INTERNATIONAL MONETARY FUND

GLOBAL FINANCIAL STABILITY REPORT

Shifting Ground beneath the Calm

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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* (GFSR) 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. The project was directed by Charles Cohen, Advisor; Mahvash Qureshi, Assistant Director; Thordur Jonasson, Assistant Director; Jason Wu, Assistant Director; Caio Ferreira, Deputy Division Chief; Sheheryar Malik, Deputy Division Chief; Mario Catalán, Deputy Division Chief; Andrea Deghi, Financial Sector Expert and Chapter 2 co-lead; Tomohiro Tsuruga, Senior Financial Sector Expert and Chapter 2 co-lead; Arindam Roy, Senior Financial Sector Expert and Chapter 3 co-lead; Patrick Schneider, Financial Sector Expert and Chapter 3 co-lead. It benefited from comments and suggestions from the senior staff in the MCM Department.

Individual contributors to the report were John Caparusso, Yuhua Cai, Sally Chen, Yingyuan Chen, Timothy Chu, Kay Chung, Fabio Cortes, Francesco de Rossi, Xiaodan Ding, Gonzalo Fernandez Dionis, Andrew A. Ferrante, Deepali Gautam, Bryan Gurhy, Sanjay Hazarika, Zixuan Huang, Esti Kemp, Johannes Kramer, Harrison Samuel Kraus, Seungduck Lee, Yiran Li, Xiang-Li Lim, Corrado Macchiarelli, Taneli Mäkinen, Srobona Mitra, Benjamin Mosk, Kleopatra Nikolaou, Sonal Patel, Silvia Loyda Ramirez, Lawrence Tang, Yuan Tian, Jeffrey Williams, Dmitry Yakovlev, Mustafa Yenice, Aki Yokoyama, Xuege Zhang, Yuchen Zhang, and Jing Zhao. Chapter 2 also benefited from comments and suggestions from Angelo Ranaldo, External Advisor.

Javier Chang, Monica Devi, Srujana P. Tyler, and Yi Zhou were responsible for excellent coordination and editorial support.

Rumit Pancholi from the Communications Department led the editorial team and managed the report's production, with editorial services from David Einhorn, Michael Harrup, Devlan O'Connor, and James Unwin.

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

This GFSR reflects information available as of September 12, 2025. The report benefited from comments and suggestions from staff in other IMF departments, as well as from Executive Directors following their discussions of the GFSR on September 29, 2025. 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. In the Executive Summary, data used in Figures ES.1, ES. 2, and ES. 3, and in Chapter 1, Figure 1.1 (all panels), Figure 1.2 (panels 1 and 2), Figure 1.3 (all panels), Figure 1.5 (all panels), Figure 1.6 (all panels), reflect information through October 2, 2025.

FOREWORD

Financial conditions have eased since our April 2025 *Global Financial Stability Report*, as policy uncertainty has receded somewhat, major central banks have become more accommodative, and the US dollar has weakened. Equity markets have rebounded to record highs, corporate and sovereign funding spreads are at historically narrow levels, and global funding liquidity remains abundant.

However, the ground is shifting beneath this seemingly tranquil surface. Valuations of risk assets appear stretched, especially as the global economy slows, and concentration risks in certain segments have reached historic highs. History reminds us that asset prices can abruptly correct following booms in the technology sector. To the extent that stock market-driven wealth effects support strong consumption, a correction could have broader implications for the real economy. Higher long-term yields on major sovereign benchmarks—most notably for US Treasuries and euro area bonds—could reverberate across the system, influencing hedging strategies and reshaping correlations with risky assets. Structural improvements in market resilience, including central clearing and leverage requirements, should help, although they remain a work in progress in many jurisdictions.

Concerningly, many advanced economies—especially those with the most elevated debt levels—have yet to present credible strategies to stabilize rising debt trajectories, even as new spending pressures emerge. With more fiscal risks, a higher level of term premia could become a defining feature of global financial markets in years to come. In this environment, central bank independence is integral to ensure monetary policy continues to focus on maintaining price stability and anchoring inflation expectations.

One of the most troubling shifts is the potential erosion of the hedging role of longer-term bonds, exposing fragilities in the financial sector-sovereign nexus. Financial sector exposure to sovereign assets remains elevated across both banks and nonbanks. While banks globally are generally well capitalized, a vulnerable subset persists in most jurisdictions, and banks' exposures to nonbank financial intermediaries are expanding. Therefore, stress in sovereign bond markets can transmit directly to banks or indirectly through nonbanks. Stress tests for nonbanks in this report reveal considerable scope for sell-offs in benchmark bonds.

The growing size of nonbank financial intermediation could amplify these vulnerabilities. While helpful in facilitating capital market activities and channeling credit to borrowers, their expansion raises the specter of risk-taking and interconnectedness in the financial system. A key challenge revolves around the limited visibility into balance sheets and the interconnectedness of nonbank financial institutions. Stronger data and disclosures are critical to both diagnose vulnerabilities and guide policy responses during stress events.

Growing macrofinancial uncertainty can strain even the highly liquid foreign exchange market, as we discuss in Chapter 2. Such uncertainty may raise funding costs, impair liquidity, and heighten foreign exchange volatility—effects that are notably pronounced in emerging markets. These pressures can also spill over into other asset classes, triggering broader negative feedback loops, most evident in the presence of significant currency mismatches and fiscal vulnerabilities. These considerations are especially relevant given US dollar softness and a substantial increase in foreign exchange hedging demand this year.

The evolving risk environment carries significance for emerging markets and developing economies (EMDEs). As discussed in Chapter 3 of this report, for emerging markets with strong fundamentals, a shift toward financing themselves in local currencies has stabilized bond yields and bolstered market liquidity during periods of global stress. By contrast, emerging markets and developing economies with weaker policy credibility and limited domestic savings remain dependent on foreign currency borrowing, and may also overly rely on domestic banks to buy government bonds. Although funding costs remain contained for most EMDEs so far this year, new major shocks could still test their resilience.

