives-based leverage than do dealers and nonfinancial companies (Figure 2.1, panel 3).[5]

The collateralized loan obligation market provides a good example of a securitization vehicle where leverage is layered in the form of underlying assets—leveraged loans to sub–investment-grade firms—and embedded

[5]Whereas gross leverage is one metric for leverage, using it as the sole metric may be misleading because derivatives are often used for hedging. Other metrics should be considered to supplement gross leverage for a more comprehensive analysis.

in the capital structure through equity and mezzanine debt (rated A and below) below AAA-rated tranches.[6] Before the global financial crisis, an additional form of leverage was used by investors through the financing of AAA tranches. Compared with the structures that prevailed before the global financial crisis, current collateralized loan obligations have less embedded leverage, with a higher share of equity and mezzanine debt as a cushion to protect AAA bond holders, and the practice of financing AAA tranches appears not to be common anymore (Figure 2.1, panel 4).[7]

Leveraged entities have a higher risk of financial distress because they are more vulnerable to sudden changes in asset prices that may force them to de-lever, amplifying the initial price declines. As discussed later in this chapter, the combination of poor market liquidity, high leverage, and a high degree of interconnectedness between NBFIs and banks is most dangerous to the financial system because it can amplify asset prices changes and spread stress to corners of the financial system that ex ante may seem to have little in common.

Liquidity Vulnerabilities at Nonbank Financial Intermediaries Catalyze Stress

The NBFI sector encompasses a wide range of institutions, some of which typically provide liquidity services to markets and institutions (such as principal trading firms or broker-dealers), while others typically demand liquidity (such as investment funds). Liquidity stress in the NBFI sector can spill over to the broader financial sector—as could be seen during recent stress episodes such as the March 2020 dash-for-cash episode or in association with liability-driven investment funds in the United Kingdom—and eventually to the real economy.[8] To be sure, some NBFIs can also be important providers of liquidity at times of stress. For example, Timmer (2018) finds that insurance companies and pension funds act countercyclically, buying securities after large price declines.

Three key liquidity-related vulnerabilities are associated with NBFIs:

- ***Liquidity mismatches.*** Some NBFIs may hold relatively illiquid assets but allow investors to redeem shares on a daily basis and at a price that does not reflect the liquidation value of the assets. Liquidity mismatches make funds vulnerable to runs because investors have an incentive to redeem ahead of others—which can contribute to volatility in asset markets and threaten financial stability (see Chapter 3 of the October 2022 *Global Financial Stability Report*). Over the past year, the liquidity of open-end funds' holdings has deteriorated to levels last seen at the onset of the COVID-19 pandemic, implying high vulnerabilities of asset markets as a result of liquidity mismatches (Figure 2.2, panel 1).
- ***Liquidity spirals.*** In combination with financial leverage, a lack of market liquidity can lead to so-called "liquidity spirals," where a decline in asset prices leads to a deterioration of funding liquidity, which then spills back to further impair market liquidity (Brunnermeier and Pedersen 2009). Such liquidity spirals are evident in the UK pension fund stress episode, where, amid already relatively poor liquidity in UK gilt markets (Figure 2.2, panel 2), margin calls as a result of large losses in derivative positions caused pension funds to sell gilts in a manner that contributed to further illiquidity in that market (see the case study on UK pension fund stress later in this chapter).
- ***Crowded trades.*** Common exposures to assets, in combination with correlated liquidity shocks, can amplify stress events.[9] For example, redemptions can force investment funds to sell assets, which depresses prices and can lead to further sales by other market participants with similar portfolio holdings, amplifying the initial shock. Over the past two years, the portfolios of investments funds have become more similar compared with previous years according to some measures, raising the threat of correlated liquidity shocks among funds (Figure 2.2, panel 3).

[6]Collateralized loan obligations are asset-backed securities issued by a special-purpose vehicle. The special-purpose vehicle acquires a portfolio of leveraged loans, which it finances through the issuance of securities in the form of bonds—senior and mezzanine tranches—and equity.

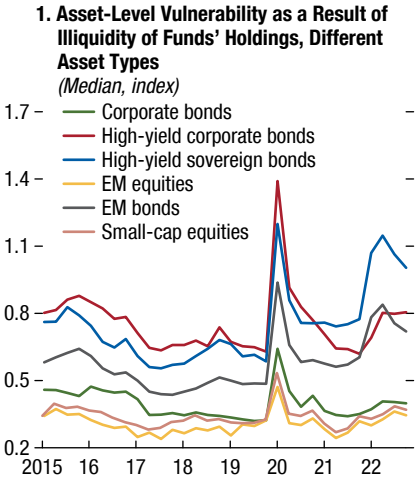
[7]In addition, whereas the rapid growth of leveraged finance and collateralized loan obligations has parallels to developments in the US subprime mortgage market and collateralized debt obligations during the run-up to the global financial crisis, there are significant differences such as collateralized loan obligations being less complex and more transparent (see Sirio and Avalos 2019).

[8]Theory and evidence support the notion that fire sales in securities markets can affect credit supply (Shleifer and Vishny 2010; Diamond and Rajan 2011; Abbassi and others 2016; Irani and others 2021).

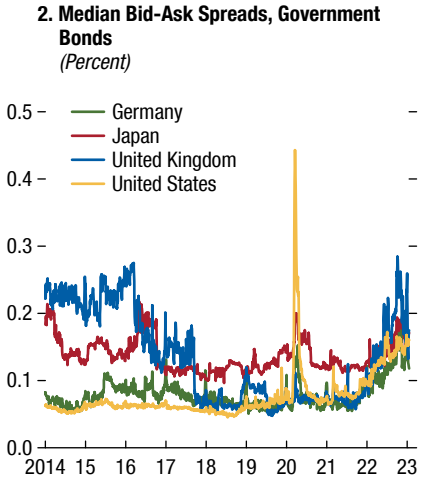
[9]Empirical evidence for this mechanism can be found in Greenwood and Thesmar (2011) for equities and in Falato and others (2021) for bond markets.

Figure 2.2. Risks for the Nonbank Financial Intermediary Sector Are on the Rise

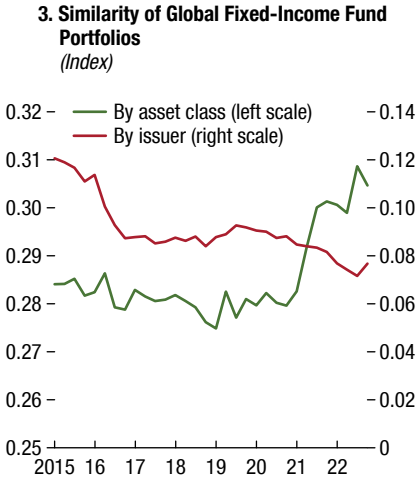
Liquidity mismatches in open-end funds have been increasing again ...



... against a backdrop of deteriorating market liquidity ...



... and common holdings across funds' portfolios may be rising.



Sources: FactSet; Morningstar; Refinitiv; and IMF staff calculations.
Note: Panel 1 shows the evolution of the median asset-level vulnerabilities for different asset classes. The vulnerability measure is constructed based on Jiang and others (2022) and captures the weighted average funds owning an asset, with liquidity defined as the portfolio-level bid-ask spread across funds. See Online Annex 3.2 of the October 2022 *Global Financial Stability Report* for further details. Panel 2 shows the five-day rolling-window average percentage bid-ask spreads of outstanding plain-vanilla, fixed-coupon sovereign bonds issued by Germany, Japan, the United Kingdom, and the United States. Only bonds with maturity longer than one year are considered. Panel 3 shows the average cosine similarity of fixed-income investment-fund portfolios over time. Only funds with assets under management larger than $1 billion and with at least 50 percent of portfolio holdings available are considered. Similarity is defined by asset class and by issuer based on the cosine similarity measure of Girardi and others (2021). Asset classes are equity, investment funds, asset-backed securities, mortgage-backed securities, and bonds by issuer type (sovereign, corporate, financial, agency, municipal) and further classified into high yield and investment grade as well as long term (above 10-year maturity) and short term (below three-year maturity). EM = emerging market.

The Increasing Interconnectedness of Nonbank Financial Intermediaries and the Financial System

NBFIs' growing role in domestic financing and cross-border capital flows is a positive feature of an open and integrated financial system. Having a broader set of financial intermediaries with different risk profiles, specialized expertise and time horizons fosters efficiency and allows for diversification of risks. At the same time, however, increased interconnectedness makes the financial system more complex and can be a source of vulnerability if it becomes a shock amplifier.

Linkages can be within the NBFI ecosystem, whereby an NBFI provides liquidity to or purchases a financial instrument issued by another NBFI. They can also be between NBFIs and the banking sector, whereby banks and NBFIs have exposures to a common counterparty or asset or NBFIs are financed by banks. Because of these linkages, NBFIs using a high degree of leverage or engaging in liquidity and maturity transformation can amplify or spread financial stress.

Available data show that NBFIs' interconnectedness with the rest of the financial system has increased. In aggregate, the portion of domestic funding to other financial intermediaries from banks and insurers has declined since the global financial crisis, while funding among NBFIs has increased (Figure 2.3, panel 1).[10] Large data gaps remain, however, with roughly half of aggregate NBFI domestic funding sources unaccounted for. At the same time, banks' cross-border linkages with NBFIs have risen, underscoring the sector's importance in cross-border intermediation (Figure 2.3, panel 2).[11]

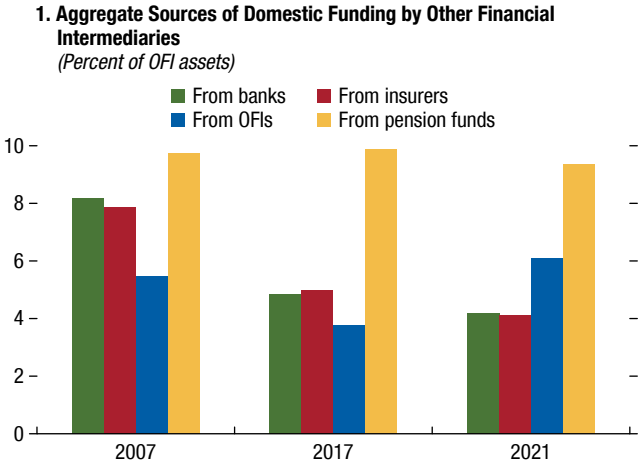
NBFIs are playing a larger role in the intermediation of capital flows to emerging market and developing economies. In the decade between the global financial crisis and the start of the COVID-19 pandemic, emerging market and developing economies benefited from strong capital inflows.

[10]This trend has exceptions, such as the rising exposure of European insurers to higher-yielding bank debt in recent years. See Chapter 1 of the April 2021 *Global Financial Stability Report*.

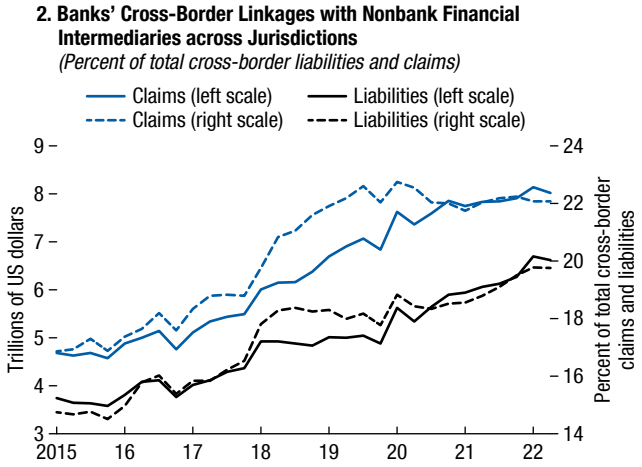
[11]See Garcia Pascual, Singh, and Surti (2021) and Financial Stability Board (2022d).

Figure 2.3. Financial Linkages of Nonbank Financial Intermediaries

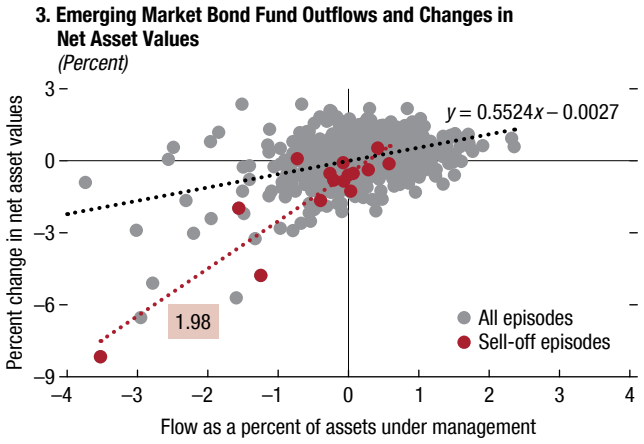
In aggregate, funding sources for OFIs have shifted from banks to other OFIs ...



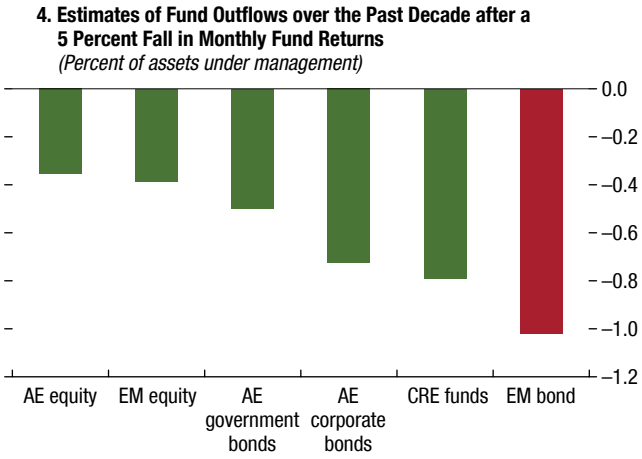
... while banks' direct cross-border linkages with nonbank financial intermediaries have mostly increased.



Global risk-off episodes have led to large falls in fund net asset values.



Outflows from emerging market bond funds have been higher than other assets during stress events.



Sources: Bank for International Settlements; Financial Stability Board 2022d; and IMF staff calculations.
Note: In panel 1, OFIs follow the Financial Stability Board's definition and are a subset of the nonbank financial intermediary sector comprising all financial institutions that are not central banks, banks, public financial institutions, insurance corporations, pension funds, or financial auxiliaries (see Financial Stability Board 2022d).
AE = advanced economy; CRE = commercial real estate; EM = emerging market; OFIs = other financial intermediaries.

Foreign-currency-denominated debt accounts for a significant share, mostly in US dollars, financed through NBFIs such as investment funds, whose assets more than tripled in the decade since the global financial crisis. Although these flows have brought many benefits to the recipient economies and diversified emerging market and developing economy funding sources, they have also contributed to building up vulnerabilities such as higher external debt.

Emerging market and developing economy debt funds tend to experience very large redemptions during risk-off episodes (Figure 2.3, panel 3). Funds that are either passively managed or that follow benchmark indices appear to play a particularly important role in accentuating the procyclicality of capital flows. The size of outflows from emerging market and developing economy debt funds is generally larger than for other types of funds during stress episodes (Figure 2.3, panel 4).[12] In addition, liquidity mismatches in emerging market

[12]Further pressure on outflows can be also related to non-benchmarked investors and multisector bond funds in particular. These unconstrained funds can be a source of spillovers to emerging markets and potentially exert a sizable effect on cross-border flows (Cortes and Sanfilippo 2021).

Table 2.2. Regulatory Data Gaps for NBFIs

NBFI (GFA)	Financial Leverage	Liquidity	Interconnectedness	Currency Mismatches
Investment funds (excluding money market funds and hedge funds) ($58 trillion, 12% of GFA)				
Insurance companies ($40 trillion, 9% of GFA)				
Pension funds ($43 trillion, 9% of GFA)				
Money market funds ($8.5 trillion, 2% of GFA)	N/A			N/A
Structured finance vehicles ($6 trillion, 1% of GFA)				
Hedge funds ($6 trillion, 1% of GFA)				
Central counterparties ($0.7 trillion, 0.1% of GFA)	N/A			N/A

Source: IMF staff elaborations.

Note: This table is to be read jointly with Table 2.1 on NBFI vulnerabilities. Red denotes no/very little data in areas with high or medium/high vulnerabilities; orange denotes no/very little data in areas with low/medium vulnerabilities; yellow denotes some data in select jurisdictions in areas with high or medium/high vulnerabilities; light green denotes some data in select jurisdictions in areas with low or medium vulnerabilities; dark green denotes broadly adequate data irrespective of level of vulnerabilities. GFA = global financial assets; N/A = not applicable; NBFI = nonbank financial intermediary.

and developing economy debt funds—given the medium to low liquidity of most fixed-income assets in these economies—may exacerbate the scale of redemptions under stress market conditions.

Regulatory Data Gaps

Regulatory data gaps for NBFIs are significant, and they inhibit the ability of the regulator to assess and monitor systemic risks.[13] Although the availability of regulatory data has improved over time, gaps in most NBFIs remain meaningful and uneven among jurisdictions in comparison to the banking sector where data quality and availability are generally adequate. The simple heat map in Table 2.2 provides a qualitative assessment for regulatory data gaps across types of NBFIs and vulnerabilities.

Significant data gaps exist for monitoring the liquidity vulnerabilities of investment, money market, and hedge funds. Although most regulators require high-level reporting of asset liquidity, data are typically not reported at a sufficient frequency or in detail. Some jurisdictions require rule-based liquidity classification disclosures (most funds in the United States and European Union as well as alternative investment fund managers), whereas others require reporting on specific factors, such as credit rating, as proxies for liquidity, which are often insufficient for analyzing liquidity risks. The data gap is wider on the liability side: Funds often have limited visibility for their investor base because of the complex nature of distribution channels. Where investor data are available, the reporting may not consider arrangements such as notice periods and gates. Differences in methodologies on liquidity metrics also hamper cross-border comparability.[14]

Likewise, data gaps are a key hindrance for leverage analysis of investment funds.[15] The United States and European Union members collect detailed data on leverage metrics for hedge funds, although these data arrive with a significant lag and at a low frequency. Many other jurisdictions, including many emerging market and developing economies, lack a definition of leverage, which also hampers cross-border comparison. Leverage disclosures for investment funds that are not hedge funds are often not detailed enough to allow for assessments of the extent of leverage that is less visible to regulators.

[13]This section focuses only on regulatory data gaps; other gaps such as for public data, investor data, and "available for purchase" data are not covered.

[14]In addition, granular data are scarce for liquidity management tool disclosures, especially for tools such as swing pricing, and are mostly absent for access to credit lines.

[15]In many countries, reporting is subject to a threshold, resulting in industrywide data gaps.

For pension funds, significant data gaps limit the assessment of leverage and liquidity, particularly with regard to the use of derivatives. Pension funds' use of synthetic leverage through derivatives is often managed by third-party asset managers, making it difficult for regulators to get a precise understanding of the leverage of these funds. In addition, corporate sponsors typically extend commitments to provide extra liquidity to their pension schemes if needed, but details of these commitments are often beyond the required regulatory reporting, thereby making it difficult to analyze sources of liquidity during adverse market events. To hedge their sizable foreign asset positions (OECD 2021), some pension funds engage in foreign exchange derivative contracts, which are typically over the counter and are difficult for regulators to monitor.[16]

Relatively tight regulations for insurance companies, particularly strict capital requirements, limit the degree to which these companies invest in riskier assets. These regulations typically require an assessment of a broad range of risks including leverage and foreign exchange risks, which would thereby be included in regulatory reporting. However, as insurance companies make extensive use of third-party investment managers, a detailed and timely examination of the actual underlying risk exposures may not always be feasible. This can obscure synthetic leverage used by investment managers to enhance returns. Also, exposures to illiquid private credit exposures such as collateralized loan obligations can disguise the embedded leverage in these structured products.

Data gaps loom even larger for unregulated or even unregistered types of NBFIs, such as family offices. Considering the unregulated nature of these entities, regulatory data are practically nonexistent, except in situations where partial data are collected through banks and regulated NBFIs concerning their transactions with such NBFIs. Although not all types of risk are equally relevant for the diverse set of unregulated or unregistered institutions, individual entities can be large and play important roles in specific financial market segments. Wide data gaps make it challenging for regulators and supervisors to gauge the systemic risks that can build up (an example is the family office Archegos, whose outsized equity derivative liabilities in relation to a set of major banks only became visible to regulators after its failure).

[16]In some cases, not hedging against currency risks is an explicit part of the investment strategy of pension funds in order to generate additional returns and avoid high costs for hedging currency risks of long-maturity assets.