At the same time, new financial market innovations, such as stablecoins backed by short-term government securities, have introduced new participants in

sovereign debt markets and payment systems. In weaker economies, these developments may lead to currency substitution and reduce the effectiveness of policies, like monetary policy. They could also alter the bond market structure with potential implications for credit disintermediation. Possible runs on stablecoins may also generate forced sales of reserve assets, potentially disrupting market functioning.

Navigating these challenges will require continued vigilance by policy authorities. Our primary recommendations emphasize fiscal discipline to ensure debt sustainability, a close monetary policy focus in line with central bank mandates, and strengthening financial sector supervision. Reinforcing the independence and credibility of central banks helps to anchor expectations and bolster confidence in the policy framework. We also advocate for enhanced reporting and oversight of nonbank financial institutions, ongoing efforts to improve the efficiency of local bond markets, and implementation of internationally agreed prudential standards, including on cryptoassets.

Tobias Adrian
Financial Counsellor

EXECUTIVE SUMMARY

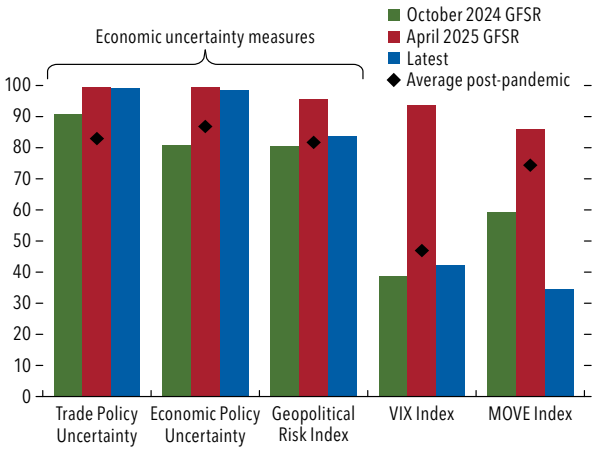
Shifting Ground beneath the Calm

Global financial markets appear calm despite continued trade and geopolitical uncertainty (Figure ES.1). However, this issue of the *Global Financial Stability Report* highlights several signs of shifting grounds in the financial system that could raise vulnerabilities if associated risks are not addressed. Accordingly, the IMF's growth-at-risk framework shows that risks to global financial stability remain elevated (Figure ES.2). Policymakers are urged to stay vigilant and respond promptly to changing circumstances.

The first sign that the ground is shifting is the continued appreciation of risk asset prices. Markets appear to downplay the potential effects of tariffs on growth and inflation. IMF staff models show that valuations of some risk assets have once again become stretched after the brief correction from the April 2 tariff announcement by the United States. Meanwhile, the US dollar has depreciated by 10 percent so far this year, having decoupled relative to wide US–G10 interest rate differentials in the months following the announcement (Figure ES.3), amid concerns about US policy uncertainty, and as investors reassessed the dollar's decade-long bull run. Any further abrupt correction of asset prices could be exacerbated by these changing asset correlations, straining financial markets. For example, foreign exchange markets have undergone structural shifts in recent years yet have not experienced significant dollar weakness (see Chapter 2).

Another crucial sign is that debt has continued to shift toward the government sector as expanding global fiscal deficits propel sovereign bond issuance. In major advanced economies, sovereign bond markets increasingly depend on price-sensitive investors, exerting upward pressure on term premiums and long-term yields. In emerging markets, governments have turned to domestic investors for financing. Although this has reduced reliance on foreign currency debt, it may yet create fragilities such as a stronger bank-sovereign nexus (see Chapter 3).

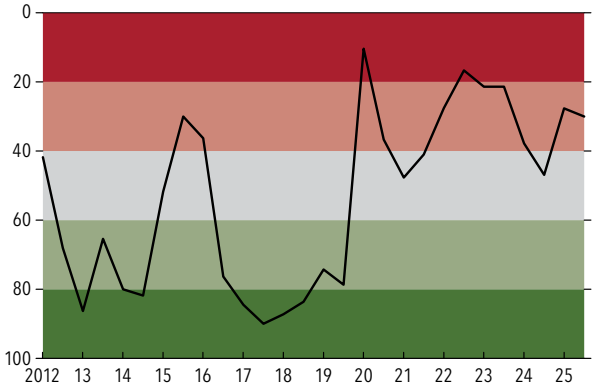
Figure ES.1. Economic Uncertainty and Financial Volatility
(Percentile)



Sources: Bloomberg Finance L.P.; Baker, Bloom, and Davis 2016; Caldara and others 2020; Caldara and Iacoviello 2022; and IMF staff calculations.

Note: Percentiles are derived from monthly data since January 1997. "Average postpandemic" is the average percentile since January 2022. The latest levels for the VIX and MOVE indices are as of October 2, 2025. GFSR = *Global Financial Stability Report*; MOVE = Merrill Lynch Option Volatility Estimate; VIX = Chicago Board Options Exchange Volatility Index.

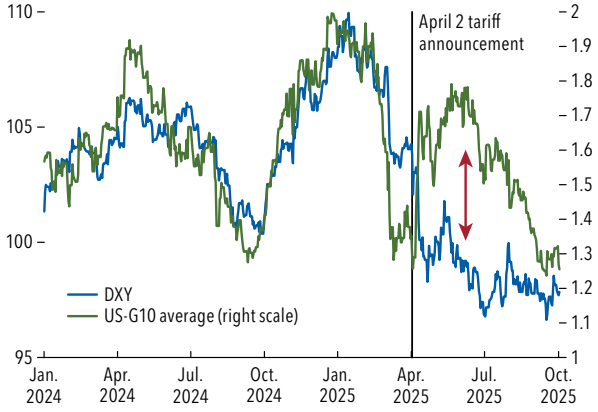
Figure ES.2. Near-Term Growth-at-Risk Framework Forecast
(Historical percentile rank)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; EUROPACE AG/Haver Analytics; IMF, International Finance Statistics database; and IMF staff calculations.

Note: The black line traces the evolution of the fifth percentile threshold (the growth-at-risk metric) of the near-term forecast densities, where the lower percentiles represent a higher downside risk. The intensity of the shading depicts the percentile rank for the growth-at-risk metric; the quintiles with the lowest percentile ranks are shaded the brightest red and the highest are brightest green.

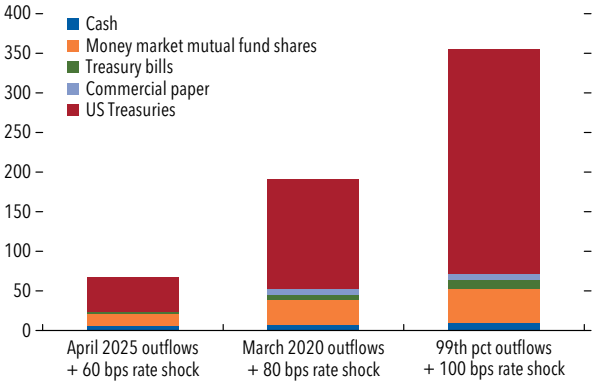
Figure ES.3. US Dollar versus Interest Rate Differentials
(Index, left scale; percent, right scale)



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

Note: The US-G10 average is the nominal 10-year interest rate differential between the United States and the average of the G10 countries. DXY is the US dollar index, which indicates the general international value of the dollar.

Figure ES.4. Forced Sales of Bond Funds under the Waterfall Approach
(Billions of dollars)



Sources: Lipper; Securities and Exchange Commission N-PORT; and IMF staff calculations. N-PORT data are taken from the second quarter 2025 batch, retaining only submissions for the first quarter of 2025.

Note: Under the "waterfall" approach, US Treasuries are sold after cash and other liquid assets are depleted. See Online Annex 1.4 for more details. bps = basis points; pct = percentile.

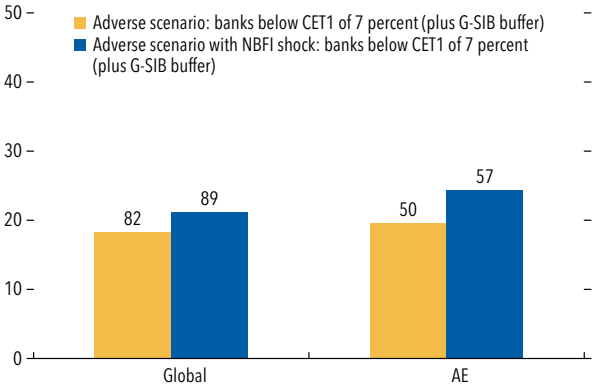
Finally, the growing size of nonbank financial intermediaries (NBFIs) and deepened ties with banks have heightened their sectoral interconnection. This *Global Financial Stability Report* documents the expanding role of NBFIs in core sovereign bond markets and corporate debt markets, including through the participation of retail investors in private credit. Such links raise the specter of excessive risk taking and interconnectedness in the financial system.

Vulnerabilities and Uncertainties

These shifts can cause vulnerabilities in the financial system. Although sovereign bond markets in major advanced economies have stabilized since the abrupt sell-off prompted by the April 2 tariff announcement, steepening yield curves, more negative swap spreads, and the erosion of convenience yields indicate that bond market functioning is on shakier footing. Bond market functioning could be tested if yields rise abruptly—for instance, a scenario analysis for bond mutual funds shows that forced US Treasury liquidations as a result of large fund outflows and an abrupt increase in yields could reach almost $300 billion (Figure ES.4). Given the crucial role of core sovereign bonds as benchmarks and collateral, their deterioration has implications for the broader financial markets.

In the banking sector, capital ratios have improved. In an adverse macroeconomic scenario, the IMF's Global Stress Test reveals that about 18 percent of global banks by assets would see their Common Equity Tier 1 capital ratio fall below the important threshold of 7 percent plus a G-SIB buffer. However, additional shocks to NBFIs could increase this share of weak banks by assets to 21 percent, highlighting the linkages between banks and NBFIs (Figure ES.5).

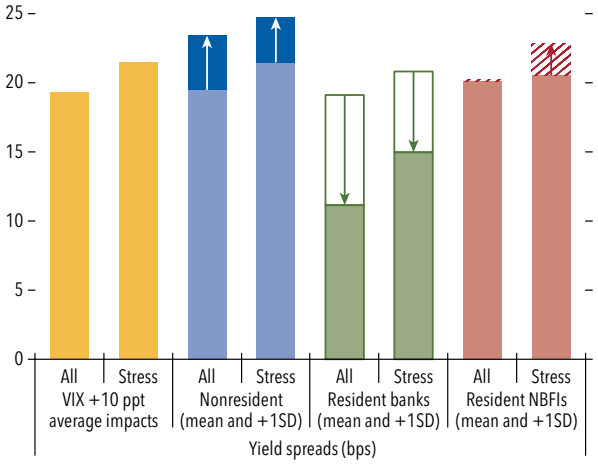
Figure ES.5. Share of Total Assets of Weak Banks, by Region
(Percent of assets, vertical axis; number of banks, bars)



Sources: Call report data; European Banking Authority; Fitch Connect; Fitch Solutions; S&P Capital IQ Pro; and IMF staff calculations.

Note: The figure shows the number of banks falling below the 7 percent CET1 ratio plus a G-SIB buffer under the IMF Global Bank Stress Test adverse scenario, with an additional NBFI shock for euro area and US banks. The NBFI shock assumes that risk weights increase from 20 percent to 50 percent and all available commitments are drawn. AE = advanced economy; CET1 = Common Equity Tier 1 capital; G-SIB = global systemically important bank; NBFI = nonbank financial intermediaries.

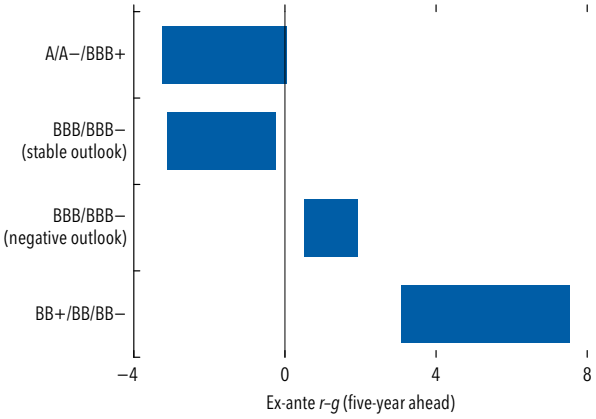
Figure ES.6. Effects of Investor Composition on Emerging Market Local Bond Market Sensitivity
(Basis points)



Source: IMF staff calculations.