Major data gaps exist in the reporting of derivative exposures across NBFIs. Important details such as the direction of positions—long versus short—and information about counterparties are often missing in disclosures. For exchange-traded and centrally cleared over-the-counter derivatives, detailed data are available through central counterparties but are highly confidential and, therefore, require robust data-sharing arrangements with the relevant supervisors. Recent over-the-counter derivative-market reforms in the Group of Twenty have helped introduce central clearing requirements for interest rate and credit derivatives across a broad range of advanced and major emerging market economies. However, the reforms have generally not extended to foreign exchange and commodity derivatives.[17]

Four Case Studies of Nonbank Financial Intermediaries

Given the growth in the NBFI sector and the vulnerabilities described, this chapter examines four recent episodes involving NBFIs and markets where NBFI vulnerabilities are building. The aim is to emphasize the potential for financial leverage, market liquidity, and interconnectedness to interact and cause spillovers in the financial system.

Case Study 1: UK Pension Fund Stress: Could It Happen Elsewhere?

The UK pension fund and liability-driven investment strategies episode in 2022 is an example of the interplay of leverage, liquidity mismatches, and interconnectedness.[18] In late September 2022, concerns about the UK fiscal outlook led to a sharp rise in UK gilt yields that, in turn, led to large mark-to-market losses in levered

[17]In some jurisdictions, supervisors have mandated the collection of detailed derivative transaction data across all major types of derivatives (such as through the European Union's European Market Infrastructure Regulation). However, the complexity of processing and analyzing these data and the fact that derivative trading is concentrated in a few jurisdictions (in particular, the United Kingdom, the United States, and the European Union) limits the use of activity-based data collection to a small number of advanced jurisdictions.

[18]Liability-driven investment strategies allow pension funds to hedge the interest rate and inflation risk that arises from their long-term liabilities, using leveraged investments to both maintain hedges and to invest in riskier assets to meet their return targets. UK insurers are also users of liability-driven investment strategies, but they were less affected by the events in September 2022 because of a combination of factors including greater expertise in liquidity risk management, lower use of financial leverage, and shorter liabilities.

fixed-income positions of defined-benefit pension funds, causing margin and collateral calls. To meet these calls, pension and liability-driven investment funds were forced to sell gilt securities, pushing gilt yields even higher in a self-fulfilling price dynamic. To prevent risks to financial stability, on September 28, 2022, the Bank of England announced temporary and targeted purchases of long-dated conventional gilts and subsequently index-linked gilts, which was effective in stabilizing gilt yields. Key elements of the intervention were the use of backstop pricing for the purchases, the short period of purchases, and the demand-led, timely but orderly, unwind of those purchases. The objective of the intervention was to buy time for liability-driven investment funds to rebalance, without further amplifying the underlying shock.

This episode raises the question as to whether a similar stress event could happen in other jurisdictions that have pension funds that use financial leverage. While UK pension funds had been stress-tested against a rise in bond yields, the sharp increase in September 2022 was much larger than used in stress tests and such gaps might be exposed in other jurisdictions. Pension funds achieve financial leverage by using repurchase agreements and derivatives such as interest rate swaps. Among a global sample of large pension plans that disclose data on derivative exposures, the average ratio of gross notional exposure of derivatives to assets has increased over the past decade, with some pension plans that have significantly increased the use of derivatives (Figure 2.4, panel 1). These pension funds are also active users of repurchase agreements, which can contribute to further increasing financial leverage.[19] Recent surveys also suggest increasing interest in investing in liability-driven investment strategies that use leverage (Figure 2.4, panel 2). Over the past decade, pension funds have also increased their overall prevalence, particularly as a share of global GDP, increasing from 40 to almost 60 percent during 2011–21. Those pension funds using financial leverage could be subject to margin and collateral calls during periods of high market volatility in the future, which given their large footprint might contribute to exacerbated periods of stress in financial markets. As a result, authorities should make sure that those leveraged pension funds have adequate liquidity risk management processes in place to account for large margin and collateral calls.

Despite the similarities between pension plans in the United Kingdom and other jurisdictions, the UK pension fund industry has some unique features that contributed to amplify stress in the 2022 crisis:

- UK pension plans have less diversified portfolios, with a larger share invested in fixed income. A more diversified portfolio allows funds to better withstand shocks and access liquidity in different asset classes and geographies. UK pension plans also have an elevated share of defined-benefit assets, only behind Japan and The Netherlands among the top seven global pension fund jurisdictions (Figure 2.4, panel 3). Defined-benefit pension funds are generally active users of liability-driven investment strategies to hedge long-dated liabilities. UK funds also have elevated duration risk compared with other jurisdictions that have significantly shorter duration that results in less price sensitivity to rapid increases in bond yields.
- The UK stress event was exacerbated by the fact that the country's pension plans owned a large share of the gilt market—a share of more than 50 percent of certain long maturities—illustrating the elevated interconnectedness between pension funds and the domestic sovereign and corporate bond markets (Figure 2.4, panel 4). Pension funds in other jurisdictions—particularly The Netherlands and Switzerland—have an even higher share. However, this might be mitigated in those countries because of their lower share of defined-benefit plans and more diversified overall portfolios.[20]
- UK pension funds are also subject to other jurisdiction-specific factors, which made them more vulnerable. Their funds have a sizable share of small- to medium-sized plans that can have more concentrated investment strategies and use pooled liability-driven investment asset management vehicles, making it more challenging for managers of those vehicles to coordinate with plan sponsors to promptly raise cash to pay for margins.

The rise in bond yields over the past year means that pension plans are in a better position in terms of solvency, given that the gap between the value of their assets and liabilities has improved significantly. This trend likely ameliorates, but does not eliminate, the vulnerabilities mentioned earlier.

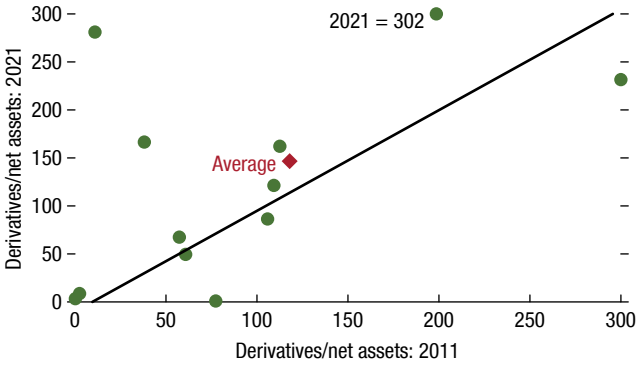
[19]Repurchase agreements were key contributors that exacerbated the UK liability-driven investment episode in 2022, as the value of collateral pension funds used to borrow in the repo market declined sharply.

[20]The Netherlands also benefits from being part of the wider and more liquid euro area bond market. In addition, the Dutch pension system may benefit from the existing undergoing reform (to be completed by January 1, 2027) which transitions its defined-benefit pension system to a largely defined contribution-style arrangement.

Figure 2.4. Pension Funds and Financial Stability

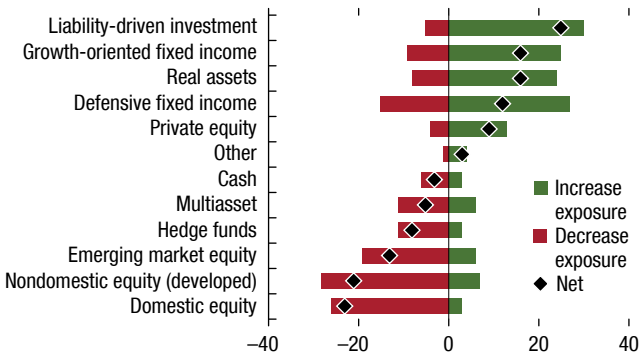
The financial leverage of selected pension funds has risen over the past decade ...

1. Financial Leverage of Selected Pension Funds
(Percent)



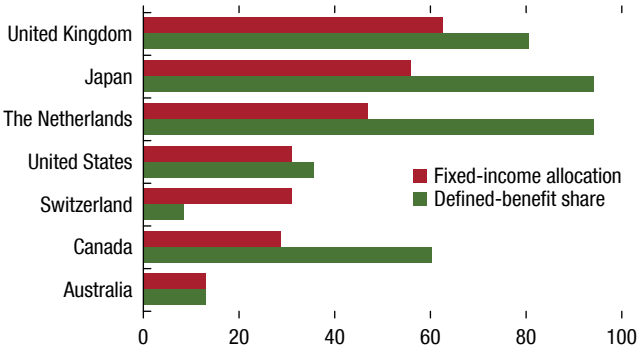
... while surveys indicated increasing willingness to increase exposure to riskier liability-driven investment strategies.

2. 2021 Survey of One-Year-Ahead Asset Allocation Plans of European Pension Funds
(Percent)



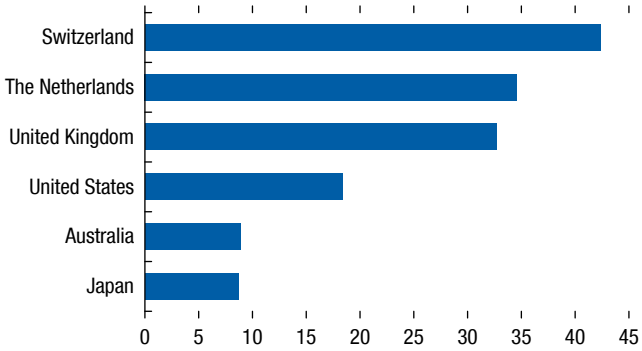
UK pension funds had less diversified portfolios and an elevated share of defined-benefit plans ...

3. Pension Fund Fixed-Income Allocation and Share of Defined-Benefit Plans
(Percent)



... and UK pension funds own a sizable share of their domestic sovereign and corporate bond markets.

4. Pension Fund Share of Domestic Sovereign and Corporate Bond Market Ownership
(Percent)



Sources: Annual reports of selected pension funds; Bloomberg Finance L.P.; Financial Stability Board; Mercer European Asset Allocation Insights 2021; UK Pension Protection Fund Purple Book; Willis Towers Watson Global Pension Assets Study 2022; and IMF staff calculations.
Note: Panel 1 uses the gross notional exposure of derivatives as a proxy for the financial leverage of pension funds. Note that these funds are also active users of repurchase agreements, which can further increase their financial leverage. This panel includes a sample of 12 pension funds in seven jurisdictions (Canada, Japan, The Netherlands, Norway, Sweden, United States, United Kingdom) that provide data on derivatives' gross notional exposures in their annual reports. These 12 funds have combined assets under management of more than $5 trillion, which is almost 10 percent of global pension fund assets. Panel 2 is based on a survey on the European defined-benefit pension industry by Mercer, covering pension funds in 11 jurisdictions. In panel 3, the seven jurisdictions account for more than 90 percent of global pension fund assets.

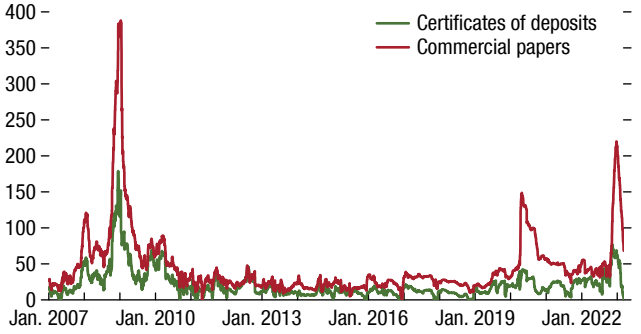
Case Study 2: Recent Stress in Debt Markets and Project Finance Lenders in Korea

Financial stress emerged in Korea's debt markets in October 2022 amid tightening financial conditions and falling property prices. The default of a commercial paper issued against real estate project finance loans—a market in which NBFIs such as insurance companies and nonbank credit intermediaries actively participate—set off a broad-based repricing of asset-backed securities, corporate bonds, and short-term notes. Spreads between commercial papers and monetary stabilization bonds—perceived as a risk-free rate—widened to 220 basis points, a level not seen since the global financial crisis (Figure 2.5, panel 1). Corporate bond yields also rose sharply across the board. Complicating matters, the default occurred against the backdrop of increased borrowing needs from both banks—in part owing to the postpandemic normalization of prudential policy—as well as a state-owned energy firm to cover its operating loss.

Figure 2.5. Recent Financial Stress in Local Debt Markets in Korea

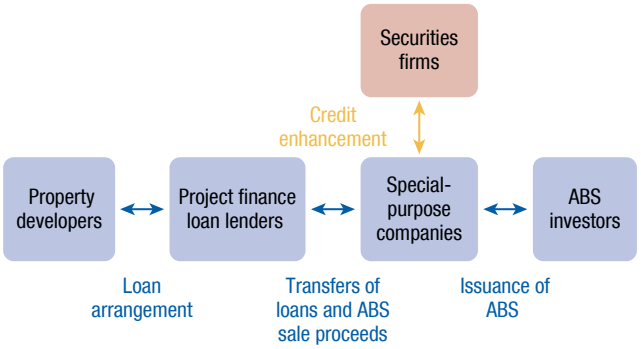
Financial stress remains, as shown by still-high spreads of money market instruments.

1. Three-Month Money Market Spreads
(Basis points; relative to the Bank of Korea's monetary stabilization bonds)



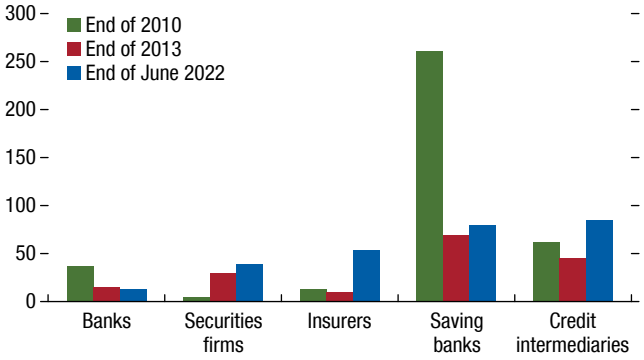
Securities firms are also exposed to project finance loan-backed securities as they are the leading provider of their credit enhancements.

2. Securitization Process of Real Estate Project Finance Loans: Asset-Backed Securities



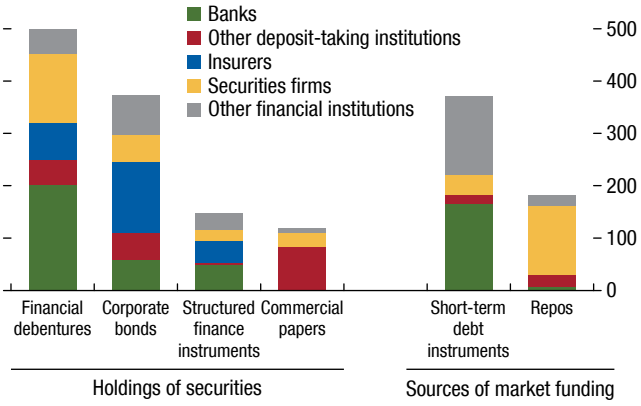
Nonbank financial intermediaries have sizable exposure to real estate project finance loans relative to their own capital.

3. Financial Institutions' Exposure to Real Estate Project Finance Loans
(Percent of own capital)



Nonbank financial intermediaries could amplify financial stress given their sizable holdings of debt securities along with their reliance on market funding.

4. Financial Institutions' Selected Holdings of Securities and Selected Sources of Market Funding
(Trillions of Korean won)



Sources: Bank of Korea; Bloomberg Finance L.P.; CEIC; and IMF staff calculations.
Note: In panel 4, securitized financial products would appear under "structured finance instruments." ABS = asset-backed securities.

The funding structure of project financing loans in the Korean case appears fragile, as NBFI lenders use high levels of leverage. These lenders issue short-term asset-backed securities with maturity of up to one year through special-purpose companies to finance longer-term project finance loans with maturity of three to five years (Figure 2.5, panel 2). As of June 2022, outstanding project finance loans amounted to KRW112 trillion (5 percent of GDP). The main NBFI lenders were insurance companies (39 percent) and nonbank credit intermediaries (24 percent).[21] About 35 percent of project finance loans were securitized, and another type of NBFI, securities firms, usually provided substantial credit guarantees to asset-backed securities. The maturity mismatch of these asset-backed securities makes them vulnerable to market sentiment, rising interest

[21]About 70 percent of project finance loans are originated for residential real estate development.

rates, and refinancing risk. Although it is unlikely that the delinquency rate for project finance loans will rise to the peak of 2013 (8.2 percent that year), the real estate sector continues to face headwinds, with falling property prices. NBFIs are exposed to these delinquencies because in addition to issuing short-term debt against these loans, they also commit their own capital to them (Figure 2.5, panel 3). More broadly, the debt market stress also revealed vulnerabilities related to NBFIs, which fund their sizable holdings of debt securities with short-term market funding (Figure 2.5, panel 4).

The Korean authorities introduced measures to alleviate systemwide funding stress and ensure that real estate project finance loans are rolled over: asset purchases, provision of liquidity and credit guarantees, relaxation of prudential policy, and use of administrative directives. Asset purchases, which were carried out largely by major state-owned and private financial institutions, targeted mostly investment-grade corporate bonds and commercial papers (notably, those backed by project finance loans). While continuing to focus on curbing inflation, the Bank of Korea provided additional liquidity to banks by relaxing its collateral rules and to securities firms by using repo transactions. Public financial institutions also provided credit guarantees to support the origination of project finance loans. The normalization of some prudential measures was postponed, and several property-related restrictive regulations were relaxed. Administrative directives were used to reduce bond issuances by banks and state-owned enterprises.

Market stabilization measures have helped ease liquidity stress, although some strains linger. Credit spreads started to narrow in late December 2022 after a purchase of higher-risk asset-backed securities was carried out, and the Bank of Korea provided liquidity to securities firms in an amount larger than initially announced. However, credit spreads remain wide, especially for lower-rated borrowers, reflecting market concerns about a further correction of property markets. Notwithstanding their effects in containing market stress, it is important that support measures remain temporary, with a clear exit strategy, to limit moral hazard concerns and fiscal risks. The authorities should also take proactive actions to manage potential solvency issues related to real estate-related financing.

Case Study 3: Commodity-Trading Firms and Financial Stability Risks

Commodity-trading firms are critical intermediaries between the producers and users of key commodities such as agricultural products, fossil fuels, metals, and minerals. In some cases, they are also important producers of commodities (for example, producers of minerals, fossil fuels, and agricultural products). Inventories constitute a large part of their assets, typically financed by a high level of short-term debt that is largely composed of bank loans (Figure 2.6, panel 1).

The relatively high level of short-term debt can give rise to liquidity risks, especially because large trading firms tend to hold fewer liquid assets than short-term debt (Figure 2.6, panel 2). In the current environment of tighter financial conditions and relatively high volatility in commodity prices, short-term debt rollovers have become more challenging.[22] Banks may not be as willing to provide large amounts of short-term lending and may view commodity-trading firms as riskier, especially if commodity price fluctuations are higher. Adequate equity ratios (Figure 2.6, panel 2) and prompt sales of existing inventory can mitigate these risks somewhat, provided that market functioning remains orderly.

Commodity-trading firms also use commodity-derivative contracts to both hedge against price declines (of their large inventories) and (to a lesser extent) to speculate. In a volatile market environment, commodity traders can quickly be faced with higher margin requirements, requiring the immediate transfer of liquid assets (in particular, cash) as collateral, as witnessed ahead of the nickel market suspension at the London Metal Exchange in March 2022 (see Box 1.1 in the April 2022 *Global Financial Stability Report*). During that episode, a number of commodity-trading firms cautioned that the liquidity challenges they face may threaten their ability to continue supplying commodities to the economy.