Note: Bars indicate the estimated impact on yield spreads of a 10-percentage-point increase in the VIX, along with the effects of a one standard deviation increase in investor participation for nonresidents, resident banks, and resident NBFIs. Solid bars indicate an amplification effect; hollow bars indicate attenuation. Shaded bars indicate statistical insignificance. See Online Annex 3.1 for more information. "Stress" refers to a subsample in which the VIX is above its 75th historical percentile. The sample is Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Poland, Romania, South Africa, Thailand, and Türkiye. bps = basis points; NBFIs = nonbank financial intermediaries; ppt = percentage point; VIX = Chicago Board Options Exchange Volatility Index.

Figure ES.7. Estimated "*r–g*" (Five-Year Ahead) in Emerging Markets, by Average Credit Rating Band
(Percent)



Sources: Bank of England; Bank of Japan; Bloomberg Finance L.P.; Citi; Consensus Economics; EUROPACE AG/Haver Analytics; European Central Bank; Federal Reserve Bank; J.P.Morgan; London Stock Exchange Group; and IMF staff calculations.

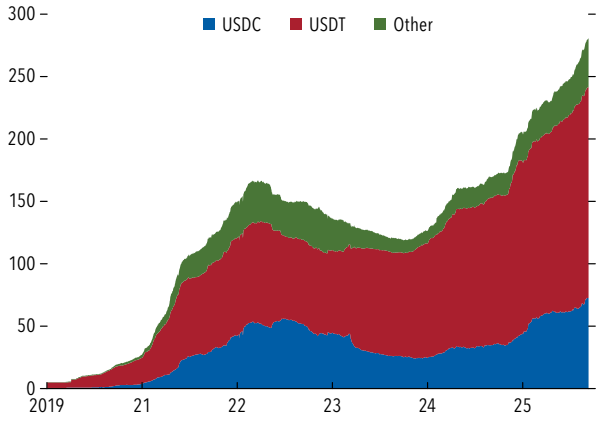
Note: The *r–g* estimates are computed from current 5-year, 10-year, and implied 5-year forward yields, considering differences in the term premium. Inflation and growth estimates are from Consensus Economics or, when unavailable, from *World Economic Outlook* database forecasts. The credit ratings are the median ratings from three international rating agencies. Data include 14 major emerging markets: Brazil, Chile, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, the Philippines, Poland, Romania, South Africa, and Thailand. *r* = long-term real interest rates; *g* = long-term growth rates.

Emerging market government debt has grown significantly across most countries, but its structure has increasingly diverged. Emerging markets with stronger economic fundamentals have been able to finance debt largely from domestic resident investors in local currency (see Chapter 3). The shift toward local government bond markets is empirically associated with increased resilience to global shocks—an increase in the resident investor share is associated with a decline in the sensitivity of emerging market bonds to shocks to the VIX, the Chicago Board Options Exchange's Volatility Index (Figure ES.6). Nonetheless, increased local currency financing may create other fragilities, such as a stronger bank-sovereign nexus. For weaker emerging market economies, on the other hand, debt service burden is mounting, with long-term real interest rates (*r*) that are higher than long-term growth rates (*g*) (Figure ES.7). That could expose emerging markets to funding risks, as fiscal consolidation would be challenging for them (see the October 2025 *Fiscal Monitor*).

The corporate sector has been resilient so far, although tariffs could put pressure on corporate profit margins in some sectors, adversely affect debt-servicing abilities, and make stretched corporate equity and bond valuations vulnerable to corrections. In a scenario whereby additional tariffs are phased in and at the same time firms face higher refinancing costs, the share of corporate debt with an interest coverage ratio falling below 1 would reach 55 percent in some countries. A weak tail of firms appears to already be struggling in the current environment. Despite the wave of restructurings, liquidity remains strained among the more vulnerable borrowers in the leveraged loan and private credit markets. This has contributed to an increase in borrower downgrades.

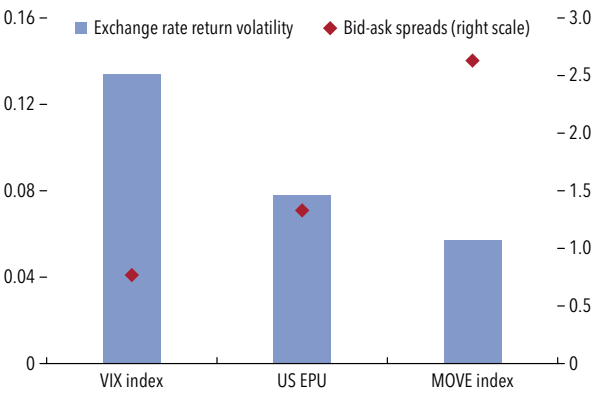
Stablecoins are growing rapidly and playing a larger role in financial intermediation, led by stablecoins pegged to the US dollar (Figure ES.8). The continued growth of stablecoins could have three main financial stability implications: (1) weaker economies may face currency substitution and reduced effectiveness of policy tools, (2) bond market structure could change with potential implications on credit disintermediation, and (3) investor runs out of stablecoins may generate forced selling of reserve assets. Potential

Figure ES.8. Stablecoin Market Cap
(Billions of dollars)



Sources: Bloomberg Finance L.P.; Reuter 2025; and IMF staff calculations.
Note: USDC = US Dollar Coin, issued by Circle Internet Group Inc.; USDT = US Dollar Tether, issued by Tether Limited.

Figure ES.9. Effect of an Increase in Macrofinancial Uncertainty on Foreign Exchange Market Conditions
(Percentage points, left scale; basis points, right scale)



Sources: Baker, Bloom, and Davis 2016; Bloomberg Finance L.P.; LSEG Datastream; and IMF staff calculations.
Note: The figure depicts the response of weekly excess exchange rate return volatility (bars) and bid-ask spreads (diamonds) against the US dollar after large macrofinancial uncertainty shocks. Macrofinancial uncertainty is measured using the Chicago Board Options Exchange Volatility Index (VIX), the US Economic Policy Uncertainty (EPU) index, and the Merrill Lynch Option Volatility Estimate (MOVE) index. Large uncertainty shocks are defined as dummy variables equal to 1 when the AR(1) residual error term of the respective indicator exceeds two standard deviations.

systemic effects would be conditional on stablecoins' continued growth.