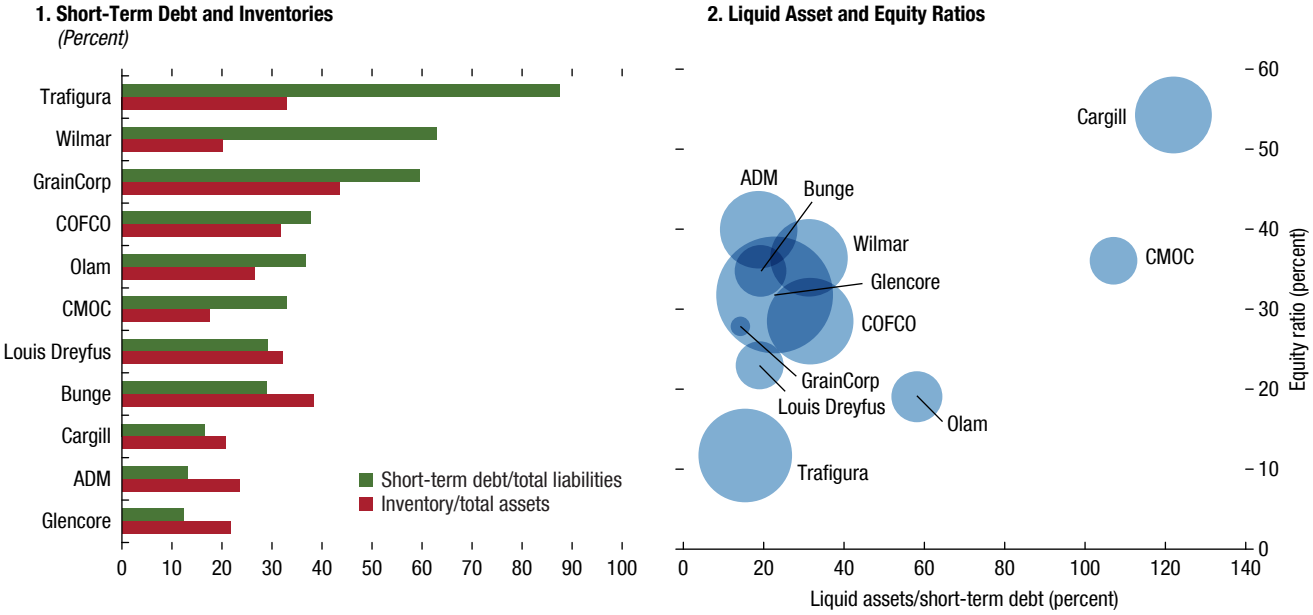
The hidden risks from trading commodity derivatives point to significant regulatory and data gaps. Even though commodity-trading firms are heavily engaged in complex and risky derivatives trading, they are not subject to the same level of regulation or supervision as financial institutions. In addition, some very large commodity traders (not shown in Figure 2.6)

[22]See Dempsey, Harry, and Neil Hume. 2022. "Trafigura's Finance Chief Warns of Commodity Industry Stress." *Financial Times*, March 23.

Figure 2.6. Financial Structure of Commodity-Trading Firms

Commodity-trading firms hold large amounts of inventories often financed by short-term funding ...

... making them vulnerable to funding shocks and margin calls, despite generally high equity ratios.



Sources: Bloomberg Finance L.P.; S&P Capital IQ; and IMF staff calculations.
Note: Data are as of the third quarter 2022 or the latest available fiscal year. The panels cover major listed commodity-trading firms for which data are publicly available. Short-term debt comprises all financial debt with a remaining maturity of less than one year. In panel 2, the equity ratio is defined as total equity over total assets. The size of the bubbles indicates firm size, ranging from $4 billion to $140 billion. Liquid assets are cash, cash equivalents, and short-term investments. ADM = Archer-Daniels-Midlands; CMOC = CMOC Group Limited, formerly China Molybdenum; COFCO = China Oil and Foodstuffs Corporation.

are private companies that are subject only to very limited (or no) public reporting requirements. To the extent that derivative trades happen on exchanges, the corresponding positions can be monitored, but they do not allow market regulators and supervisors to make a holistic assessment of commodity-trading firms' risk exposures. For over-the-counter trades, the scarcity of reported data on commodity derivatives makes it particularly difficult to monitor large risk exposures. These positions can become large enough that a materialization of risks can impact the functioning of a corresponding commodity market on a regulated exchange, as during the nickel market suspension.[23]

Case Study 4: Vulnerabilities in Private Credit Markets

Private credit refers to the provision of credit by NBFIs to often smaller borrowers through direct lending (about 40 percent) and other structures (Figure 2.7, panel 1) (see Block and others 2023). In terms of size, the private credit market rivals the institutional leveraged loan market, which is driven by large bank syndications. Both markets had approximately $1.4 trillion outstanding in 2022.[24] Some of the vulnerabilities highlighted in this chapter—liquidity mismatches and use of financial leverage—appear to be less prominent in this sector. These vehicles typically do not carry maturity or asset-liability mismatches because investors' capital is locked in for many years, so there is no run risk. They also appear to use limited financial leverage. Banks can provide such leverage as credit lines, collateralized borrowing, and capital call lines (Aramonte and Avalos 2021).[25] However, interconnectedness is a key channel of

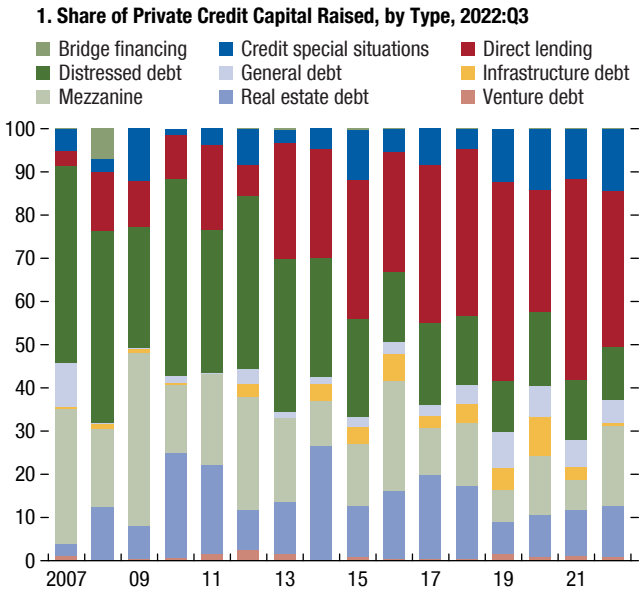
[23]As a response, the London Metal Exchange has introduced reporting requirements for over-the-counter derivative positions of its members for a range of metals.

[24]See the October 2022 *Global Financial Stability Report*. Private credit, provided by dedicated funds, is often referred to as "direct lending" because it is not issued or traded in the public markets and the debt is not originated by regulated bank syndicates. Most private credit is provided as direct lending for private companies that cannot access—or that want to circumvent—public markets or that want certainty of execution and confidentiality.

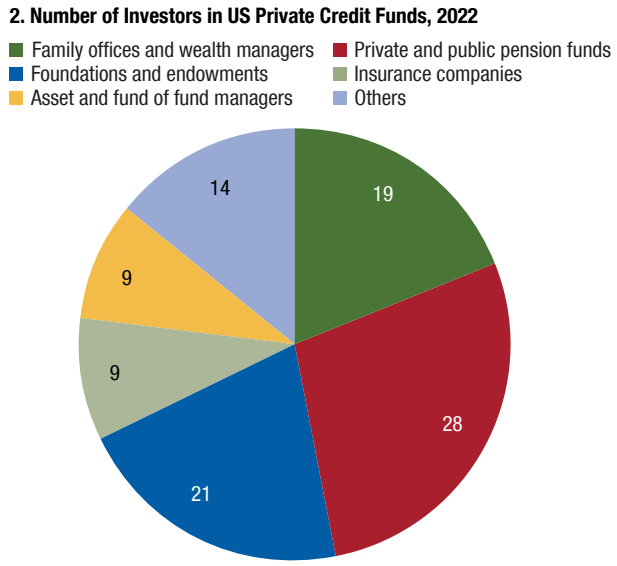
[25]A "capital call line" is a line of credit typically provided by a bank to a private equity firm that can be used to enhance debt fund returns or to provide bridge financing for limited partnership capital.

Figure 2.7. Private Credit Markets
(Percent)

Direct lending is the main source of private credit financing.



Pension funds are the largest investors in private credit vehicles.



Sources: Goldman Sachs; PitchBook Leveraged Commentary & Data; Preqin; and IMF staff calculations.
Note: Q3 = quarter 3.

risk, given that most private credit investors are usually institutional investors in the NBFI ecosystem that could face a capital call in the event of broader market stress or face losses on their investments (Figure 2.7, panel 2).

Rapid growth of private credit markets may have increased vulnerabilities in the financial system, with potential systemic implications. Privately financed leveraged buyout transactions with high debt multiples tend to be more vulnerable to economic slowdowns. Competition in private credit has led to deterioration in covenant quality, and managers of private credit deals often finance deals of other managers, which concentrates risk.[26] Lending is largely opaque, driving an accumulation of asset quality performance risks that may be hard for market participants and regulators to discern until it is too late to counteract. In all, private credit is a relatively new asset class, with performance untested in a prolonged economic downturn. If private credit were suddenly restricted in a market stress event, smaller borrowers could face rollover risks if bank financing is unable to handle the new credit demand under current regulations. Because of the low transparency and limited liquidity in private credit markets, spillovers to other markets could occur during a stress episode as investors are forced to sell other assets with more timely mark-to-market pricing and more liquid secondary markets in order to access cash.

Policies to Support Financial Stability in a High-Inflation Environment

The case studies illustrate how NBFI stress often emerges as a result of a combination of vulnerabilities related to elevated financial leverage, liquidity, and interconnectedness.[27] Under the current high-inflation environment, higher interest rates and tighter financial conditions can interact with these vulnerabilities in the NBFI ecosystem, potentially triggering investor runs and asset fire sales. In such circumstances, central banks may then face a challenging trade-off between safeguarding financial stability and simultaneously maintaining price stability. Consequently, ongoing monitoring and timely

[26]Wiggins, Kaye. 2022. "Selling to Yourself: The Private Equity Groups that Buy Companies They Own." *Financial Times*, June 21.

[27]The Financial Stability Board's 2023 workplan outlines work being taken forward to address NBFI vulnerabilities, with a particular focus on not only addressing the rise in demand for liquidity in stress periods but also considering the lack of resilience of liquidity supply in a stress episode.

identification of vulnerabilities in the NBFI ecosystem is particularly important at this juncture to ameliorate the difficult trade-off between the price stability and financial stability mandates. The appropriate policy response by central banks should account for the emerging vulnerabilities in NBFIs; the monetary policy framework in place; and, critically, the supervisory, regulatory, and legal framework of each jurisdiction.

Closing Data Gaps, Enhancing Risk Management, and Strengthening Regulation and Supervision

Several key guardrails are essential to safeguard financial stability. They include (1) closing data gaps to facilitate appropriate and timely risk assessment by market participants (by encouraging market discipline) and supervisory authorities, (2) incentivizing stronger risk management by the NBFIs themselves, (3) implementing adequate and comprehensive regulatory standards, and (4) conducting appropriately resourced and intensive supervisory oversight. With these elements in place, the need for action by central banks should be reduced, or at least limited to tail risks, thereby mitigating the risk of moral hazard.

To carry out adequate supervision and regulation, the availability of reliable and comparable data is a key prerequisite. Closing data gaps should therefore be a policy priority. Adequate data coverage enables regulators and central banks to analyze risk profiles appropriately and calibrate necessary regulatory approaches.

In terms of robust risk management and regulation to manage the risks from a growing NBFI sector, NBFI entities themselves should improve their risk management to address the vulnerabilities to which they are exposed. In addition, adequate regulation proportionate to the risks of different types of NBFIs is key moving forward. The heterogeneity of NBFI business models suggests that a one-size-fits-all approach to regulation is not appropriate. NBFIs need to be regulated and supervised from a myriad of different angles. Conduct requirements such as public disclosure are important to support market discipline and price discovery, as are governance requirements to ensure proper risk management, and prudential regulations (such as capital and liquidity management tools) to address quantifiable risks (such as credit, market, and liquidity). Jurisdictions should ensure that supervision is adequately intrusive to ensure compliance with all relevant regulatory elements for each sector (see Box 2.1 for a brief overview of NBFI supervisory and regulatory priorities).[28]

Guidelines for Central Bank Intervention to Provide Liquidity

Central bank intervention should aim to address liquidity and not solvency problems. 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. The financial stability intervention should be parsimonious to avoid conflicting with the monetary policy stance, especially in a tightening cycle. This means pricing it to be relatively expensive to avoid attracting opportunistic demand. Finally, central banks should introduce appropriate risk mitigation (for example, haircuts) and agree on loss sharing with the fiscal authorities to manage risks to their own balance sheet.[29]

What is different about NBFIs, and when should they be eligible for central bank liquidity? NBFIs were traditionally not at the center of the financial system and credit intermediation compared with banks. Hence, NBFIs are usually not central bank counterparties for monetary policy purposes, although there have been exceptions (that is, discount houses in the United Kingdom and primary dealers and money market funds in the United States). NBFIs have grown to become key financial intermediaries, including in liquidity provision during normal times, as banks have stepped back. Liquidity support to the NBFI sector has been provided primarily through the standard counterparties (banks). Therefore, opening access to central bank liquidity to NBFIs could be necessary if there is a high risk of contagion either to systemically important institutions or markets or if the sector or entities are important for financial intermediation and credit provision.

[28]For a detailed discussion of policy options for investment funds see Garcia Pascual, Singh, and Surti (2021) and Chapter 3 of the October 2022 *Global Financial Stability Report* as well as Claessens and Lewrick (2021) and Financial Stability Board (2022a, 2022b).

[29]The fiscal authorities commit to underwrite part or all the losses that the central bank may incur because of the liquidity support either by providing guarantees or by setting up a special-purpose vehicle. Partial risk sharing could be considered to incentivize prudent program design.

Table 2.3. Liquidity Frictions: Diagnoses and Potential Responses

Nonbank Financial Intermediaries	Risks	Security Types	Central Bank Responses
Nonbank intermediaries	Securities dealers lose access to funding because of uncertainty about: • Counterparty creditworthiness • Collateral values	Sovereign bonds	Collateralized lending (for example, repo): expanded eligibility for counterparties
		Corporate bonds, asset-backed securities	Collateral upgrade (that is, swaps)
		Commercial paper	Asset purchases: expanded counterparties and asset universe
	Securities dealers cannot sell assets at reasonable prices	All types of securities	Asset purchases: expanded counterparties and asset universe
Investment funds (including money market and hedge funds)	Funds face temporary redemption pressures (liquidity mismatches)	All types of securities	Collateralized lending (for example, repo): expanded eligibility for counterparties
	Funds face persistent redemption pressures (liquidity mismatches)	All types of securities	Asset purchases: expanded counterparties and asset universe
Pension funds	Funds face early/unexpected redemption	All types of securities	Asset purchases: expanded counterparties and asset universe
	Funds face liquidity pressure arising from derivative/valuation	All types of securities	Collateralized lending (for example, repo): Expanded eligibility for counterparties
Insurance	Insufficient liquidity buffer/ unexpectedly high pay-off	All types of securities	Asset purchases
Central counterparties	Central counterparties lose access to funding (and cannot sell high-quality liquid assets)	High-quality liquid assets	Idiosyncratic (lender of last resort)
Systemic nonbank financial intermediaries regardless of the type	A systemically important (solvent) nonbank financial intermediary loses access to funding	Various, including credit claim	Idiosyncratic (lender of last resort)

Source: IMF staff.
Note: The central bank response would depend on the nature of the liquidity issue. Collateralized lending would respond in priority to temporary funding pressure, whereas asset purchases would address market illiquidity and liquidity drain with less chance of recovery.

The challenge is to transpose the well-established principles for central bank liquidity provision to NBFIs while addressing the "new" risks appropriately. It is therefore paramount to guarantee that appropriate guardrails are in place, including in terms of NBFI supervision and regulation (Box 2.1).

On lending, the central bank could expand eligible collateral (with appropriate haircuts) or expand the counterparty list to add NBFIs if the new counterparties are appropriately regulated and supervised (see Table 2.3).[30] In practice, NBFIs generally use financial market infrastructures of a given jurisdiction and settle the transactions with their banking agents, which is usually one of the standard counterparties. To improve efficiency during stress periods, eligible counterparts could pre-position collateral at the central bank; this entails placing securities in a central bank account, which are then readily available for them to pledge as collateral against any lending operation.

On purchasing, the central bank could broaden the list of counterparties in asset purchase operations to those that are not part of monetary operations. This should be done as appropriate to avoid relying on dealer banks' intermediation or expanding the universe of purchased assets.

Regarding the type of central bank interventions, there are three broad categories: (1) discretionary marketwide operations, (2) standing lending facilities, and (3) discretionary provision through LOLR arrangements.

First, discretionary marketwide operations may be required to deal with broad market liquidity stress events. "Marketwide" refers to asset-purchase and lending operations aimed at re-establishing proper

[30]For example, in response to funding pressures during the global financial crisis, the Federal Reserve established the Primary Dealer Credit Facility, which provided primary dealers (securities dealers licensed and supervised by the Federal Reserve) with committed funding collateralized by investment-grade securities. In other markets (for example, Hungary and India), central banks expanded term repo operations to NBFIs (for example, mutual funds and insurance companies) to address sectoral liquidity stresses. Collateral swaps are also an effective tool to support a return to market-based activity when markets are hampered by uncertainty about underlying collateral asset value.

functioning of a market segment (such as government bonds, see Case Study 1) or to cope with stress in an NBFI segment (such as money market funds). "Discretionary" means that the timing and amounts of the operation are decided by the central bank. Lessons from previous stress events highlight that such operations should be (1) temporary, (2) targeted at those segments of the NBFI ecosystem where further market dislocation and disintermediation could have adverse macro-financial stability implications, and (3) designed to restore market functioning while containing moral hazard (King and others 2017). In the past, programs have been "time-bound" if the amount announced is sufficiently large to influence market expectation. Alternatively, the program could be "state contingent" and "self-liquidate" to facilitate exit once market stress abates.[31] In addition, central banks should guarantee that appropriate risk mitigation measures are in place.

Regarding the timing of discretionary marketwide interventions, early provision of liquidity may be preferable to avoid contagion and lessen solvency risk, although it risks increasing moral hazard. A framework based on "discretion under constraints" should be in place. This means data-driven metrics should guide the decision to intervene (the constraints), while policymakers ultimately retain the discretion on whether to intervene. The metrics may be based on a heatmap of indicators—such as funding spreads, premium in relation to a risk-free benchmark, margin requirements, trading volumes, bid-ask spread, and price volatility—with appropriate thresholds. This can be complemented with more sophisticated methods based on forecasts of the short-term distributions of these indicators.[32] The thresholds should ensure that the central bank will contemplate intervening only to respond to extreme tail risks. While these metrics are important guideposts, policymakers' judgment remains crucial in the decision to provide liquidity and ameliorate systemic risk.

Second, access by NBFIs to central banks' standing lending facilities could be granted to reduce the risk of fire sales and spillovers to the financial system. In contrast with discretionary marketwide operations, standing facilities are permanently available at the initiative of the eligible counterparties.[33] Importantly, the bar for such access should be very high to avoid moral hazard.[34] Central banks should coordinate with NBFI regulators to ensure that the appropriate regulatory and supervisory regimes are in place proportionate to the risk profiles of the different types of NBFIs, some of which may not qualify because of a high-risk profile. The central bank should also charge a sufficiently high rate to discourage recourse to the facility in normal times (IMF 2020).

Third, in case of idiosyncratic (not marketwide) stress at a systemically important NBFI, central banks should be prepared to act as LOLR. In some cases, an ex-ante designation of a systemically important NBFI may be in place with accompanying appropriate supervisory and regulatory guardrails (in nonsystemic cases, the institution may be left to the relevant resolution/bankruptcy procedures to instill market discipline). General LOLR principles applied to banks, or standard counterparties provide the template for responses in such cases. The principles affirm that lending should be at the discretion of the central bank, after exhausting other liquidity support options, only to solvent firms, at a penal rate, fully collateralized, and with more intrusive supervisory oversight (Dobler and others 2016). To compensate for the higher risk taken by the central bank, including possibly because of lower-quality collateral and large exposure, conditions could be imposed on the borrower. These might include conditions on the use of the funds and conditions that the measures taken should have a clear timeline to reestablish the liquidity of the institutions. Extra attention is also needed to protect the central bank through loss-sharing arrangements with the government. Finally, LOLR may be necessary even when standing lending facilities are available. For example, this may happen if a systemically important institution has exhausted its eligible collateral, then

[31]State-contingent operations involve setting parameters, such as maximum credit spreads, at which the operations are conducted. When credit spreads "normalize," counterparts resort to market-based transactions and the operation is no longer needed. Self-liquidating operations are operations that, in duration, span the expected period of liquidity stress. Examples include purchases of short-term commercial paper and the provision of short-term funding.

[32]Lafarguette and Veyrune (2021) provide an illustration concerning the foreign exchange market.

[33]Standing lending facilities are defined here as precommitted, on demand, and unlimited short-term funding (see Adrian, Laxton, and Obstfeld 2018 and Maehle 2020).

[34]NBFIs have been included in the monetary policy framework to improve control of the short-term rate when the list of standard counterparties was too restrictive for efficient monetary policy implementation (for example, money market funds in the United States).

the LOLR may provide emergency liquidity against lower quality collateral, but with tighter risk-mitigation measures and conditionality.[35]

Transposing LOLR principles to NBFIs is challenging. Criteria for solvency and viability are not as clearly defined for NBFIs as for banks. LOLR could be provided only to institutions fully in the surveillance perimeter of the central bank, which supposes full information transfer from the NBFI regulators and enough capacity at the central bank to process this information.

Clear communication is critical. In the current high-inflation environment, central banks may be perceived as working at cross-purposes during periods of market stress—they may need to provide liquidity to restore financial stability while bringing inflation back to target, both by hiking the policy rates and possibly by shrinking their balance sheets. In these circumstances, central banks should use separate tools aimed at price stability and financial stability, if available. A clear separation of tools may support communication and strengthen the effectiveness of policy action. The communication should clarify the source of the stress; the objectives of the intervention and its modalities; the time horizon of the intervention, if appropriate; and the time and threshold for exit that preferably does not overlap with the timing of monetary policy operations.

Crisis Management: A Coordinated Response

Regulatory coordination across sectors and jurisdictions is essential both for identifying risks and managing crisis situations. Specifically, internationally coordinated reforms can reduce the risks of cross-border spillovers, regulatory arbitrage, and market fragmentation. Most NBFI regulators across sectors have adopted a risk-based supervisory framework that enables interventions to be adequately calibrated to risks and vulnerabilities and that has mechanisms in place to share information with other regulators and central banks. Jurisdictions should ensure that their data-sharing arrangements ensure timely coordination to swiftly identify cross-sectoral risks and determine further action as needed. Most jurisdictions also have contingency and business continuity requirements for their NBFIs that should be monitored as part of regular supervisory activities. However, the Financial Stability Board recently noted that resolution regimes for systemic NBFIs, including central counterparties and insurers, should be strengthened, and that such regimes should be introduced where they do not exist.[36] The Financial Stability Board also identified the need to address obstacles (for example, legal, regulatory, and operational) to cross-border funding in resolution, including the ability to mobilize collateral across borders.

Cross-Border Considerations

Well-designed policies to address liquidity stresses in NBFIs can have a favorable effect on international spillovers by reducing the procyclicality of cross-border flows and mitigating exchange rate pressures. This is especially the case in emerging market economies that are exposed to large portfolio flows. To harness the benefits that growing cross-border flows bring to emerging market and developing economies, a combination of both recipient and source country policies is needed (Garcia Pascual, Singh, and Surti 2021). In source countries, such policies include robust regulation of NBFIs and well-designed central bank interventions. In recipient emerging market and developing economies, the appropriate mix of macro-financial policies is critical and may include foreign exchange intervention, macroprudential measures, and capital flow measures.[37] Cross-border coordination in the introduction of policy measures would reduce regulatory arbitrage and improve implementation.

[35]An example of a systemically important NBFI (where idiosyncratic support may be justified) may be a central counterparty that clears a significant proportion of risks in a particular market, or any other NBFIs deemed to be systemic by policymakers because of size, centrality in the financial system, the financial services provided, or other reasons. In particular, the activity of central counterparties is narrowly based, with risks directly tied to the price volatility of collateral, which is mostly observable. Any such support can be predicated on compliance with the relevant Principles of Financial Markets Infrastructures and on any risk management criteria that the central bank (or other regulator) may have set.

[36]The Financial Stability Board (2022a, 2022b) calls for urgent work to address cross-border resolution challenges in the nonbank sector.

[37]For information on the IMF's Integrated Policy Framework, see http://www.imf.org/en/Topics/IPF-Integrated-Policy-Framework. For further information on capital flows, see IMF (2022). See also Chapter 3 of the April 2020 *World Economic Outlook*.

Box 2.1. Regulatory and Supervisory Priorities for Nonbank Financial Intermediaries

Regulators should prioritize periodic comprehensive systemic risk assessments across all nonbank financial intermediaries (NBFIs). Such assessments should include systemwide stress testing as well as stress testing of those NBFI subsectors and markets that pose high systemic risks. Certain vulnerabilities, such as liquidity spirals, crowded trades, and indirect interconnectedness, need additional marketwide assessments, especially for high-risk markets such as derivatives, repo, securities lending, and leveraged loans, among others. A special focus should be placed on interconnectedness, as this vulnerability cannot be assessed using microprudential (financial-institution-level) stress testing.

With respect to liquidity mismatches, the structural resilience of open-ended investment funds should be improved. For funds holding very illiquid assets, the liquidity offered to investors should be calibrated closer to the liquidity of funds' assets. Regulators should also focus on greater, more effective, and consistent use of liquidity management tools (such as swing pricing, antidilution levies, in-kind redemptions, and redemption gates, among others) with suitable implementation guidance (see Chapter 3 of the October 2022 *Global Financial Stability Report*). Where private incentives do not align with financial stability goals, mandating the use of some liquidity management tools or granting power to the regulators to activate at least some of those tools, in the public interest, may be necessary. Jurisdictions should also improve their ability to assess liquidity mismatches in the investment fund sector, including by closing knowledge gaps on the liability side—what is called "knowing your investor risk profile." Moreover, funds' liquidity risk management practices could be strengthened. Finally, where policy has been agreed already, such as the Financial Stability Board's policy proposals to enhance money market fund resilience, it is important that jurisdictions take steps to implement the agreed reforms.[1]

[1]The US Securities and Exchange Commission has consulted on a proposed rule on money market fund reform (see https://www.sec.gov/rules/proposed/2021/ic-34441.pdf). The Bank of England and the Financial Conduct Authority published a discussion paper on the resilience of money market funds (see https://www.fca.org.uk/publication/discussion/dp22-1.pdf) and expect to consult on a set of reforms in 2023.

Regulation should also aim to improve leverage disclosures, risk management, and consistency in measurement and consider leverage caps where appropriate. Data granularity for hedge funds and overall improvement in disclosures for other leveraged funds should be prioritized. For other highly leveraged NBFIs, regulators should consider improved reporting in line with their structure and use of leverage, especially off-balance-sheet items and over-the-counter derivatives. At a cross-border level, international standard setters should lead improvements in cross-border consistency in the measurement of leverage beyond hedge funds. Regulators for lenders/counterparties (for example, banks) should improve risk management in such entities with respect to their NBFI exposures. The lack of such management was highlighted in the Archegos and UK liability-driven investment cases. In some cases, regulators might consider leverage caps.

Microprudential stress testing for liquidity and leverage risks should be required and improved. Regulators may consider issuing guidance, as appropriate, for a minimum level of stress testing requirements and frequency to improve the overall quality of stress testing in the NBFI sector.

Financial Sector Assessment Programs have repeatedly noted insufficient resourcing of NBFI supervisory authorities coupled with, in some cases, lack of operational independence, both of which hamper supervisory abilities. Robust resources and independence in line with international standards should be a priority. Also, regulators collecting a substantial amount of granular data but lacking the processing and analytical capabilities should focus on building such capacity. Coordination across sectors is key, given the diversity of regulators supervising NBFIs as should be leveraging on financial stability committees for the collection and analysis of information. Cross-border cooperation needs to be strengthened, particularly on data sharing, supervision, and the use of liquidity management tools. Global standard-setting bodies can play a crucial role in this regard.

References

Abbassi, Puriya, Rajkamal Iyer, José-Luis Peydró, and Francesc R. Tous. 2016. "Securities Trading by Banks and Credit Supply: Micro-Evidence from the Crisis." *Journal of Financial Economics* 121 (3): 569–94.

Adrian, Tobias, Paolo Colla, and Hyun Song Shin. 2012. "Which Financial Frictions? Parsing the Evidence from the Financial Crisis of 2007–09." NBER Working Paper 18335, National Bureau of Economic Research, Cambridge, MA.

Adrian, Tobias, and Bradley Jones. 2018. "Shadow Banking and Market-Based Finance." IMF Departmental Paper 2018/013, International Monetary Fund, Washington, DC.

Adrian, Tobias, Douglas Laxton, and Maurice Obstfeld. 2018. *Advancing the Frontiers of Monetary Policy*. Washington, DC: International Monetary Fund.

Aramonte, Sirio, and Fernando Avalos. 2019. "Structured Finance Then and Now: A Comparison of CDOs and CLOs." *BIS Quarterly Review* (September): 11–14.

Aramonte, Sirio, and Fernando Avalos. 2021. "The Rise of Private Markets." *BIS Quarterly Review* (December): 69–82.

Block, Joern, Young Soo Jang, Steven N. Kaplan, and Anna Schulze. 2023. "A Survey of Private Debt Funds." NBER Working Paper 30868, National Bureau of Economic Research, Cambridge, MA.

Brunnermeier, Markus K., and Lasse Heje Pedersen. 2009. "Market Liquidity and Funding Liquidity." *Review of Financial Studies* 22 (6): 2201–38.

Choi, Jaewon, and Mathias Kronlund. 2018. "Reaching for Yield in Corporate Bond Mutual Funds." *Review of Financial Studies* 31 (5): 1930–65.

Claessens, Stijn, and Ulf Lewrick. 2021. "Open-Ended Bond Funds: Systemic Risks and Policy Implications." *BIS Quarterly Review* (December): 31–51.

Cortes, Fabio, and Luca Sanfilippo. 2021. "Multi-Sector Bond Funds in Emerging Markets—Easy Come, Easy Go." Global Financial Stability Note 221/05, International Monetary Fund, Washington, DC.

Diamond, Douglas W., and Raghuram G. Rajan. 2011. "Fear of Fire Sales, Illiquidity Seeking, and Credit Freezes." *Quarterly Journal of Economics* 126 (2): 557–91.

Dobler, Marc, Simon Gray, Diarmuid Murphy, and Bozena Radzewicz-Bak. 2016. "The Lender of Last Resort Function after the Global Financial Crisis." IMF Working Paper 2016/10, International Monetary Fund, Washington, DC.

Elliott, David, Ralf R. Meisenzahl, and José-Luis Peydró. 2023. "Nonbank Lenders as Shock Absorbers: Evidence from US Monetary Policy Spillovers." Staff Working Paper 1102, Bank of England, London.

Falato, Antonio, Ali Hortaçsu, Dan Li, and Chaehee Shin. 2021. "Fire-Sale Spillovers in Debt Markets." *Journal of Finance* 76 (6): 3055–102.

Financial Stability Board. 2022a. "Assessment of the Effectiveness of the FSB's 2017 Recommendations on Liquidity Mismatch in Open-Ended Funds." Financial Stability Board, Basel, Switzerland.

Financial Stability Board. 2022b. "Enhancing Resilience of Nonbank Financial Intermediation." Financial Stability Board, Basel, Switzerland.

Financial Stability Board. 2022c. "Global Monitoring Report on Nonbank Financial Intermediation." Financial Stability Board, Basel, Switzerland.

Financial Stability Board. 2022d. "US Dollar Funding and Emerging Market Economy Vulnerabilities." Financial Stability Board, Basel, Switzerland.

Garcia Pascual, Antonio, Ranjit Singh, and Jay Surti. 2021. "Investment Funds and Financial Stability: Policy Considerations." IMF Departmental Paper 2021/018, International Monetary Fund, Washington, DC.

Girardi, Giulio, Kathleen W. Hanley, Stanislava Nikolova, Loriana Pelizzon, and Mila Getmansky Sherman. 2021. "Portfolio Similarity and Asset Liquidation in the Insurance Industry." *Journal of Financial Economics* 142 (1): 69–96.

Greenwood, Robin, and David Thesmar. 2011. "Stock Price Fragility." *Journal of Financial Economics* 102 (3): 471–90.

International Monetary Fund (IMF). 2020. "IMF Chile: Technical Assistance Report—Central Bank Services to Nonbank Financial Institutions." IMF Country Report 2020/160, Washington, DC.

International Monetary Fund (IMF). 2022. "Review of the Institutional View on the Liberalization and Management of Capital Flows." IMF Policy Paper 2022/008, Washington, DC.

International Organization of Securities Commissions (IOSCO). 2019. "Recommendations for a Framework Assessing Leverage in Investment Funds." IOSCO, Madrid, Spain.

Irani, Rustom M., Rajkamal Iyer, Ralf R. Meisenzahl, and José-Luis Peydró. 2021. "The Rise of Shadow Banking: Evidence from Capital Regulation." *Review of Financial Studies* 34 (5): 2181–235.

Jiang, Hao, Yi Li, Zheng Sun, and Ashley Wang. 2022. "Does Mutual Fund Illiquidity Introduce Fragility into Asset Prices? Evidence from the Corporate Bond Market." *Journal of Financial Economics* 143 (1): 277–302.

Kashyap, Anil K., and Jeremy C. Stein. 2023. "Monetary Policy When the Central Bank Shapes Financial-Market Sentiment." *Journal of Economic Perspectives* 37 (1): 53–76.

King, Darryl, Luis Brandao-Marques, Kelly Eckhold, Peter Lindner, and Diarmuid Murphy. 2017. "Central Bank Emergency Support to Securities Markets." IMF Working Paper 17/152, International Monetary Fund, Washington, DC.

Lafarguette, Romain, and Romain Veyrune. 2021. "Foreign Exchange Intervention Rules for Central Banks: A Risk-Based Framework." IMF Working Paper 2021/032, International Monetary Fund, Washington, DC.

Maehle, Nils. 2020. "Monetary Policy Implementation: Operational Issues for Countries with Evolving Monetary Policy Frameworks." IMF Working Paper 2020/026, International Monetary Fund, Washington, DC.

Organisation for Economic Co-operation and Development (OECD). 2021. "Pension Markets in Focus 2021." Paris, France.

Shleifer, Andrei, and Robert W. Vishny. 2010. "Unstable Banking." *Journal of Financial Economics* 97 (3): 306–18.

Timmer, Yannick. 2018. "Cyclical Investment Behavior across Financial Institutions." *Journal of Financial Economics* 129 (2): 268–86.

CHAPTER 3

GEOPOLITICS AND FINANCIAL FRAGMENTATION: IMPLICATIONS FOR MACRO-FINANCIAL STABILITY

Chapter 3 at a Glance

- Rising geopolitical tensions among major economies have intensified concerns about global economic and financial fragmentation.
- Financial fragmentation induced by geopolitical tensions could have potentially important implications for global financial stability by affecting the cross-border allocation of capital, international payment systems, and asset prices.
- Geopolitical tensions, proxied by the divergence in the foreign policy orientation of investing and recipient countries, matter significantly for cross-border portfolio allocation. For example, a one-standard-deviation increase in geopolitical tensions between an investing and a recipient country—equivalent to the diverging voting behavior of the United States and China in the United Nations since 2016—could reduce bilateral cross-border portfolio and bank allocation by about 15 percent.
- An increase in geopolitical tensions with major partner countries could cause a sudden reversal of cross-border capital flows, with the effect being more pronounced for emerging market and developing economies than for advanced economies.
- This could pose macro-financial stability risks by increasing banks' funding costs, reducing their profitability, and lowering their provision of credit to the private sector. These impacts are likely to be disproportionately larger for banks with lower capitalization ratios.
- Greater financial fragmentation stemming from geopolitical tensions could also exacerbate macro-financial volatility in the longer term by reducing international risk diversification opportunities in the face of adverse domestic and external shocks.

Policy Recommendations

- Policymakers need to be aware of potential financial stability risks associated with a rise in geopolitical tensions and devote resources to their identification, quantification, management, and mitigation.
- To develop actionable guidelines for supervisors, a systematic approach that employs stress testing and scenario analysis is needed to assess and quantify geopolitical shock transmission to financial institutions.
- Based on the assessments of geopolitical risks, banks and nonbank financial institutions may need to hold adequate capital and liquidity buffers to mitigate the adverse consequences of rising geopolitical risks.
- In the face of rising geopolitical tensions, the adequacy of the global financial safety net needs to be ensured through strong levels of international reserves held by countries, bilateral and regional financial arrangements, and precautionary credit lines from international financial institutions.
- Given the significant risks to global macro-financial stability, countries should make utmost efforts to strengthen engagement and dialogue to diplomatically resolve geopolitical tensions and prevent economic and financial fragmentation.

The authors of this chapter are Mario Catalán (co-lead), Max-Sebastian Dovì, Salih Fendoglu, Oksana Khadarina, Junghwan Mok, Tatsushi Okuda, Hamid Reza Tabarraei, Tomohiro Tsuruga (co-lead), and Mustafa Yenice, under the guidance of Fabio Natalucci and Mahvash Qureshi. Luigi Zingales served as an expert advisor.

Introduction

Rising geopolitical tensions have intensified concerns about global economic and financial fragmentation. Geopolitical tensions have increased globally over the past few years amid deteriorating diplomatic ties between the United States and China, and Russia's invasion of Ukraine.[1] This increase is reflected in the growing incidence of geopolitical threats and conflicts, a rise in military spending across economies, and increased disagreement in the voting behavior of the United States and China on foreign policy issues in the United Nations (Figure 3.1). The escalation in geopolitical tensions has raised concerns about greater geoeconomic fragmentation—a policy-driven reversal of economic and financial integration, often guided by strategic considerations (Aiyar and others 2023)—that could be costly for the world economy.[2]

Geopolitical factors may already be influencing the global economic and financial landscape. Several studies document that geopolitical factors matter for international trade linkages and that global trade has declined in recent years after major countries imposed new restrictions on the exchange of goods and services (see Fisman and others 2022; Góes and Bekkers 2022; and the October 2022 *Regional Economic Outlook: Asia and Pacific*). Geopolitical relationships also seem to matter for allocating cross-border capital, with investors generally allocating a smaller share of capital to recipient countries with more distant foreign policy outlooks to their country of origin (Figure 3.2, panels 1–3; April 2023 *World Economic Outlook*).[3] Moreover, as geopolitical tensions have risen in recent years, restrictions on cross-border capital flows have also increased (Figure 3.2, panel 4), with apparent implications for international capital allocation.[4] For example, after Russia's invasion of Ukraine and the subsequent sanctions imposed by the United States and European Union on Russia, cross-border banking and portfolio debt flows to Russia and its allies (countries that rejected the motion in the United Nations in March 2022 to condemn Russia's war on Ukraine) have reversed sharply, with allocations falling by about 20 and 60 percent relative to prewar levels, respectively (Figure 3.2, panels 5 and 6).

An increase in geopolitical tensions could have adverse implications for macro-financial stability. Imposing financial restrictions, or increased uncertainty and risk aversion generated by geopolitical tensions, could exacerbate global financial fragmentation as international investors reallocate investment portfolios and credit lines away from geopolitically more distant countries.[5] This could trigger a sharp reversal of capital flows and a decline in asset prices, with associated consequences for macro-financial stability.[6] Beyond these near-term effects, increased financial fragmentation may make countries more vulnerable to adverse domestic and external shocks by reducing opportunities to diversify risk, thereby raising the likelihood of systemic financial crisis in the longer term as well.

The financial effect of a rise in geopolitical tensions may not be uniform across countries. Countries are likely to be affected more if tensions escalate with their major economic and financial partners.[7]

[1]The term "geopolitics" is a multidimensional concept that has traditionally been used to describe the practice of states to control and compete for territory, although in recent decades, power struggles for other reasons (such as trade or politics) and of a diverse set of agents—including corporations, rebel groups, and political parties—have also been considered as part of geopolitics. See Caldara and Iacoviello (2022) and references therein.

[2]An escalation of geopolitical tensions could lead to countries imposing policy measures that restrict the cross-border flow of goods and services, capital, labor, and technologies with rival countries, resulting in increased fragmentation across countries. Such fragmentation may entail strategic advantages for individual countries but is likely to impose significant economic costs in the aggregate (Aiyar and others 2023).

[3]The similarity in foreign policy outlook is captured by the agreement in voting behavior of the investor and recipient countries in the UN General Assembly (see Online Annex 3.2 for details). The trends reported in panels 1–3 of Figure 3.2 are supported by Kempf and others (2022), who show that US-domiciled investors invest less in countries with ideologically distant governments.

[4]The sharp increase in the number of sanctioned countries in 2022 reflects the financial sanctions imposed by Russia on the European Union. The increase in financial sanctions across countries has been accompanied by a rise in other types of sanctions in recent years, notably trade sanctions (see Online Annex Figure 3.2.2).

[5]In principle, financial systems may already be fragmented to some extent because of regulatory differences, technological and natural barriers, market forces, trade and capital account policies, and taxation (Claessens 2019). Geopolitical factors could be an important contributor to financial fragmentation through the imposition of trade and capital account restrictions or an increase in uncertainty.

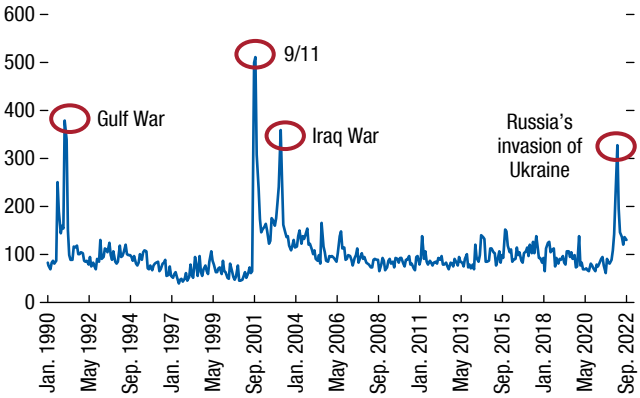
[6]As discussed later, the effect on capital flows, asset prices, and macro-financial stability could be amplified by restrictions imposed on trade and technology, and by supply-chain and commodity-market disruptions. While in principle the impact of a sudden disruption in financial ties with one country (or a group of countries) could be mitigated if the countries that are more similar geopolitically increase their portfolio allocation to the affected economy, in practice, such reallocations may take some time to materialize, leading to financial stress in the affected economy, particularly in the short run.