Despite deep liquidity, global foreign exchange markets remain vulnerable to episodes of increased macrofinancial uncertainty. As Chapter 2 shows, flight to quality and increased demand for hedging during such periods can raise foreign currency funding costs and impair foreign exchange market liquidity, reflected in wider bid-ask spreads and heightened exchange rate return volatility (Figure ES.9). These pressures may be exacerbated by structural fragilities in the foreign exchange market, including large currency mismatches, concentrated dealer activity, and increased NBFI involvement. Strains in foreign exchange market conditions can spill over into other asset classes, tightening broader financial conditions and potentially posing risks to macrofinancial stability. Moreover, the expansion of foreign exchange trading has heightened settlement risk—the possibility that one party delivers currency without receiving the countervalue. Operational risks to foreign exchange market infrastructure, such as technical failures and cyberattacks, further threaten market functioning.

Policy Recommendations

Macroeconomic stability is crucial to financial stability. For tariffed jurisdictions facing weaker demand, a gradual easing of the policy rate could be appropriate. For countries where inflation is still above target, central banks need to proceed carefully with any monetary easing and maintain their commitment to price stability. This cautious approach would also help temper further valuation pressures on risk assets. Central bank operational independence remains crucial for anchoring inflation expectations and enabling central banks to achieve their mandates.

Urgent fiscal adjustments to reduce deficits are crucial to protect the resilience of sovereign bond markets. High debt and delayed fiscal adjustments in many countries could further raise borrowing costs for governments, underscoring the need for more ambitious fiscal measures to reduce sovereign risks. Improvements in market structure—such as expanding central clearing for cash bond and repo transactions to lower counterparty risks, improving balance sheet efficiency, and boosting transparency—would also enhance bond market resilience. Standing liquidity facilities are vital to backstop these markets.

Even though a softer US dollar has tempered the external headwinds faced by emerging markets in recent months, these markets remain vulnerable to changes in investor sentiment. When signs of fragility such as rising inflation expectations and surges in exchange rate and capital flow volatility are observed, emerging markets should use foreign exchange interventions, macroprudential measures, and capital flow management consistent with the IMF's Integrated Policy Framework,

provided that these measures do not impair progress on necessary fiscal and monetary adjustments. Further developing local bond markets by enhancing macroeconomic fundamentals—such as raising domestic financial savings and strengthening fiscal and monetary credibility—is essential to increase debt-carrying capacity. Other policies to deepen emerging market bond markets include enhancing the predictability and transparency of debt issuance, developing efficient repo and money markets, strengthening primary dealer frameworks, and diversifying the investor base.

The IMF's Global Stress Test underscores the importance of improving capitalization to address risks from weak banks. Implementation of internationally agreed-upon standards that ensure sufficient levels of capital and liquidity, notably Basel III, is paramount during times of high economic uncertainty. The efficiency of regulations should be ensured by reviewing any undue complexity without undermining the overall resilience of the banking sector or international minimum standards. National authorities should strengthen the financial sector safety net to protect the banking sector against potential financial stability risks from weak banks. This includes establishing emergency liquidity assistance frameworks, ensuring that banks can quickly access central bank funding, and advancing recovery and resolution frameworks to manage shocks without systemic disruption or taxpayer losses.

Effective regulatory oversight of NBFIs and digital assets such as stablecoins calls for improved data collection, coordination, and analysis, including across borders. To address liquidity mismatches in investment funds, it is key to further improve and expand the availability and usability of liquidity management tools. To address the risks that crypto assets such as stablecoins could pose to macroeconomic and financial stability, policymakers should implement the Financial Stability Board's high-level recommendations, including establishing effective risk-management frameworks, safeguarding anti-money laundering/combating the financing of terrorism measures, and ensuring that relevant authorities have the powers they need and can cooperate effectively.

To address financial stability risks arising from stress in the foreign exchange market, policymakers should enhance surveillance, including systematic foreign exchange liquidity stress testing that captures interactions with underlying vulnerabilities. It is essential to close foreign exchange data gaps and ensure that capital and liquidity buffers in financial institutions are adequate and supported by robust crisis management frameworks. Strengthening the global financial safety net—including through sufficient international reserve buffers and an expanded network of central bank swap lines—could help mitigate foreign exchange market volatility. This effort would also benefit from a macroeconomic policy mix aligned with the IMF's Integrated Policy Framework. Enhancing the operational resilience of key foreign exchange market participants, including against cyber risks, and promoting broader use of payment-versus-payment arrangements could further reduce settlement risks.

IMF EXECUTIVE BOARD DISCUSSION OF THE OUTLOOK, SEPTEMBER 2025

The following remarks were made by the Chair at the conclusion of the Executive Board's discussion of the Fiscal Monitor, Global Financial Stability Report, *and* World Economic Outlook *on September 29, 2025.*

Executive Directors broadly agreed with staff's assessment of the global economic outlook, risks, and policy priorities. They welcomed the recent economic resilience despite repeated shocks, noting the importance of stronger economic fundamentals and policy frameworks in EMDEs. Directors acknowledged, however, that major policy shifts are reshaping the global economic landscape and broadly concurred that the recent resilience, also supported by temporary factors, could be fragile as lingering vulnerabilities, elevated policy uncertainty, and fragmentation continue to weigh on growth prospects. At the same time, a view was held that staff's overall characterization of the global economic environment is overly pessimistic. Directors cautioned that protectionism and significant cuts to foreign aid disproportionately affect the outlook for the world's poorest economies, undermining their convergence prospects.

Directors broadly concurred that risks to the outlook are tilted to the downside, including from prolonged policy uncertainty and any escalation in trade tensions, as well as from rising fiscal vulnerabilities, increased fragilities in financial markets, and their potentially adverse interactions. With high debt service obligations and rollover needs, a continued rise in government borrowing costs would further reduce fiscal space, challenging efforts to rebuild fiscal buffers and making bond market functioning more fragile. Directors also acknowledged that stretched risk asset valuations and higher interconnectedness between banks and nonbank financial institutions (NBFIs) has kept financial stability risks elevated. They also recognized the risks stemming from eroding good governance and the independence of key economic institutions. Labor supply shocks, regional conflicts, including Russia's war in Ukraine, and commodity price volatility are additional risks to the outlook.

Directors broadly underscored the need to reinvigorate multilateral cooperation to meaningfully reduce trade policy uncertainty by re-anchoring trade in an open, rules-based and transparent system. They acknowledged the need to modernize trade rules and lower barriers, including through regional agreements that remain open to and do not discriminate against third parties. There was general recognition that trade diplomacy should work hand in hand with a coordinated approach to implement domestic macroeconomic adjustments and address distortions behind internal and external imbalances. Attention was also brought to the role of the global financial safety net in mitigating systemic risks and, in this regard, the importance of continued progress on Fund concessional resources and a strong, quota-based, and adequately resourced IMF at its center.

Directors highlighted the need for the Fund to provide tailored fiscal advice that takes country specific circumstances into account. They stressed the importance of rebuilding fiscal buffers and creating space for new spending demands while safeguarding debt sustainability. Directors called for fiscal consolidation with realistic and credible plans that are anchored in robust medium term fiscal frameworks and combine spending rationalization and revenue generation, while protecting the vulnerable. They emphasized the need to prioritize measures that raise efficiency of public spending and support sustainable and inclusive private sector led growth, while avoiding blanket spending cuts. Where new discretionary support is warranted, it should be transparent, targeted, and temporary. Directors noted the potential for reforms to pensions, health care, wage bills, and tax expenditures to create fiscal room for spending that promotes long run economic growth. In countries where debt is unsustainable, they emphasized the importance of cooperation through the

G20 Common Framework and the Global Sovereign Debt Roundtable to seek timely and orderly debt restructuring.

Directors emphasized the importance of central bank independence and their insulation from political pressures for the anchoring of inflation expectations and the pursuit of price stability in line with their respective mandates. Monetary policy should be data-driven, calibrated to country-specific circumstances—with careful assessment of the nature of shocks and the output gap—and clearly communicated. In economies experiencing supply shocks, a gradual easing of the policy stance should be considered provided that disinflation is clearly established. Where weaker demand dominates, cautious consideration can be given to a reduction in policy rates. A prudent approach to monetary policy easing can also help contain asset valuation pressures. For countries experiencing excessive exchange rate volatility and with shallow foreign exchange markets, the use of temporary foreign exchange interventions and capital flow measures may be appropriate, consistent with the advice of the Integrated Policy Framework, alongside further deepening local bond markets while managing risks from the bank-sovereign nexus. Directors also called on the authorities to continue to use their macroprudential tools, as appropriate, and generally supported the consistent and timely implementation of internationally-agreed regulatory frameworks, like Basel III, to mitigate macro-financial stability risks. It will also be important to address data gaps and strengthen regulation of NBFIs and digital assets, including stablecoins.

Directors acknowledged the importance of boosting productivity and re-igniting growth over the medium term. They called for comprehensive and carefully sequenced structural reform packages, taking into account country-specific circumstances including social and political economy considerations. Priority reforms include encouraging labor mobility and participation, increasing digitalization and AI readiness, and improving the business climate and competition to reallocate labor and capital to the most productive firms. Directors generally welcomed the Fund's analysis on industrial policies, with many calling for further work in this area, including expanding its scope to include a discussion of spillover risks and related policy advice. Directors cautioned that the expanding use of industrial policies involves opportunity costs and tradeoffs, including fiscal costs, higher consumer prices, and resource misallocation. Where pursued, industrial policies should be transparent and focus on addressing market failures, targeting areas with the highest potential for positive spillovers and impact on supply-side capacity and job creation, supported by complementary structural reforms. Directors generally noted that strong governance is key for their successful implementation and called on governments to stay agile in monitoring their impact and scaling back or discontinuing ineffective measures. A few Directors also stressed the importance of leveraging historical experiences in the conduct of industrial policies.

CHAPTER 1

SHIFTING GROUND BENEATH THE CALM: STABILITY CHALLENGES AMID CHANGES IN FINANCIAL MARKETS

Chapter 1 at a Glance

- Recent months have seen continued appreciation in risk asset prices and a depreciation of the US dollar. Meanwhile, government debt has continued to rise, and nonbank financial intermediaries (NBFIs) and stablecoins have continued to grow.
- Markets appear complacent as the ground shifts. Despite trade tensions, geopolitical uncertainties, and rising concerns about sovereign indebtedness, asset prices have returned to stretched valuations and financial conditions have broadly eased.
- Although these shifts have been under way in recent years, new evidence points to increasing vulnerabilities in the financial system:
  - Valuation models indicate that risk asset prices are well above fundamentals, increasing the probability of disorderly corrections when adverse shocks occur.
  - Analysis of sovereign bond markets highlights growing pressure from widening fiscal deficits on the functioning of markets.
  - Stress tests for banks and NBFIs reveal increasing interconnectedness and persistent maturity mismatches that could amplify shocks.
- These vulnerabilities reinforce each other, keeping global financial stability risks elevated. For example,
  - An abrupt yield increase—triggered, for instance, by debt sustainability concerns—could strain banks' balance sheets and pressure open-ended funds.
  - Heightened interconnectedness between banks and NBFIs would exacerbate adverse shocks.
- This chapter urges policymakers to
  - Remain attentive to potential risks to inflation, especially where inflation is still above target, and preserve central bank operational independence;
  - Curb government deficits;
  - Implement internationally agreed-upon prudential standards;
  - Strengthen financial sector safety nets and NBFI oversight, and
  - Promote effective regulation and supervision of stablecoins.

Introduction

The world economy faces persistent trade and geopolitical uncertainties, while structural challenges continue to weigh on medium-term growth. Yet, after a brief jolt from the United States' April 2 tariff announcements, global financial markets have largely brushed off subsequent shocks and uncertainties. Asset prices have rebounded strongly since the April 2025 *Global Financial Stability Report*, and, after an abrupt tightening in early April, financial conditions across regions have eased back to accommodative levels.