[7]Countries may also be affected indirectly if their major trade and financial partners are involved in a geopolitical conflict with another country through cross-border macro-financial spillovers, or financial contagion. This chapter focuses on the direct effect of geopolitical tensions with partner countries.

Figure 3.1. Rise in Global Geopolitical Tensions

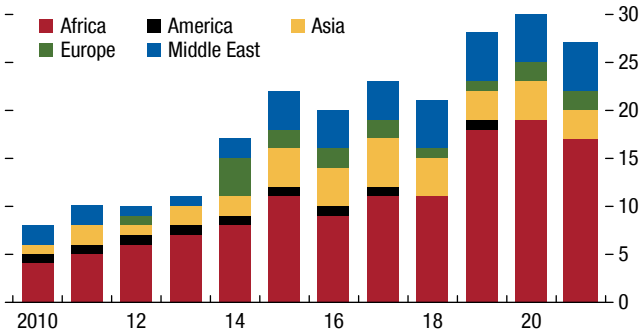
Geopolitical risks remain elevated, especially since Russia's invasion of Ukraine.

1. Geopolitical Risk Index, January 1990 to September 2022
(Index)



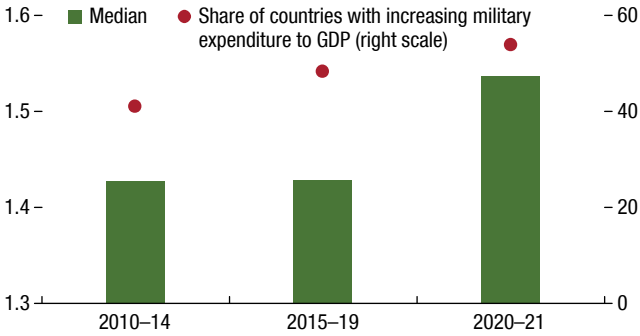
International military disputes have almost tripled in the past decade ...

2. International Military Conflicts, 2010–21
(Number of disputes)



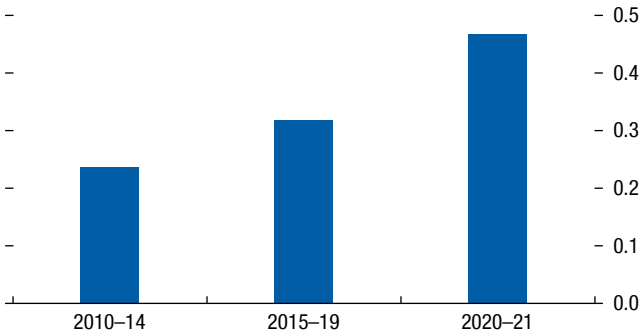
... and military spending has been on the rise.

3. Ratio of Military Expenditure to GDP, 2010–21
(Percent)



Disagreement between the United States and China in UN voting has increased.

4. Foreign Policy Distance, 2010–21
(Index)



Sources: Caldara and Iacoviello 2022; Häge 2011; SIPRI Military Expenditure Database; Uppsala Conflict Data Program; and IMF staff calculations.
Note: Panel 1 shows the news-based geopolitical risk index computed by Caldara and Iacoviello (2022, p. 1197), which is defined as the "threat, realization, and escalation of adverse events associated with wars, terrorism, and any tensions among states and political actors that affect the peaceful course of international relations." The index is normalized to be equal to 100 on average for the 1985–2019 period. Panel 2 is based on data from the Uppsala Conflict Data Program, where international military conflicts are defined as a contested incompatibility (resulting in at least 25 battle-related deaths in one calendar year) between (1) two or more governments (interstate); (2) a government and a nongovernmental party where the government side, the opposing side, or both sides receive troop support from other governments (internationalized intrastate); and (3) a state and a nonstate group outside its own territory, where the government side fights to retain control of a territory outside the state system (extrasystemic). Conflicts between a government and a nongovernmental party with no interference from other countries are excluded from the sample. In panel 2, the Uppsala Conflict Data Program divides the world into five categories geographically (America: North and South America; Africa: sub-Saharan Africa and North Africa; Middle East: Middle East, not including North Africa; Europe; and Asia: Asia and Oceania). Panel 3 plots the median military spending to GDP across all countries in the sample and the share of countries in the sample with an increase in this ratio, averaged over the indicated time periods. Panel 4 plots the average disagreement in foreign policy between the United States and China based on their voting patterns in the UN General Assembly (Häge 2011), with values standardized from –1 (less disagreement) to 1 (more disagreement). See Online Annex 3.1 for more details on data sources and variables.
SIPRI = Stockholm International Peace Research Institute.

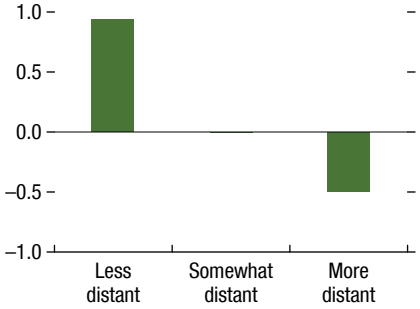
Economies with less developed financial systems or inadequate external buffers may also be more vulnerable to geopolitical shocks because of their limited capacity to absorb the adverse consequences of such shocks.

In this context, this chapter examines the role of geopolitical factors as drivers of financial fragmentation and the associated financial stability risks. The chapter begins by laying out a simple conceptual framework to discuss the main channels through which geopolitical tensions could lead to financial fragmentation and threaten macro-financial stability. It then uses a sample of advanced economies and emerging market and developing economies over the past two decades to review global financial developments and empirically

Figure 3.2. Geopolitical Tensions and Global Financial Fragmentation

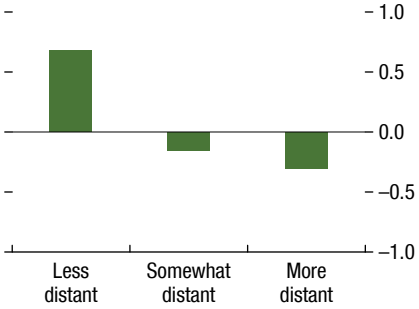
Investing countries tend to allocate a smaller share of foreign direct investment to countries with less agreement on foreign policy issues ...

1. Direct Investment, 2009–21
(Percentage points; relative to world portfolio)



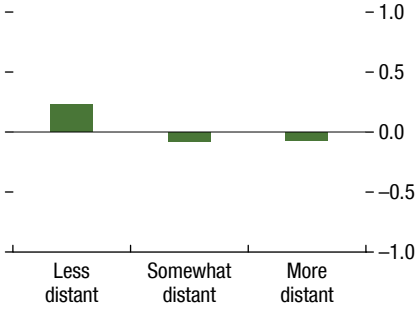
... as well as a smaller share of cross-border portfolio investment ...

2. Portfolio Investment, 2009–21
(Percentage points; relative to world portfolio)



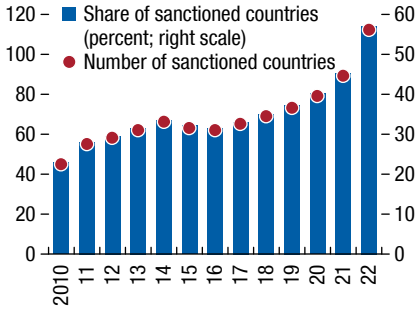
... and bank credit.

3. Banking Claims, 2009–21
(Percentage points; relative to world portfolio)



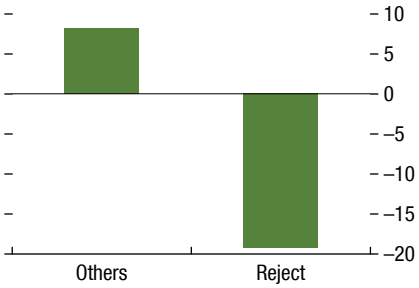
Bilateral financial sanctions have increased in recent years.

4. Number of Countries with Financial Sanctions, 2010–22



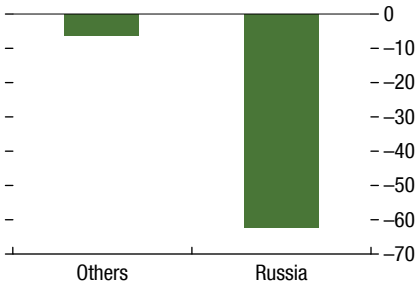
Since invading Ukraine, Russia has suffered a sharp decline in cross-border banking flows ...

5. Cross-Border Banking Flows
(Cumulative 2022:H1 percent of prewar cross-border banking claims)



... as well as portfolio flows.

6. Cross-Border Portfolio Debt Flows
(Cumulative 2022:March–November; percent of prewar portfolio debt allocation)



Sources: Bank for International Settlements, Locational Banking Statistics; FinFlows; Global Financial Sanctions Database; Institute of International Finance, Capital Flows Tracker; IMF, Coordinated Direct Investment Survey; IMF, Coordinated Portfolio Investment Survey; and IMF staff calculations.
Note: Panels 1–3 show the average share of bilateral cross-border financial assets allocated to a recipient country by a source country, in excess of the total cross-border financial assets allocated to the recipient country by all source countries. The latter adjustment is made to account for the different economic sizes of recipient countries. The averages are taken over the indicated years for different ranges of the bilateral foreign policy distance measure, with less, somewhat, and more distant indicating country pairs in the bottom, middle, and top third, respectively, of the sample distribution of the distance measure. Panel 4 indicates the number of countries with financial sanctions (dots) and the share of countries with financial sanctions in the sample (bars). Panel 5 shows the sum of cross-border banking flows over the first and second quarters of 2022 to countries that "rejected" the motion to condemn Russia's invasion of Ukraine (including Belarus, Eritrea, Democratic People's Republic of Korea, Russia, and Syria) in the UN General Assembly meeting of March 2, 2022, and all others that did not reject the motion (that is, those that were "absent" or voted "abstain" and "accept" on the motion; excluding Ukraine), in percent of total cross-border claims of these groups in the fourth quarter of 2021. Panel 6 indicates the sum of portfolio debt flows to Russia and all other countries (excluding Ukraine) that did not vote to reject the motion after the onset of the war (March through November 2022) in percent of their prewar (February 2022) portfolio debt allocation.

analyze three key questions. First, do geopolitical factors influence the cross-border allocation of capital? Second, do geopolitical shocks, and the financial fragmentation driven by those shocks, affect macro-financial stability as proxied by the profitability, solvency, and lending behavior of banks? And third, does financial fragmentation make countries more vulnerable to adverse shocks by reducing their international risk diversification opportunities?[8]

To capture geopolitical factors, the empirical analysis primarily relies on a commonly used

[8]See Online Annex 3.1 for the list of countries in the sample. The exact sample composition varies across analyses based on data availability.

measure of "geopolitical distance" between countries obtained from Häge (2011). This measure reflects the divergence in countries' voting behavior in the UN General Assembly, such that countries with more dissimilar voting patterns are deemed more geopolitically distant.[9] The sensitivity of the results is examined using alternative measures based on the UN voting behavior from Häge (2011) and Bailey, Strezhnev, and Voeten (2017) as well as other proxies such as bilateral financial sanctions and arms trade.[10]

How Geopolitical Tensions Can Affect Financial Stability: A Conceptual Framework

Geopolitical tensions could lead to financial instability through two key channels. The first is directly through a financial channel triggered by restrictions placed on capital flows and payments (such as capital controls, financial sanctions, and international asset freezing) or through an increase in uncertainty and investors' risk aversion to future restrictions, the escalation of conflict, or expropriations (Figure 3.3). These factors could affect cross-border capital allocation and lead to financial fragmentation, as well as to a decline in asset prices, as investors and lenders may adjust portfolio investment allocations and cut cross-border credit lines to the rival country (or group of countries).[11] If capital is suddenly reallocated, it could generate liquidity and solvency stress in the financial and nonfinancial sectors by increasing funding costs or debt rollover risk and by reducing asset values and overall profitability, thereby threatening macro-financial stability.[12,13]

The effects of the financial channel on financial stability could be exacerbated through a real channel. An increase in geopolitical tensions could also affect financial instability indirectly through a real channel triggered by restrictions on international trade and technology transfer and by disruptions to supply chains and commodity markets. This outcome could adversely affect international trade and economic growth and generate inflationary pressures. These factors could, in turn, adversely affect the liquidity and profitability of nonfinancial corporations, generating credit risks for banks and undermining macro-financial stability.

These financial and real channels are likely to be mutually reinforcing. Adverse feedback loops between the financial and real channels could arise if, for example, restrictions on international trade were to reduce economic output, which would discourage cross-border investment and further weaken economic activity and trade interlinkages.[14] Similarly, physical commodity market disruptions caused by a spike in geopolitical tensions could lead to higher inflation, warranting a tightening of monetary policy that could dampen asset prices and raise borrowing costs for nonfinancial firms, posing financial stability risks.

Financial fragmentation induced by geopolitical tensions could also increase the vulnerability of economies to adverse shocks by limiting the diversification of cross-border exposures. Beyond the near-term effect of a reallocation of cross-border capital on

[9]This measure is based on the "S" measure in Signorino and Ritter (1999) and calculates the distance metric as the sum of squared deviations in the UN votes. See Online Annex 3.2 for further details.

[10]The various geopolitical measures considered in this chapter are strongly positively correlated. For example, the correlation between the geopolitical distance measures obtained from Häge (2011) and Bailey, Strezhnev, and Voeten (2017) range from 0.6 to 0.9. Similarly, the likelihood of imposing financial sanctions is significantly higher in relation to countries that are more geopolitically distant. See Online Annex 3.2 for further details.

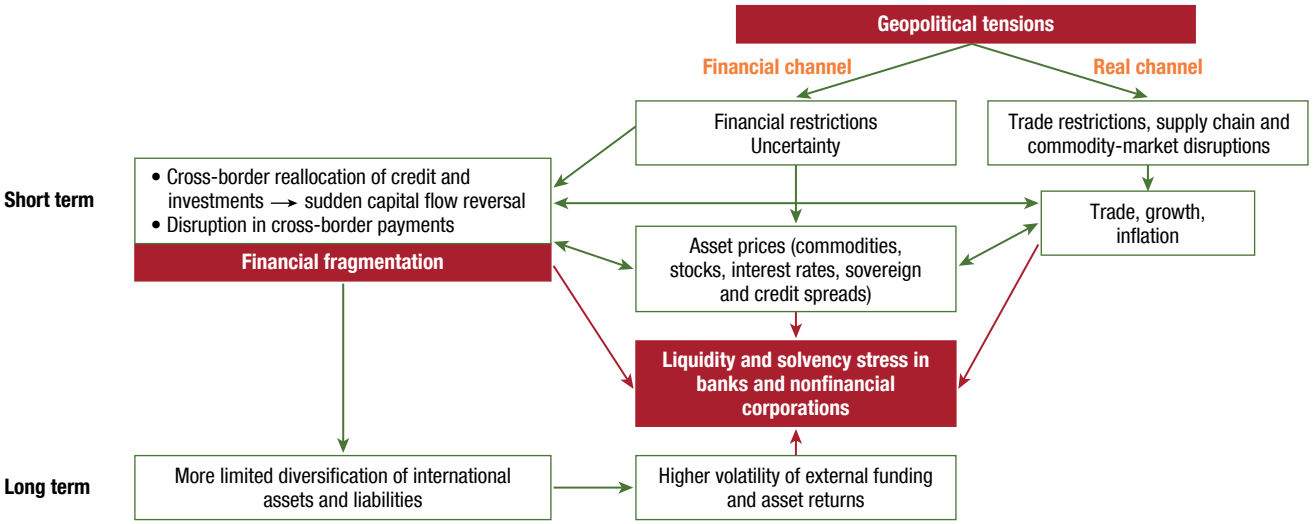
[11]See Coeurdacier, Kollmann, and Martin (2010) and Okawa and van Wincoop (2012) for more general theoretical frameworks on the effects of cross-border frictions and transaction costs on international asset and liability portfolios.

[12]A large body of literature shows that sharp and sudden reversals in cross-border capital flows are associated with financial crises, particularly in emerging market and developing economies (Reinhart and Rogoff 2009; Ghosh, Ostry, and Qureshi 2017). Focusing on geopolitical risks, Phan, Tran, and Iyke (2022) show that banking stability declines as such risks increase, while several studies (Ghasseminejad and Jahan-Parvar 2021; Jung, Lee, and Lee 2021; Salisu and others 2022) find that an increase in geopolitical risks is associated with a decline in stock returns and increased market volatility. Gurvich and Prilepskiy (2015) show that financial sanctions that Western countries imposed on Russia after its annexation of Crimea in 2014 had a significant effect on foreign funding and output.

[13]A reversal in foreign direct investment as a result of geopolitical tensions could lead to the closure of factories and stores, reducing economic growth and hurting employment directly (Busse and Hefeker 2007; April 2023 *World Economic Outlook*).

[14]Several studies establish a strong interrelationship between cross-border financial and trade linkages (for example, see Cavallo and Frankel 2008).

Figure 3.3. Key Channels of Transmission of Geopolitical Tensions and Macro-Financial Stability



Source: IMF staff.
Note: The figure shows the two key channels of transmission, financial and real, through which geopolitical tensions could contribute to financial fragmentation and exacerbate macro-financial stability risks. In addition to these channels, macro-financial stability could also be affected if geopolitical tensions increase cybersecurity risks, compliance, legal and reputational risks for entities, risks associated with money laundering and financing of terrorism, or climate-related risks because of lack of international coordination to mitigate climate change.

macro-financial stability discussed earlier, financial fragmentation could increase the volatility of capital flows in the longer term by limiting the possibilities for international risk diversification.[15] The higher volatility of capital flows could, in turn, lead to greater volatility in domestic financial markets, making financial systems more susceptible to shocks and prone to crisis.[16]

The effects of geopolitical tensions and financial fragmentation depend on country characteristics. The effect of geopolitical tensions on macro-financial stability could be highly asymmetric depending on country characteristics such as financial interconnectedness, level of financial development, and the size of available external buffers to help cushion the effect of a sudden reallocation of foreign capital. Countries whose currencies are commonly held as international reserves may also over time face a shift in the preferences of foreign official investors (such as central banks) toward reserve assets of geopolitically more aligned countries, with potentially destabilizing effects on financial markets (Aiyar and others 2023).[17] In some cases, the adverse consequences of financial fragmentation induced by geopolitical tensions may be mitigated if it helps to ensure greater continuity in the availability of external finance as countries move away from less predictable financing from geopolitically distant countries to potentially more stable financing from geopolitically aligned countries.

The macro-financial effect of geopolitical tensions could spill over to other countries not directly involved in conflicts. The effects of geopolitical tensions could reverberate across borders to major trading and financial partners, posing a risk to global financial stability through, for example, losses at financial institutions, withdrawal of credit lines, decline in asset prices, high inflation, or a slowdown in economic activity as a

[15]Financial fragmentation could also increase the volatility of capital flows in emerging market and developing economies by limiting their financial deepening and development, thereby weakening their capacity to absorb shocks.

[16]While greater financial integration can also expose countries to external shocks and increase the volatility of capital flows, such risks could be mitigated through appropriate policy frameworks (Ghosh, Ostry, and Qureshi 2017; IMF 2020; see also Chapter 2 of the April 2023 *Global Financial Stability Report*). Moreover, several types of capital flows such as foreign direct investment and portfolio equity flows are potentially less destabilizing and can help smooth consumption and finance productive investment.

[17]Central banks may reshuffle their portfolios, fearing that geopolitically motivated asset freezing—or other administrative measures—could restrict access to reserve assets. The reserve composition may also change naturally if, as a result of an increase in geopolitical tensions, countries start to trade more with geopolitically aligned countries, invoicing in national currencies. See Aiyar and others (2023) for a more detailed discussion on the implications of geoeconomic fragmentation for the composition of global reserves.

result of disruptions to cross-border trade and supply chains (Chițu and others 2022).[18] The cross-border spillover effects are likely to be larger if geopolitical tensions involve major, globally integrated economies rather than smaller economies with more localized trade and financial interlinkages. While some "neutral" countries may be able to take advantage of the global reallocation of capital resulting from increased geopolitical tensions between major economies by attracting new foreign capital, the beneficial effects of such capital are likely to depend on their absorptive capacity and the policy framework in place to manage large capital inflows.