The apparent calm masks a degree of complacency. Markets seem to have downplayed the potential effects of tariffs on growth and inflation (see the October 2025 *World Economic Outlook*) as well as other potential adverse developments. This chapter shows that beneath the calm surface, the ground is shifting in several parts of the financial system, giving rise to vulnerabilities. Global financial stability risks remain elevated, according to the IMF's growth-at-risk metrics, having receded only modestly since the April 2025 *Global Financial Stability Report*.

The first sign that the ground is shifting appears in asset price movements, covered in the next section, "Financial Market Developments and Asset Valuations." The US dollar has depreciated by 10 percent to date

this year, despite April's sell-off in risk assets and better-than-expected US economic data in the several months that followed. This reflects a reassessment of the dollar's decade-long bull run and increased hedging by non-US investors against further weakening. Meanwhile, IMF staff models ascertain that valuations of risk assets have again become stretched. An abrupt correction of asset prices could be exacerbated by these unusual asset correlations and lead to an unwinding of leverage and straining financial markets. This strain could include foreign exchange markets, which have undergone structural shifts yet have not experienced significant dollar weakness (see Chapter 2).

The second sign of shifting ground is that debt continues to move toward the government sector. As detailed in the "Sovereign Bond Markets" section, expanding fiscal deficits continue to propel sovereign bond issuance. In advanced economies, sovereign bond markets are increasingly dependent on price-sensitive investors to buy new issuances. While bond market functioning has been stable to date, scenario analyses show that abrupt yield increases would strain bank balance sheets and add liquidity pressures at open-ended funds. Stress in core bond markets, although a tail risk, could have broad and disruptive ramifications for financial markets, given bonds' role as key benchmarks and collateral. In emerging markets, governments have turned more to domestic investors for financing in recent years. Although this reduces reliance on foreign currency debt, it may also create fragilities such as a stronger bank-sovereign nexus (see Chapter 3).

Nonbank financial intermediaries (NBFIs) continue to grow and deepen their ties with banks. The section "Financial Intermediaries" documents the expanding role of NBFIs in core sovereign bond markets and corporate debt markets, including private credit. Although the IMF's Global Stress Test (GST) shows that the weak tail of global banks has diminished compared with two years ago, a sizable group of weak banks remains, and banks have also become more exposed to NBFIs—heightening interconnections and the fragilities across both sectors. In addition, the global growth of stablecoins could offer investors alternatives to traditional safe assets and bank deposits and could influence cross-border capital flows. These trends raise the specter of excessive risk taking, rising leverage, and maturity mismatch vulnerabilities in the financial system.

While not an imminent financial stability risk, weaker firms, as documented in the section "Corporate Credit Risk," appear to be struggling in an environment of higher tariffs and refinancing rates, and borrower downgrades and restructurings have risen. Nonetheless, retail investors are increasingly interested in private credit markets and high-yield bond funds, which could amplify credit downturns.

Financial Market Developments and Asset Valuations

Asset Prices Rebound and Volatility Subsides amid Elevated Uncertainty

Since the April 2025 *Global Financial Stability Report*, financial markets have largely rebounded from the broad-based sell-off that followed the April 2 tariff announcement. In part this was because the 90-day pause was announced a week later, sequential trade agreements then resolved some uncertainty, and global economic data remained solid. Despite the intermittent market gyrations since April from tariff-related news, buyers have been ready to step in based on the belief that any adverse tariff impacts would be temporary and eventually reversed. As a result, market volatility across asset classes has declined, on net, in contrast with the still-elevated economic, trade, and geopolitical uncertainty (Figure 1.1, panel 1). This decline in volatility has been supported by expectations of further easing of monetary policy across most major advanced economies and emerging markets (Figure 1.1, panel 2).[1]

At present, the global economy has shown tenuous resilience[2] (see the October 2025 *World Economic Outlook*).[3] Nonetheless, with tariffs settling at their highest levels in almost a century, a slowdown in the global economy is beginning to emerge as front-loaded consumption and investments fade. In addition, market expectations for near-term US inflation remain elevated amid high trade policy uncertainty, whereas

[1]Still, the lasting impact of tariffs on the global economy, particularly in the United States, remains a significant unknown, prompting caution in central bank communications.

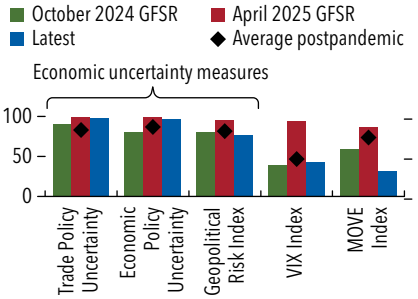
[2]Specifically, global growth in the first half of the year was larger than predicted in the April 2025 *World Economic Outlook*, but higher-frequency indicators for July and August point to drags on global economic activity. In addition, expectations for inflation have been revised upward in the United States but downward in many other jurisdictions, consistent with the expectation of a supply shock in the tariffing country and demand shocks in tariffed countries.

[3]Temporary factors include front-loading of consumption and investment, inventory management strategies, implementation delay of tariffs, and strong profit margins.

Figure 1.1. Asset Prices amid Still-Elevated Uncertainty

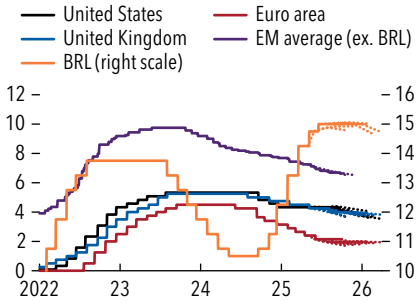
Financial market volatility has declined since April, but measures of economic uncertainty remain elevated.

1. Economic Uncertainty and Financial Volatility
(Percentile)



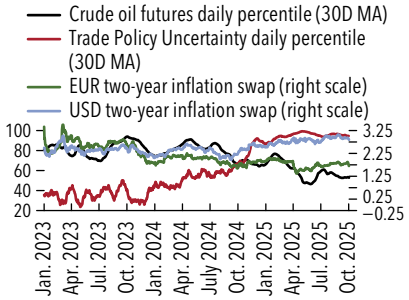
Monetary policy easing is expected to continue, although with divergence across countries.