Geopolitical tensions could affect financial stability through several other channels. Nontraditional risks such as cybersecurity risks may increase as a result of geopolitical tensions, threatening macro-financial stability.[19] Geopolitical tensions and financial fragmentation may also split commodity markets along geopolitical lines and make it more difficult to address climate change, which requires international cooperation to set country-level greenhouse gas reduction commitments as well as deeper global financial integration to support the needed investments to mitigate and adapt to climate change (Rajan 2022; Aiyar and others 2023). This might increase the risk of a disorderly climate transition that could magnify the risks to financial systems (see Chapter 5 of the April 2020 *Global Financial Stability Report* and Chapter 3 of the October 2021 *Global Financial Stability Report*). Furthermore, addressing the external debt problems of many countries after the COVID-19 pandemic requires cooperation among stakeholders, without which both creditor and borrower countries may suffer significant losses (Gaspar and Pazarbasioglu 2022).

This chapter focuses on the direct financial channel of transmission of geopolitical tensions. In what follows, the chapter documents how cross-border financial relationships have evolved over the past few decades to gauge any emerging signs of increasing fragmentation along geopolitical alignments. It then more formally assesses the role played by geopolitical factors in determining cross-border financial interlinkages and their implications for macro-financial stability.

The Changing Global Financial Landscape

Global financial integration increased sharply in the run-up to the global financial crisis, but the momentum has slowed since then. Total external financial assets and liabilities expanded rapidly in the 1990s and through most of the 2000s as cross-border capital flows surged in both advanced economies and emerging market and developing economies amid declining capital account restrictions (Figure 3.4). This trend reversed at the start of the global financial crisis, when cross-border capital flows to many countries declined sharply. It has slowed down since then as capital flows relative to output have been well below their precrisis peak in advanced economies and in emerging market and developing economies.

Several factors may explain the decline in cross-border capital flows, including increasing capital account restrictions across countries. The reduced cross-border capital movements since the global financial crisis are largely the result of a decline in banking flows triggered by a retrenchment of global banks from foreign jurisdictions (Lane and Milesi-Ferretti 2018). However, other factors such as official restrictions increasingly imposed on capital flows may also have played a role (Figure 3.4, panel 3).[20] Capital account restrictions on both capital inflows and outflows have increased notably since the global financial crisis and are now almost as prevalent as the levels observed in the early 1990s in both advanced economies and emerging market and developing economies.[21]

[18]History offers examples of severe cross-border financial contagion triggered by geopolitical conflicts. For example, after the rise in geopolitical tensions that precipitated World War I, British banks that were at the center of the global financial network faced defaults from German counterparts and liquidity constraints. In trying to restore their liquidity positions, British banks cut credit lines to counterparties in the United States, which was not yet involved in the conflict (Ferguson 2008).

[19]Other nontraditional risks may include compliance, legal, and reputational risks for financial institutions as well as risks associated with money laundering and financing terrorism.

[20]Global banks may have retreated from international lending activity for a range of factors such as new capital and liquidity regulations being imposed on banks after the global financial crisis, foreign country risk being reappraised, and ultra-loose monetary policy and low interest rates that encouraged the growth of nonbank financial intermediation (Rankin, James, and McLoughlin 2014; Avdjiev and others 2020). Cross-border capital flows may have also declined because of correspondent banking relationships being reduced, particularly in developing economies (Rice, von Peter, and Boar 2020).

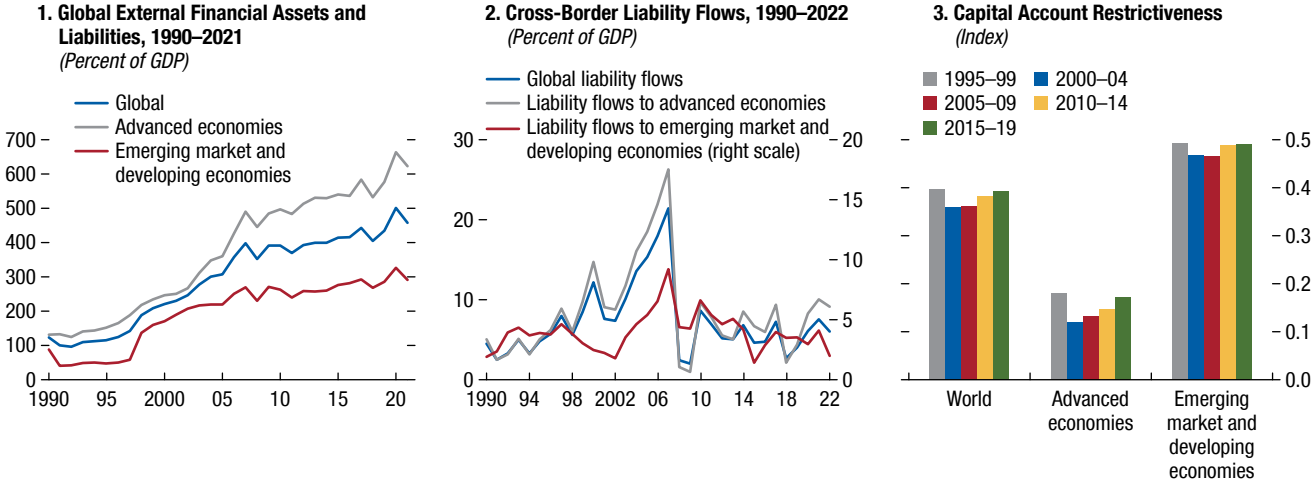
[21]In general, measures to capture restrictions on capital account transactions reflect the presence of such restrictions but not their intensity. Thus, it is plausible that capital account restrictions in place in earlier periods were generally more severe than those observed in recent periods.

Figure 3.4. Developments in Global Financial Integration

Cross-border external positions expanded sharply in the 1990s, but the momentum has slowed since the global financial crisis ...

... as capital flows have declined ...

... amid increasing capital account restrictions.



Sources: External Wealth of Nations database; Fernández and others 2016; IMF, Balance of Payments Statistics; and IMF staff calculations.
Note: Panel 1 indicates the sum of the total stock of external assets and liabilities for all countries (global), advanced economies, and emerging market and developing economies as a percentage of the sum of their respective GDPs. Panel 2 indicates the sum of total liability flows (positive values indicate nonresident capital inflows) for all countries, advanced economies, and emerging market and developing economies as a percentage of the sum of their respective GDPs. Panel 3 indicates the average capital account restrictiveness for all countries, advanced economies, and emerging market and developing economies over the indicated time periods, following Fernández and others (2016), with higher values indicating greater restrictiveness.

Despite the shifts in cross-border capital flows, the United States dominates in global financial markets, although the importance of China has increased. The share of the United States in global debt and portfolio equity investment has remained broadly constant over the past few decades, although its share in foreign direct investment has declined (Online Annex Figure 3.3.1). Concurrently, China and several international financial centers (such as Ireland and Luxembourg) have grown in importance in the global financial system, with a notable increase in their holdings of external assets.

Overall, bilateral financial interlinkages appear to have weakened in recent years, with cross-border investment becoming more concentrated in fewer partner countries. Both advanced economies and emerging market and developing economies tend to have closer financial relationships with advanced economies (Online Annex Figure 3.3.2). In the past few years, however, cross-border financial exposures among advanced economies have increased, whereas international financial exposures appear to be becoming increasingly concentrated more generally, with major advanced economies and emerging market economies engaging in financial trade with fewer partner countries (Figure 3.5).[22]

Geopolitical factors may be influencing cross-border capital allocation. Although global financial interlinkages are complex and driven by many factors, geopolitical affinities (as measured by the similarity of countries' voting behavior in the United Nations) do seem to matter for cross-border capital allocation, as shown in Figure 3.2 (panels 1–3).[23] Recent events

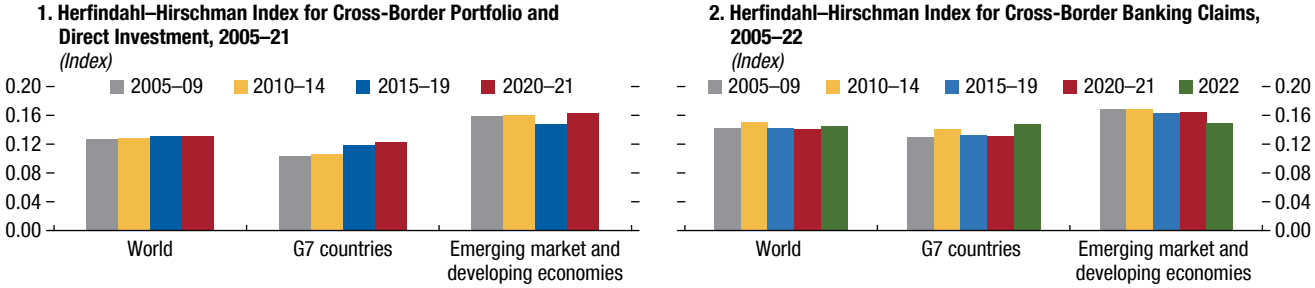
[22]Given their sizable financial exposures to advanced economies, but greater differences on geopolitical issues, emerging market and developing economies are particularly vulnerable to a spike in geopolitical tensions with financial partners (Chapter 4 of the April 2023 *World Economic Outlook*).

[23]Disagreement between countries on foreign policy exhibits a clear clustering pattern, whereby countries that disagree (agree) with the United States also tend to disagree (agree) with the European Union, while those that agree (disagree) with China, tend to disagree (agree) with the United States (Online Annex Figure 3.3.3). Although such a clear-cut pattern is not visible in the network of bilateral financial interlinkages (Online Annex Figure 3.3.4), recent data on cross-border portfolio/direct investment and banking links suggest a weakening of the relationship of the United States and European countries with Russia. For exposure to China, although the trend is less clear-cut, two-way portfolio and direct investment allocations between China and the United States and other major advanced economies seem to have declined over the past decade, while they have increased in relation to Russia (Online Annex Figure 3.3.5).

Figure 3.5. Bilateral Cross-Border Financial Linkages

The concentration of portfolio and direct investment is increasing, suggesting a weakening of broader financial linkages.

This also holds for banking claims across advanced economies.



Sources: Bank for International Settlements, Locational Banking Statistics by Residence (restricted version); FinFlows; IMF, Coordinated Direct Investment Survey; IMF, Coordinated Portfolio Investment Survey; and IMF staff calculations.
Note: The Herfindahl–Hirschman Index is based on the bilateral total exposure (sum of assets and liabilities of each pair of counterparties relative to the sum of the total assets and liabilities of the reporting country) and is computed as the sum of squares of each reporting country's bilateral exposure to all counterparties. See Online Annex 3.2 for more details. G7 = Group of Seven.

also indicate that geopolitical factors are important in determining cross-border capital allocation. For example, US fund flows to China appear to respond to the escalating political tensions between the two countries, although the effect thus far does not seem to have been persistent (Figure 3.6). Given that investors' decisions to allocate capital tend to be driven by many global and domestic factors, this chapter next examines the role of geopolitical factors in driving cross-border capital allocation more formally through regression analysis.

Geopolitical Factors Matter for Cross-Border Capital Allocation

A rise in geopolitical tensions weakens financial relationships between countries. Investors may decide to allocate less capital to geopolitically distant economies for several reasons, including financial restrictions that increase transaction costs, informational asymmetries, general mistrust, and fear of expropriation. Empirical analysis based on the gravity model of bilateral cross-border financial relationships (Portes and Rey 2005) confirms this intuition, showing that source countries tend to allocate significantly less capital to recipient countries with which they have less agreement on foreign policy issues.

The effect of geopolitical tensions on cross-border banking claims and portfolio allocation is sizable, particularly for investment funds. Specifically, controlling for a range of country-specific and bilateral factors, an increase of one standard deviation in geopolitical distance between a source and a recipient country—equivalent, for example, to the divergence in the voting behavior of the United States and China in the United Nations since 2016—is associated with a reduction in bilateral cross-border allocation of portfolio investment and bank claims by about 15 percent (Figure 3.7, panel 1).[24] Investment funds' cross-border portfolio allocations are more sensitive to similar changes in geopolitical distance, with investments declining by more than 20 percent.[25] These impacts are conditional on several recipient country characteristics—specifically, cross-border allocations are less sensitive to changes in geopolitical tensions for countries that are more financially developed, or hold larger stocks of international reserves or net foreign assets (Online Annex 3.4).

[24]The dependent variable is (log) portfolio share of a recipient country in a source country's cross-border portfolio investment or banking claims. To disentangle the role of geopolitical factors in bilateral cross-border investment, the model controls for common global factors (such as global investor risk sentiment and financial conditions) and macroeconomic and structural characteristics of countries by including source-country-time and recipient-country-time fixed effects. It also controls for other bilateral factors that may affect investor allocation decisions such as geographical distance and cultural and linguistic ties between the two countries. All regressors are lagged by one period to mitigate potential endogeneity concerns. Geopolitical distance between countries is measured by how much their voting behavior diverges in the UN General Assembly. See Online Annex 3.4 for details on the definition of geopolitical distance, the empirical framework, and further results.

[25]In addition to portfolio and banking flows, foreign direct investment tends to respond strongly to geopolitical factors, with the evidence pointing to increased sensitivity in recent years (see Chapter 4 of the April 2023 *World Economic Outlook*).

A spike in geopolitical tensions could thus trigger potentially large capital flow reversals from countries. The results of the gravity model suggest that portfolio and banking outflows triggered by geopolitical tensions could be substantial in terms of recipient countries' GDPs. For example, previous results imply that if the geopolitical distance between a recipient country and all partner countries with which it already has little agreement on foreign policy issues were to increase by one standard deviation, the median (mean) gross portfolio investment outflow would be equivalent to 1.5 (2.8) percent of the recipient country's GDP (Figure 3.7, panel 2).[26] The effect could also be significant globally, with the decline in portfolio flows amounting to about 3 percent of world GDP.[27] Broadly similar results hold for cross-border banking flows, although the response to geopolitical shocks is estimated to be smaller, with a median (mean) decline of 0.3 (1) percent of recipient country GDP (Figure 3.7, panel 3).[28]

The results in Figure 3.7 are robust to using other measures of geopolitical distance, such as the extent of arms trade between the source and recipient countries or the imposition of financial sanctions.[29] For example, a decline of one standard deviation in bilateral arms trade is associated with a 4–5 percent decline in equity portfolio investments and banking claims to the recipient country (Online Annex Figure 3.4.2).[30]

[26]For recipient countries, bilateral partners with low levels of agreement on foreign policy issues are identified as those with bilateral geopolitical distance above the median. This scenario analysis is conducted to assess the effect of a further rise in geopolitical tensions with countries that are already distant geopolitically, which is a more likely scenario than an escalation of tensions with geopolitically closer countries.

[27]To gauge the potential effect of increased geopolitical tensions on portfolio outflows at the global level, the effect on the recipient countries is weighted by their respective GDPs and then averaged.

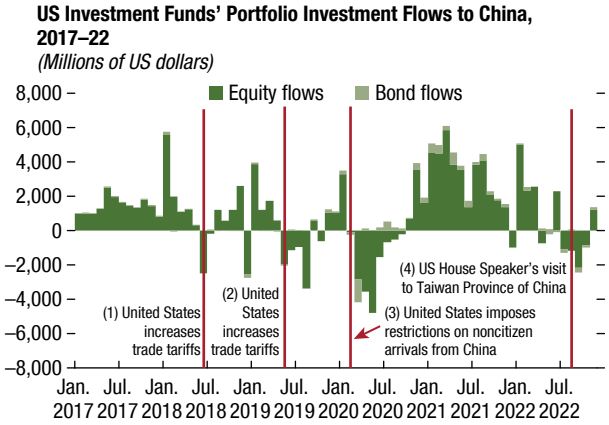
[28]From the perspective of an individual country, it is likely that capital outflows triggered by increased geopolitical distance to rival countries could be partially or fully offset by capital inflows from countries that are close strategic partners (Online Annex Figure 3.4.1). Thus, some countries could emerge as beneficiaries of rising global geopolitical tensions by attracting new capital. However, as noted earlier, the macro-financial implications of such capital are likely to depend on countries' absorptive capacity and policy frameworks as well as the stability of such flows (Ghosh, Ostry, and Qureshi 2017).

[29]These results are also broadly robust to using alternative geopolitical distance measures proposed by Häge (2011), such as the "pi" measure and the "ideal distance point" measure of Bailey, Strezhnev, and Voetens (2017). See Online Annex 3.4 for further details.

[30]Imposing financial sanctions on the recipient country is also associated with a significant decline in cross-border banking claims and portfolio investments, which generally tends to be the aim of such sanctions.

Figure 3.6. Tensions between the United States and China and Cross-Border Portfolio Investment

US funds' capital allocation to China appears to decline when tensions with the United States escalate.



Sources: Council on Foreign Relations; EPFR Global; and IMF staff calculations.
Note: The events marked as an escalation of geopolitical tensions between the United States and China (red lines) are as follows: (1) July 2018: the Trump Administration imposed new tariffs totaling 34 billion US dollars on Chinese goods; (2) May 2019: after trade talks broke down, the Trump Administration raised trade tariffs from 10 to 25 percent on 200 billion US dollars' worth of Chinese goods; (3) January 2020: the Trump Administration barred all non-US citizens who recently visited mainland China from entering the United States amid an outbreak of a new coronavirus that was first reported in Wuhan, China; and (4) August 2022: US House Speaker Nancy Pelosi visits Taiwan, Province of China. The figure shows an unconditional association between geopolitical events and portfolio flows.

In addition to the analysis of bilateral capital allocation, analysis based on aggregate capital flows confirms that rising geopolitical tensions could cause abrupt reversals of capital flows. The effect is particularly pronounced for emerging market economies, with an increase of one standard deviation in geopolitical distance with a country's financial partners, on average, associated with a decline in net capital flows of about 3 percent of GDP compared to about 2 percent of GDP for advanced economies (Figure 3.8, panel 1).[31] For these economies, a large portion of the total effect on net capital flows corresponds to a decline in portfolio flows (Figure 3.8, panel 2).

In addition to their effect on cross-border capital allocation, an increase in geopolitical tensions

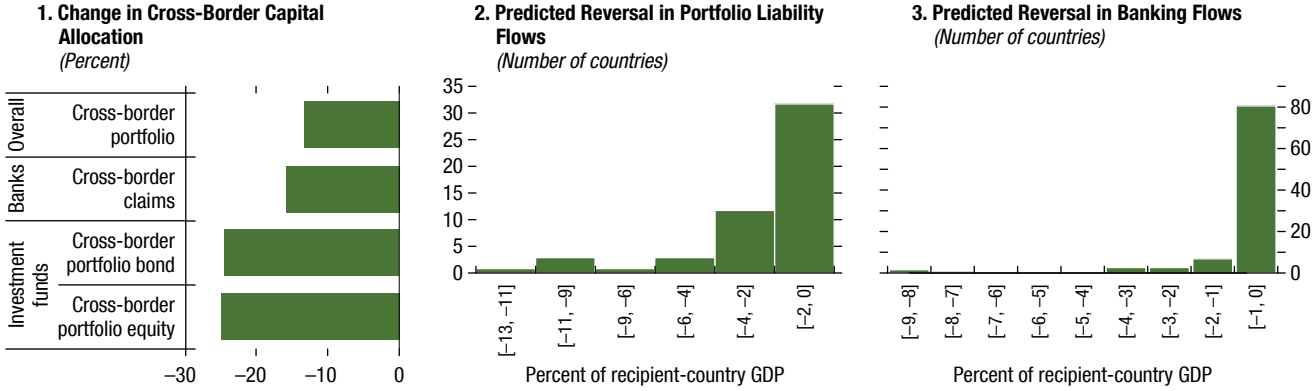
[31]To study the relationship between geopolitical tensions and aggregate capital flows, a panel regression analysis is performed using a weighted-average measure of bilateral geopolitical distance (foreign policy disagreement based on UN voting), where the weights are shares of foreign portfolio and direct investment liabilities in relation to partner countries. See Online Annex 3.5 for further details on the estimation.

Figure 3.7. Effect of Geopolitical Tensions on Cross-Border Capital Allocation

Greater geopolitical distance is associated with reduced cross-border banking and portfolio allocation by source to recipient countries ...

... and could imply a sizable portfolio flow reversal from recipient countries if tensions rise with more geopolitically distant countries.

The effect on banking flows could also be significant for some economies.



Sources: Bank for International Settlements, Locational Banking Statistics by Residence (restricted version); EPFR Global; FinFlows; IMF, Coordinated Direct Investment Survey; IMF, Coordinated Portfolio Investment Survey; and IMF staff calculations.
Note: Panel 1 shows the estimated average percent change in portfolio share of a recipient country in a source country's cross-border portfolio investment or banking claims in response to a one-standard-deviation increase in bilateral geopolitical distance within a year. The results for "Banks" exclude international financial centers identified as those in Damgaard and Elkjaer (2017). Panels 2 and 3 report the estimated aggregate reduction in overall portfolio and banking flows as a percent of recipient country GDP after an increase of one standard deviation in geopolitical distance in relation to lenders that are geopolitically distant (that is, above the median in terms of the geopolitical distance measure). See Online Annex 3.4 for further details of the results reported here. Bars indicate statistical significance at the 10 percent or lower level.

could also disrupt cross-border payment activity. For example, financial sanctions imposed in response to escalating geopolitical tensions could increase the cost of making cross-border payments and undermine the interoperability of different payment platforms. An event-study analysis of international remittance flows as a form of cross-border payment activity shows that financial sanctions could have a strong effect on the volume and price of cross-border remittances (Box 3.1). Specifically, imposing financial sanctions could reduce remittance volume to the sanctioned country by about 17.1 percent within six quarters while increasing the cost of remittances (fees and foreign exchange margins) by 3 percentage points.

Geopolitical Shocks Can Pose Financial Stability Risks

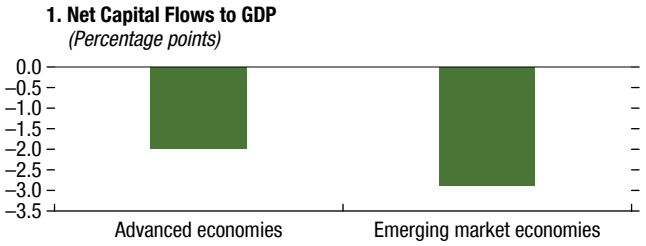
Geopolitical tensions could affect the banking sector through several channels. First, a sudden reversal of cross-border credit and investments leading to financial fragmentation can increase banks' debt rollover risks and funding costs (the "financial" channel in Figure 3.3). Second, for a given amount of external financing, the increased uncertainty associated with geopolitical tensions could widen sovereign bond and credit spreads, reducing the values of banks' assets and increasing their funding costs.[32] In addition, the effect of geopolitical tensions on domestic growth and inflation as a result of possible disruptions to supply chains and physical commodity markets (the "real" channel in Figure 3.3) could exacerbate banks' market and credit losses, further reducing their profitability and capitalization ratios. The solvency and liquidity stress is likely to diminish the risk-taking capacity of banks, prompting them to cut domestic lending, thereby exacerbating the decline in economic growth.

Banks' performance could be significantly affected by a rise in geopolitical tensions. An increase in geopolitical distance between a country and its financial partners could significantly increase banks' funding costs, reduce their profitability, and prompt them to contract lending

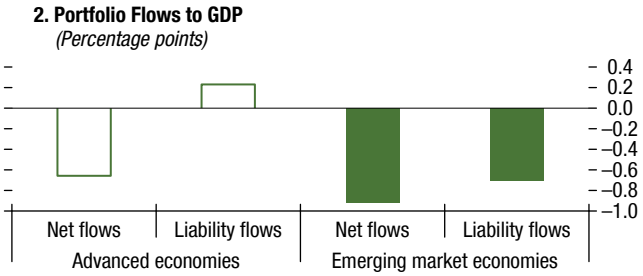
[32]Banks in global financial centers, which intermediate funds between countries while also performing maturity transformation, could be particularly vulnerable to geopolitical shocks if they raise funds from countries that could suddenly become geopolitically more distant to lend in countries that exhibit greater geopolitical affinity.

Figure 3.8. Effect of Geopolitical Tensions on Aggregate Capital Flows

An increase in geopolitical distance could lead to a significant decline in capital flows ...



... with the effect most pronounced for portfolio flows in emerging market economies.



Sources: IMF, Balance of Payment Statistics; and IMF staff calculations.
Note: The bars represent the percentage-point change in total net capital flows to GDP in response to a one-standard-deviation increase in geopolitical distance with a country's financial partners. Geopolitical distance for each recipient country is the financial exposure–weighted average of geopolitical distances with source countries, where financial exposure is computed as the share of portfolio and direct investment liabilities to a source country. Solid bars indicate statistical significance at the 10 percent level or lower. See Online Annex 3.5 for further details on the empirical analysis and results.

to the real economy (Figure 3.9, panels 1–3).[33,34] These effects are notably larger for emerging market and developing economies, underscoring their greater vulnerability and limited capacity to absorb such shocks. The results also show some nonlinearity in the effect of geopolitical tensions, such that the overall effect—in particular, for banks' lending—tends to be larger when tensions in relation to foreign lenders are already elevated.[35]

In general, well-capitalized banks are less affected by geopolitical shocks than those that hold less capital. Separating the effect of geopolitical shocks on banks with high capital ratios (that is, those with capital ratios in the top 25th percentile of the specific country-year distribution) versus other banks, the results show that the latter experience a much larger increase in borrowing costs, decline in profits, and reduction in lending than the former (Figure 3.9, panels 4–6).[36] This suggests that building bank capital buffers should be considered an effective way to mitigate the transmission of geopolitical shocks to the real economy (through credit provision).

Financial Fragmentation Can Exacerbate Macro-Financial Volatility

Global financial fragmentation resulting from an escalation of geopolitical tensions could lead to a loss of international risk diversification benefits, making countries more vulnerable to adverse shocks. Under financial integration, countries

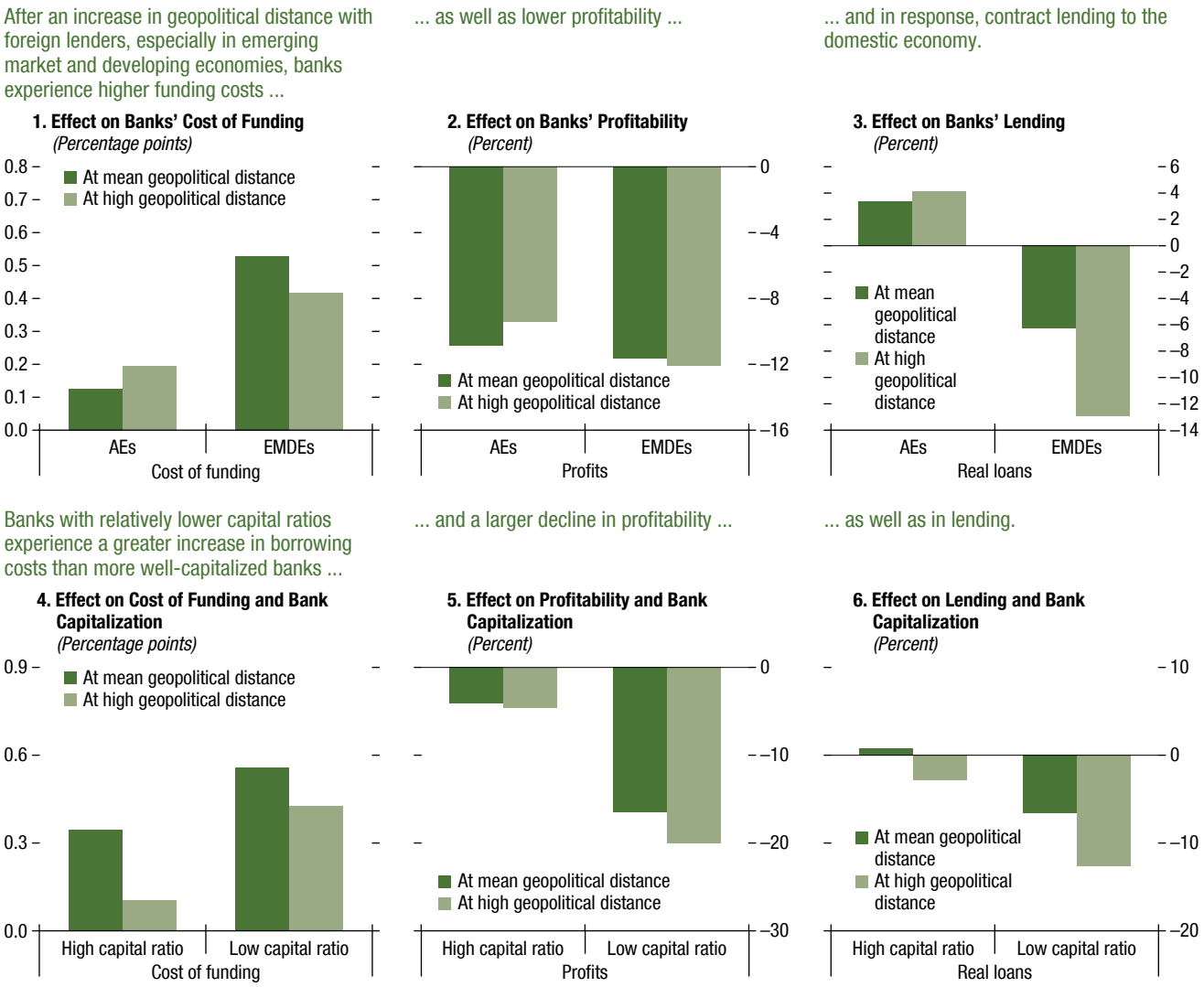
[33]This section uses detailed bank-level data and estimates panel regressions to assess the effects of changes in a country's (weighted-average) geopolitical distance in relation to foreign lenders on banks' funding costs, profitability, and real loan growth. The data are composed of annual unconsolidated financial statements of more than 5,000 banks from 52 advanced economies and emerging market and developing economies. The regressions control for relevant bank-level characteristics, macroeconomic fundamentals, and time effects. All regressors are lagged one period to mitigate potential endogeneity concerns. See Online Annex 3.6 for more details on the estimation methodology and results.

[34]In addition to higher interest expenses, a deterioration in bond valuations and credit quality of loan portfolios could also undermine the profitability of banks. Completely disentangling the financial channel from the real channel (for example, fully absorbing indirect credit demand side effects) is feasible if more granular data were available. For example, such granular data could allow for exploiting within-country bank-level variation in geopolitical distances in relation to foreign lenders.

[35]The nonlinearity is captured by including an interaction term between the (lagged) geopolitical distance measure and a dummy variable, which takes the value one if this distance is greater than the 75th percentile of the distribution of geopolitical distance for the specific sample. The coefficient on the interaction term in the regression for banks' funding cost is negative when considering the lagged geopolitical distance measure as in the baseline; however, it turns positive and statistically significant when considering the contemporaneous geopolitical distance measure instead.

[36]In addition to higher interest expenses, a deterioration in bond valuations and credit quality of loan portfolios could also undermine the profitability of banks, including through a "sovereign-bank nexus" (April 2022 *Global Financial Stability Report*). Disentangling these channels is difficult because of the lack of granular data.

Figure 3.9. Banks' Performance and an Increase in Geopolitical Tensions



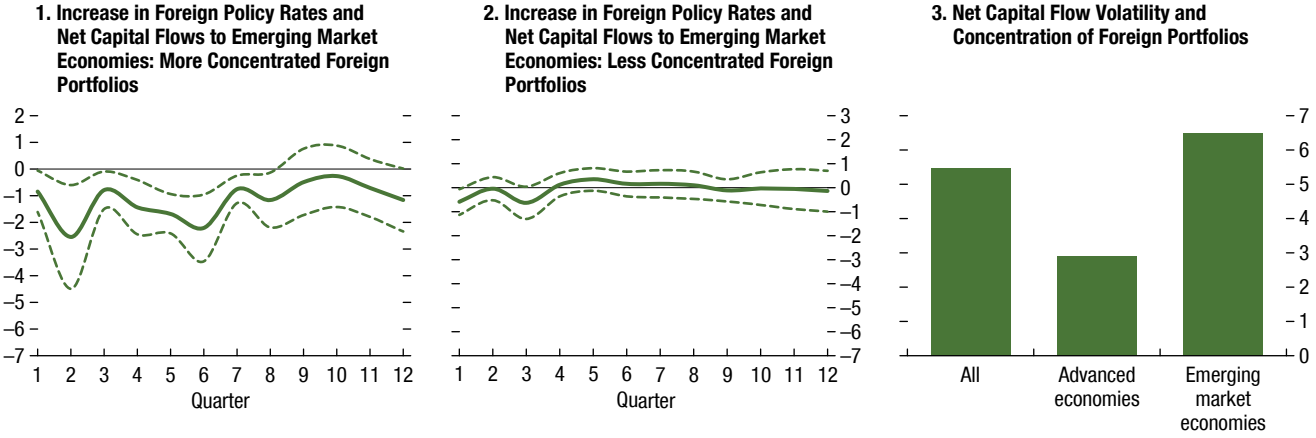
Source: IMF staff calculations.
Note: Panels 1–3 show the effect on bank outcome variables when a country experiences a one-standard-deviation increase in geopolitical distance in relation to foreign lenders. The outcome variables are (1) total interest expenses-to-total interest-bearing liabilities, (2) (log) operating profits-to-total assets, and (3) (log) real outstanding gross loans (gross loans in local currency terms divided by the domestic consumer price index). To capture potential nonlinearity in the relationships between geopolitical distance and bank performance indicators, the regressions include an interaction term of geopolitical distance with a dummy variable equal to one when the distance is "high" (above the 75th percentile of the distribution of geopolitical distance for the specific sample) and zero when the distance is "low." Panels 4–6 report whether results differ based on bank capital ratios and is estimated for banks in EMDEs only. "High capital ratio" corresponds to banks with equity-to-total assets ratio above the 75th percentile of the equity-to-total assets ratio of banks in a given country in a given year. The model further includes a large set of bank- and country-specific macro variables as well as bank and year fixed effects. See Online Annex 3.6 for further details. Solid bars indicate statistical significance at the 10 percent level or lower. AEs = advanced economies; EMDEs = emerging market and developing economies.

can reduce their vulnerability to domestic and external shocks by maintaining internationally diversified portfolios of assets and liabilities to help smooth consumption (Obstfeld 1994). By contrast, an escalation of geopolitical tensions that triggers a cross-border reallocation of credit provision and investments can result in more concentrated cross-border financial linkages with fewer financial partners and increase countries' vulnerability to shocks by limiting their

Figure 3.10. Financial Fragmentation Amplifies Vulnerability to Shocks
(Percent of GDP)

Monetary tightening in partner countries implies a significant decline in net capital flows to emerging markets with more concentrated foreign exposures relative to those with less concentrated exposures.

Countries with more concentrated foreign exposures experience higher capital flow volatility.



Source: IMF staff calculations.
Note: Panels 1 and 2 show the cumulative impulse response of net capital flows to GDP to foreign monetary policy shocks of countries with high- and low-concentrated financial exposures, respectively, over different horizons. Countries with higher (lower) than median value of Herfindahl–Hirschman Index of portfolio and direct investment liabilities are classified as more (less) concentrated. Foreign monetary policy shock is captured by the change in the monetary policy rate of the largest financial partner country (where financial partners are based on foreign portfolio and direct investment liability exposures) for each country. Dashed lines represent the 95 percent confidence interval. Panel 3 shows the effect of an increase in the foreign portfolio concentration measure from zero (full diversification) to one (full concentration). Panels 1 and 2 are based on the empirical framework presented in Online Annex Figure 3.7.1, and panel 3 is based on the results presented in Online Annex Figure 3.7.2. Bars indicate statistical significance at the 10 percent level or lower.

risk-sharing opportunities.[37] Fragmentation can thus also exacerbate the risk of systemic financial stress across countries in the longer term.

Increased concentration of international financial positions amplifies the propagation of external macro-financial shocks, especially to emerging market economies. Empirical analysis shows that in the face of an adverse foreign monetary policy shock—proxied by a 100-basis-point increase in the monetary policy rate of an economy's largest financial partner—net capital flows to emerging market economies with more concentrated international financial positions decline notably (Figure 3.10, panel 1).[38] The effect is both substantial—on average, about 2 percent of GDP—and persistent, lasting up to eight quarters. However, the effect of a foreign monetary policy shock of a similar magnitude on emerging market economies with less concentrated international financial exposures is neither economically nor statistically significant (Figure 3.10, panel 2).[39]

Overall, reduced diversification of international financial positions is associated with greater volatility

[37]Risk diversification may not only depend on the concentration of exposures but also on the correlation of the underlying assets in the international portfolio relative to the home portfolio. Overall, empirical evidence on the risk-sharing benefits of financial integration is mixed (Kose, Prasad, and Terrones 2007). Coeurdacier, Rey, and Winant (2020) argue that the effect of financial integration on welfare is heterogeneous across countries, depending on risk characteristics. In general, countries facing a higher level of uncertainty (such as emerging markets) potentially gain more from risk sharing.

[38]In this exercise, countries with a higher-than-median Herfindahl–Hirschman Index score of portfolio and direct investment liabilities are classified as concentrated. These findings are obtained from a local projection analysis of a sample of advanced economies and emerging market economies between the first quarter of 2000 and the fourth quarter of 2021 while controlling for other relevant external factors and domestic macroeconomic and structural characteristics. See Online Annex 3.7 for more details on the empirical methodology and results.

[39]The effect of a foreign monetary policy shock is also not strong for advanced economies perhaps because their higher level of financial development allows them to better hedge against such shocks (Online Annex Figure 3.7.1).

of capital flows. In general, countries with more concentrated cross-border financial positions experience a higher volatility of net capital flows to GDP (Figure 3.10, panel 3). Specifically, moving from a case of full diversification (that is, if a country has equal financial exposures to all countries in the world) to extreme concentration (that is, if a country has only one partner country) implies a 5.5 percentage-point increase in the volatility of net capital flows to GDP. The effect is more pronounced for emerging market economies than for advanced economies, confirming the weaker capacity of the former to absorb shocks. The effect is also stronger for countries that have smaller stocks of international reserves (Online Annex 3.7), confirming the role of reserves in insuring countries against macro-financial volatility.

The welfare loss stemming from reduced risk diversification opportunities could be notable even in more advanced economies. A scenario analysis based on a simple modeling exercise for the Group of Seven economies suggests that the volatility of macro-financial variables such as output, consumption, corporate profits, and stock and bond prices could increase notably in some countries under fragmentation, implying a significant loss of diversification benefits (Box 3.2).

Conclusions and Policy Recommendations

This chapter has shown that rising geopolitical tensions can lead to financial fragmentation through cross-border capital reallocation and sudden reversals of international capital flows. Financial fragmentation induced by geopolitical tensions can increase banks' funding costs, reduce their profitability, and prompt them to contract lending, with potentially adverse effects on economic activity. Emerging market and developing economies are more vulnerable to adverse geopolitical shocks than are advanced economies. Countries can, however, mitigate these risks by holding adequate international reserves and by promoting financial development. In addition, banks can mitigate these risks by holding larger capital buffers. The analysis also shows that if geopolitical tensions persist, the long-term costs associated with reduced cross-border risk diversification in the form of capital flow and broader macro-financial volatility could be substantial.

To mitigate the macro-financial stability risks arising from heightened geopolitical tensions, policymakers should consider taking the following steps:

- **Strengthen Financial Oversight**

Supervisors, regulators, and financial institutions should be aware of the risks to financial stability stemming from a potential rise in geopolitical tensions and devote resources to identify, quantify, manage, and mitigate these risks. Unexpected but plausible geopolitical shocks could adversely affect financial institutions that are inadequately prepared to absorb losses; therefore, proper risk management and preparedness is crucial. A better understanding and monitoring of the interactions between geopolitical risks and "traditional" credit, interest rate, market, liquidity, and operational risks could help prevent a potentially destabilizing fallout from geopolitical events.[40]

A more systematic approach to the assessment and quantification of geopolitical shock transmission to financial institutions is needed to develop actionable guidelines for supervisors. Geopolitical risks and their transmission mechanisms could be more formally embedded in stress-testing frameworks and scenario analysis to help inform discussions between supervisors and financial institutions (including through the Internal Capital Adequacy Assessment Process) to build adequate buffers.

- **Build Adequate Buffers and Safety Nets**

In response to rising geopolitical risk, economies reliant on external financing should ensure an adequate level of international reserves as well as capital and liquidity buffers at financial institutions. Countries that are exposed to greater geopolitical risk should consider building stronger buffers of international reserves to mitigate the adverse macro-financial consequences of a sudden reallocation of cross-border capital.[41]

[40]Stringent financial restrictions may prompt a shift of capital flows in the restricted country away from well-regulated traditional banks to less regulated or unregulated nonbank financial institutions and crypto assets. To address this risk, supervisors and regulators should expedite the development of a global supervisory and regulatory framework for nonbank financial institutions. See Chapter 2 for a discussion.

[41]The possibility of freezing reserve assets by reserve-issuing countries in the face of an escalation in geopolitical tensions could influence the reserve management decisions of countries toward more geopolitically aligned countries, or lead to more diversified reserve portfolios with possibly increased allocations to gold, and raise the demand for global financial safety net resources (Aiyar and others 2023; Arslanalp, Eichengreen, and Simpson-Bell 2023).

Regarding the capital and liquidity buffers of financial institutions, the transmission of geopolitical shocks (if material) should be considered in the quantification of credit, interest rate, market, liquidity, and operational risks. The buffers should be calibrated to protect against extreme but plausible losses associated with the materialization of tail risk.

Policymakers should strengthen crisis preparedness and management frameworks to deal with potential financial instability arising from an escalation of geopolitical tensions. In addition, cooperative arrangements between different national authorities should continue for effective management and containment of international financial crises including through development of effective resolution mechanisms of financial institutions that operate in multiple jurisdictions (IMF 2014).

Higher risk of capital flow reversals driven by geopolitical tensions will increase the demand for global financial safety nets. Mutual assistance agreements between countries—through regional safety nets, currency swaps, or fiscal mechanisms—could help smaller countries weather shocks.[42] The IMF could play an important role in mitigating the risks from financial fragmentation through its financing facilities, particularly the precautionary lending toolkit at the request of its member countries. In addition, the IMF could help countries build resilience and cope with geopolitical shocks through policy advice and capacity development (Aiyar and others 2023).

- **Strengthen International Cooperation**

In the face of geopolitical risks, efforts by international regulatory and standard-setting bodies should continue to promote convergence in financial regulations and standards to prevent an increase in financial fragmentation. In cases where countries opt for unilateral actions, guardrails could help to limit cross-border spillovers (Aiyar and others 2023). For example, deepening international cooperation to improve cross-border payments, and developing an international framework to enhance the interoperability of payment systems, could help to mitigate disruptions to cross-border payment services arising from geopolitical tensions.

Imposing financial restrictions for national security reasons could have unintended consequences for global macro-financial stability. Although imposing financial restrictions might address national security concerns, policymakers need to be aware of the potential risks to global macro-financial stability from increased financial fragmentation, high inflation, lower global economic growth, and financial contagion. Policymakers should thus make utmost efforts to resolve political conflicts through diplomacy and negotiations to prevent an escalation of geopolitical tensions and weakening of global economic and financial ties.

[42]It is possible for mutual assistance mechanisms to be affected by geopolitical tensions and available only to countries with close strategic ties.

Box 3.1. Geopolitical Tensions and Cross-Border Payments: A Case Study of Remittances

Rising geopolitical tensions often generate the risk of cross-border payment disruptions as a result of imposing financial restrictions. Such restrictions may include freezes of financial assets and investment activities of individuals, firms, and banks and—in extreme cases—shutting down the cross-border payment communication protocol. Depending on their intensity and scope, these restrictions aim to impede the ability of domestic entities to transact with the rest of the world by increasing the cost (fees and foreign exchange margins) of making cross-border payments and reducing their volume. To formally assess the effect of financial restrictions on cross-border payments, this box analyzes the effect of bilateral financial sanctions on international remittances, which are an important type of cross-border payment and represent a major source of external income for many economies.[1]

[1]Lack of data availability precludes a broader analysis of the effect of geopolitical tensions on all types of payments (for example, trade payments). The focus here is on remittances because they are an important source of financing for low- and middle-income countries—on average, amounting to about 2.5 percent of GDP, but in some cases more than 26 percent. G20 countries have committed to reducing the global average remittance cost to 5 percent, and the UN Sustainable Development Goals have indicated a target of 3 percent to be reached by 2030.

The average cost of sending remittances has declined over the past decade as a result of technological progress and global cooperation (World Bank 2022). This trend, however, appears to have reversed in some regions since Russia's invasion of Ukraine.[2] In particular, the average cost of sending remittances (weighted by the volume of remittances) to Eastern Europe and Central Asia surged by 27.4 percent between the end of 2021 and the second quarter of 2022 (Figure 3.1.1, panel 1). A formal analysis of the effect of financial sanctions on remittances in 18 countries from the first quarter of 1980 to the second quarter of 2022 confirms that such measures could have a significant effect on the cost and volume of sending cross-border remittances (see Online Annex 3.5 for further details on the estimation methodology). Specifically, the results show that financial sanctions increase the cost of sending remittances (measured as a percentage of the remitted amount) to sanctioned countries by 3 percentage points (Figure 3.1.1, panel 2), whereas the volume of remittances drops by 17.1 percent after six quarters of sanctions (Figure 3.1.1, panel 3).

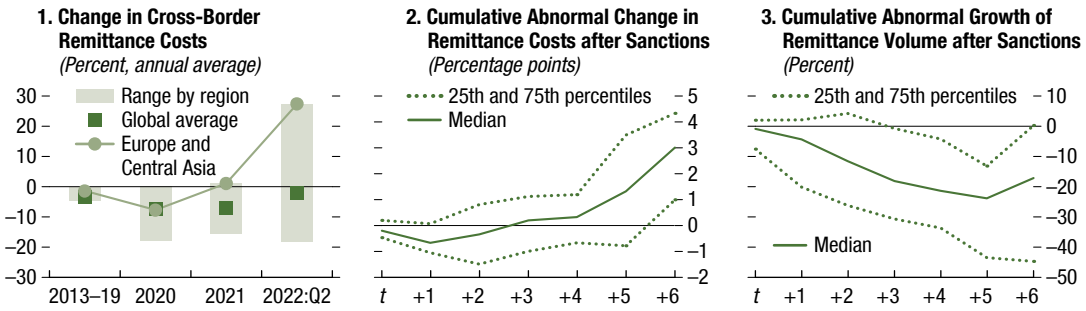
[2]Regional grouping of the remittance price data is based on World Bank (2022).

Figure 3.1.1. Effect of Geopolitical Tension on International Remittances

The cost of sending remittances to Europe and Central Asia has increased since Russia's invasion of Ukraine.

Financial sanctions increase remittance costs ...

... and reduce remittance volumes to sanctioned countries.



Sources: Global Sanctions Database; World Bank, Remittance Prices Worldwide; IMF, Balance of Payment Statistics; and IMF staff calculations.

Note: Panel 1 presents the growth rate of regional average remittance costs (when sending $200) weighted by the remittance volume (World Bank 2022). The regional grouping based on World Bank (2022) includes six regions: East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South Asia, and sub-Saharan Africa. The regional grouping of Europe and Central Asia only includes countries in Eastern Europe and Central Asia. The bar indicates the range of the values of these regions. The right bar in panel 1 denotes the change from the fourth quarter of 2021 to the second quarter of 2022. The data do not include corridors originating in Russia in 2022. Panels 2 and 3 show the effect of sanctions on remittance cost ratios and remittance volume after the sanctions. The remittance cost is measured as a ratio of total costs to the remitted $200. The analyses do not consider the effect of the sanction on Russia in 2022 because of limited data availability. See Online Annex 3.5 for further details of the empirical analysis.

Box 3.2. Financial Fragmentation: Loss of Diversification Benefits

Financial fragmentation driven by an escalation of geopolitical tensions can limit international risk diversification opportunities for countries and increase the volatility of key macro-financial variables such as output, consumption, corporate profits, and asset prices. To assess the potential loss of diversification benefits under financial fragmentation relative to full integration, this box considers the case of the Group of Seven (G7) economies and applies a two-country open-economy model with trade in stocks and bonds developed by Coeurdacier, Kollmann, and Martin (2010).

The model is designed to explain the "equity home bias" puzzle—that is, the observed preference of domestic residents to hold local equity relative to foreign equity—in G7 economies. The model also generates plausible macro-financial dynamics after total factor productivity and investment-specific technology shocks. In the model, households can obtain international diversification benefits by investing in foreign equity because of imperfectly correlated total factor productivity and investment efficiency shocks across economies. Home bias arises because wage income and dividends from domestic equity investments are imperfectly correlated, providing some opportunity for risk diversification domestically.[1]

The model is simulated individually for each G7 economy under four scenarios characterized by different degrees of global financial fragmentation. In the "full integration" scenario, G7 economies trade with the rest of the world (composed of a sample of 53 countries). Under the "moderate" and "extreme" fragmentation scenarios, G7 economies are unable to engage in financial transactions with countries that are geopolitically less similar—that is, their geopolitical distance measure (based on UN voting behavior) in relation to the G7 economies exceeds the top 25th and 50th percentiles of the sample distribution, respectively. Finally, in the "autarkic" scenario, the G7 economies are self-sufficient and financially cut off from all other economies.

[1]Online Annex 3.7 presents further details on the structure of the model and its parameterization.

The results indicate that financial fragmentation could notably exacerbate the vulnerability of G7 economies to shocks, increasing the volatility of their macro-financial variables. For example, under the moderate and extreme fragmentation scenarios, the median volatility of output increases by 1 and 3 percentage points, respectively, relative to the full integration scenario, while the median volatility of (real) consumption, corporate profits, equity and bond prices increases in the range of 2–8 percentage points (Figure 3.2.1, panel 1).

The increase in volatility under fragmentation in turn implies a potentially significant loss of diversification benefits. To quantify this loss, the increase in volatility of output, consumption, corporate profits, and stock and bond prices under fragmentation is compared with the increase in the volatility of these variables under the autarky scenario, and the ratio of the changes in volatilities is defined as the diversification benefit. As can be seen in Figure 3.2.1, panel 2, "moderate" fragmentation implies that about 20 percent of the diversification benefits from financial integration would be lost, while nearly 40–50 percent of the benefits would be lost under the "extreme" fragmentation scenario.[2]

While these estimated losses are significant, several caveats to the analysis are warranted. The simulations only focus on the loss of cross-border investment diversification benefits and assume full substitutability of foreign goods production among foreign countries that are available to trade with G7 economies. Alternative assumptions, or broader geoeconomic fragmentation also affecting trade, technology diffusion, and labor migration, could impose additional costs. Neither do the simulations take into account any potential benefits from fragmentation, such as from capital reallocation, or whether financial fragmentation genuinely reduces threats to national or global security.

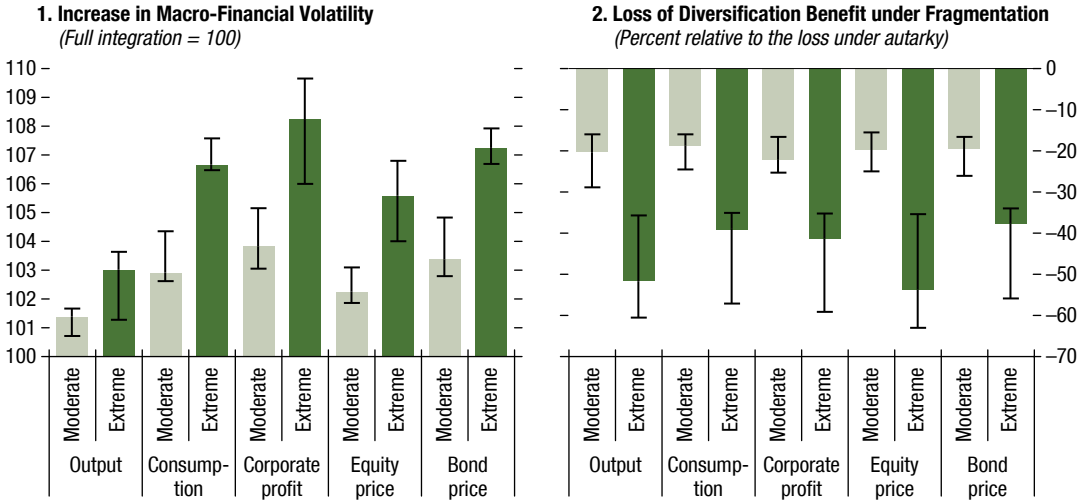
[2]These magnitudes are in line with other studies that have a similar setup and consider a production economy with capital (Coeurdacier, Rey, and Winant 2020) but are smaller than those that consider an endowment economy (Van Wincoop 1999). This is because in a production economy, capital can be used in autarky to smooth the effect of shocks, which reduces the diversification benefit from integration.

Box 3.2 *(continued)*

Figure 3.2.1. Macro-Financial Volatility and Loss of Diversification Benefits in the G7 Economies under Fragmentation

Macro-financial volatility could increase under fragmentation relative to full integration ...

... and the loss of diversification benefits could be substantial.



Source: IMF staff calculations.
Note: Bars in panel 1 show the median volatility (standard deviation) of (real) output, consumption, corporate profits, and equity and bond prices in the home country under two fragmentation scenarios—"moderate" ("extreme"), where the home country does not financially trade with countries to which the bilateral geopolitical distance measure lies in the top 25th (50th) percentile of the sample distribution. Whiskers indicate the interquartile range of the effect across G7 economies. Panel 2 shows the loss of diversification benefit under fragmentation, quantified as the difference in volatility for each variable under fragmentation relative to an autarkic scenario. See Online Annex 3.7 for further details of the modeling exercise. G7 = Group of Seven.

References

Aiyar, Shekhar, Jiaqian Chen, Christian H. Ebeke, Roberto Garcia-Saltos, Tryggvi Gudmundsson, Anna Ilyina, Alvar Kangur, Tansaya Kunaratskul, Sergio L. Rodriguez, Michele Ruta, Tatjana Schulze, Gabriel Soderberg, and Juan P. Trevino. 2023. "Geoeconomic Fragmentation and the Future of Multilateralism." IMF Staff Discussion Note 2023/001, International Monetary Fund, Washington, DC.

Arslanalp, Serkan, Barry Eichengreen, and Chima Simpson-Bell. 2023. "Gold as International Reserves: A Barbarous Relic No More?" IMF Working Paper, 23/14, International Monetary Fund, Washington, DC.

Avdjiev, Stefan, Leonardo Gambacorta, Linda Goldberg, and Stefano Schiaffi. 2020. "The Shifting Drivers of Global Liquidity." *Journal of International Economics* 125 (C): 103324.

Bailey, Michael, Anton Strezhnev, and Erik Voeten. 2017. "Estimating Dynamic State Preferences from United Nations Voting Data." *Journal of Conflict Resolution* 61 (2): 430–56.

Busse, Matthias, and Carsten Hefeker. 2007. "Political Risk, Institutions, and Foreign Direct Investment." *European Journal of Political Economy* 23 (2): 397–415.

Caldara, Dario, and Matteo Iacoviello. 2022. "Measuring Geopolitical Risk." *American Economic Review* 112 (4): 1194–225.

Cavallo, Eduardo, and Jeffrey Frankel. 2008. "Does Openness to Trade Make Countries More Vulnerable to Sudden Stops, or Less? Using Gravity to Establish Causality." *Journal of International Money and Finance* 27 (8): 1430–52.

Chițu, Livia, Eric Eichler, Peter McQuade, and Massio Ferrari Minesso. 2022. "How Do Markets Respond to War and Geopolitics?" *ECB Blog*, September 28. https://www.ecb.europa.eu/press/blog/date/2022/html/ecb.blog220928~a4845ecd8c.en.html.

Claessens, Stijn. 2019. "Fragmentation in Global Financial Markets: Good or Bad for Financial Stability?" BIS Working Paper 815, Bank for International Settlements, Basel, Switzerland.

Coeurdacier, Nicolas, Robert Kollmann, and Philippe Martin. 2010. "International Portfolios, Capital Accumulation and Foreign Asset Dynamics." *Journal of International Economics* 80 (1): 100–12.

Coeurdacier, Nicolas, Helene Rey, and Pablo Winant. 2020. "Financial Integration and Growth in a Risky World." *Journal of Monetary Economics* 112 (June): 1–21.

Damgaard, Jannick, and Thomas Elkjaer. 2017. "The Global FDI Network: Searching for Ultimate Investors." IMF Working Paper 17/258, International Monetary Fund, Washington, DC.

Ferguson, Niall. 2008. "Earning from History? Financial Markets and the Approach of World Wars." *Brookings Papers on Economic Activity* (Spring): 431–77.

Fernández, Andrés, Michael W. Klein, Alessandro Rebucci, Martin Schindler, and Martín Uribe. 2016. "Capital Control Measures: A New Dataset." *IMF Economic Review* 64 (3): 548–74.

Fisman, Raymond, April Knill, Sergey Mityakov, and Margarita Portnykh. 2022. "Political Beta." *Review of Finance* 26 (5): 1179–215.

Gaspar, Vitor, and Ceyla Pazarbasioglu. 2022. "Dangerous Global Debt Burden Requires Decisive Cooperation." *IMF Blog*, April 11. http://www.imf.org/en/Blogs/Articles/2022/04/11/blog041122-dangerous-global-debt-burden-requires-decisive-cooperation.

Ghasseminejad, Saeed, and Mohammad R. Jahan-Parvar. 2021. "The Impact of Financial Sanctions: The Case of Iran." *Journal of Policy Modeling* 43 (3): 601–21.

Ghosh, Atish R., Jonathan D. Ostry, and Mahvash S. Qureshi. 2017. *Taming the Tide of Capital Flows: A Policy Guide*. Cambridge, MA: MIT Press.

Góes, Carlos, and Eddy Bekkers. 2022. "The Impact of Geopolitical Conflicts on Trade, Growth, and Innovation." Staff Working Paper ERSD-2022-09, World Trade Organization, Economic Research and Statistics Division, Geneva.

Gurvich, Evsey, and Ilya Prilepskiy. 2015. "The Impact of Financial Sanctions on the Russian Economy." *Russian Journal of Economics* 1 (4): 359–85.

Häge, Frank. 2011. "Choice or Circumstance? Adjusting Measures of Foreign Policy Similarity for Chance Agreement." *Political Analysis* 19 (3): 287–305.

International Monetary Fund (IMF). 2014. "Cross-Border Bank Resolution: Recent Developments." IMF Policy Paper 2014/011, Washington, DC.

International Monetary Fund (IMF). 2020. "Toward an Integrated Policy Framework." IMF Policy Paper 2020/046, Washington, DC.

Jung, Seungho, Jongmin Lee, and Seohyun Lee. 2021. "The Impact of Geopolitical Risk on Stock Returns: Evidence from Inter-Korea Geopolitics." IMF Working Paper 2021/251, International Monetary Fund, Washington, DC.

Kempf, Elisabeth, Mancy Luo, Larissa Schäfer, and Margarita Tsuoutsoura. 2022. "Political Ideology and International Capital Allocation." Harvard Business School Working Paper 23-004, Harvard University, Cambridge, MA.

Kose, Ayhan, Eswar Prasad, and Marco Terrones. 2007. "How Does Financial Globalization Affect Risk Sharing? Patterns and Channels." IMF Working Paper 2007/238, International Monetary Fund, Washington, DC.

Lane, Philip, and Gian-Maria Milesi-Ferretti. 2018. "The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis." *IMF Economic Review* 66: 189–222.

Obstfeld, Maurice. 1994. "Evaluating Risky Consumption Paths: The Role of Intertemporal Substitutability." *European Economic Review* 38 (7): 1471–86.

Okawa, Yohei, and Eric van Wincoop. 2012. "Gravity in International Finance." *Journal of International Economics* 87 (2): 205–15.

Phan, Dinh Hoang Bach, Vuong Thao Tran, and Bernard Njindan Iyke. 2022. "Geopolitical Risk and Bank Stability." *Financial Research Letters* 46 (B): 102453.

Portes, Richard, and Helene Rey. 2005. "The Determinants of Cross-Border Equity Flows." *Journal of International Economics* 65 (2): 269–96.

Rajan, Raghuram. 2022. "Joined at the Hip: Why Continued Globalization Offers Us the Best Chance of Addressing Climate Change." Per Jacobsson Lecture at the International Monetary Fund/World Bank Annual Meetings, October 15.

Rankin, Ewan, Elliot James, and Kate McLoughlin. 2014. "Cross-Border Capital Flows since the Global Financial Crisis." RBA Bulletin, Reserve Bank of Australia, 65–72, June.

Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.

Rice, Tara, Goetz von Peter, and Codruta Boar. 2020. "On the Global Retreat of Correspondent Banks." *BIS Quarterly Review* (March): 37–52.

Salisu, Afees, Ahamuefula Ogbonna, Lukman Lasisi, and Abeeb Olaniran. 2022. "Geopolitical Risk and Stock Market Volatility in Emerging Markets: A GARCH–MIDAS Approach." *North American Journal of Economics and Finance* 62: 101755.

Signorino, Curtis, and Jeffery Ritter. 1999. "Tau-b or Not Tau-b: Measuring the Similarity of Foreign Policy Positions." *International Studies Quarterly* 43 (1): 115–44.

Van Wincoop, Eric. 1999. "How Big Are Potential Welfare Gains from International Risk Sharing?" *Journal of International Economics* 47 (1): 109–35.

World Bank. 2022. "An Analysis of Trends in Cost of Remittance Services." *Remittance Prices Worldwide Quarterly* 43 (September).

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