2. Advanced Economy and Emerging Market Interest Rate Paths
(Percent)



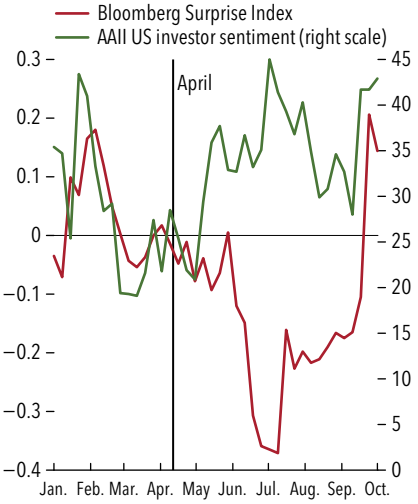
Market expectations of inflation depend on oil prices and trade policy uncertainty.

3. Market-Based Inflation Expectations versus Oil Price and Trade Policy Uncertainty
(Percentile, left scale; percent, right scale)



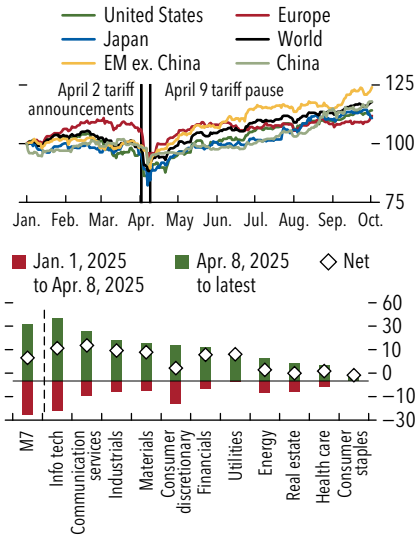
Despite economic surprises trending negative for several months following the April sell-off, investor sentiment has continued to improve ...

4. Economic Surprise and Investment Sentiment Indices in the United States, 2025
(Z-score, left scale; percent, right scale)



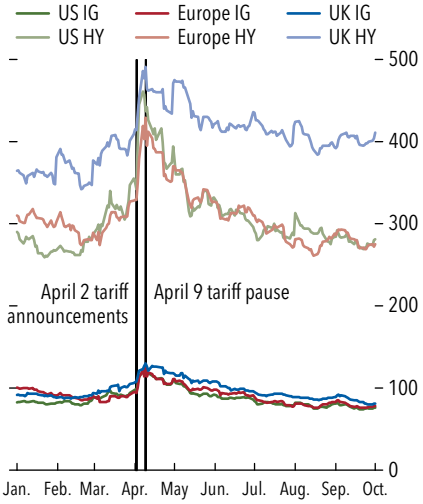
... equity prices globally have risen, largely on the back of outperformance in AI-related sectors, particularly the M7.

5. Performance of Global Equities, by Selected Economies and Sector, 2025
(Normalized, January 1, 2025 = 100; percentage points)



Corporate spreads have narrowed.

6. Investment-Grade and High-Yield Corporate Bond Spreads, 2025
(Basis points)



Sources: American Association of Individual Investors; Bloomberg Finance L.P.; IBES DataStream; Baker, Bloom, and Davis 2016; Caldara and others 2020; Caldara and Iacoviello 2022; and IMF staff calculations.

Note: In panel 1, percentiles are derived from monthly data starting January 1997. "Average postpandemic" is the average percentile since January 2022. "Economic Policy Uncertainty" and "Trade Policy Uncertainty" are the indices of Baker, Bloom, and Davis (2016); the Geopolitical Risk Index is from Caldara and Iacoviello (2022). Economic Uncertainty Measures are text-based. The latest level for economic uncertainty measures is the latest available for each corresponding monthly series. The latest levels for the VIX and the MOVE indices are as of October 2, 2025. Solid lines in panel 2 are actual central bank policy rates. Dotted lines are forecast future policy rates derived from swap curves. The average emerging market central bank (excluding Brazil) includes India, Hungary, Mexico, and South Africa. In panel 3, Trade Policy Uncertainty (30D MA) is the 30-day moving average of percentiles calculated from the entire daily series in Caldara and others (2020). Crude oil futures (30D MA) correspond to the 30-day moving average of percentiles calculated from the third generic crude oil futures contracts for West Texas Intermediate, due to expire in around three months from the date of this publication. In panel 4, the Bloomberg Surprise Index is the Bloomberg ECO Surprise Index for the United States. The values are *z*-scores, representing the number of standard deviations that analysts' expectations, as surveyed by Bloomberg, are above or below normal surprise levels. The AAII index is compiled from the AAII weekly; data indicate how bullish the surveyed members feel about equity markets in the next six months. Panel 5 uses the S&P 500 Index for the United States, Euro Stoxx 600 for Europe, Topix Index for Japan, MSCI All Country World Index for World, MSCI Emerging Market excluding China for emerging markets excluding China, and Shanghai Shenzhen CSI 300 Index for China. Global Industry Classification Standard level 1 sectors are used for the MSCI All Country World Index. Panel 6 uses option-adjusted spreads. Data labels in the figure use International Organization for Standardization (ISO) country codes. AAII = American Association of Individual Investors; AI = artificial intelligence; EM = emerging market; ex. = excluding; GFSR = *Global Financial Stability Report*; HY = high yield; IG = investment grade; M7 = Magnificent 7; MOVE = Merrill Lynch Option Volatility Estimate; VIX = Chicago Board Options Exchange Volatility Index.

euro area inflation expectations have anchored as oil prices have declined (Figure 1.1, panel 3). Although inflation effects from trade policy are expected to be largely temporary, as indicated by inflation swaps pricing, it is now more likely that tariffs may be settling at high levels for an extended period.[4] As a result, exporters around the world who are most affected by tariffs could gradually be shifting some tariff-related costs onto consumers to mitigate pressures on their profit margins (see the section "The Corporate Sector Is Resilient to Tariffs So Far").[5]

Despite recent economic data surprises trending negative until more recently, equity market sentiments have continued to remain high (Figure 1.1, panel 4), buoyed by optimism about mega-cap stocks related to information technology (IT) and artificial intelligence (AI) (Figure 1.1, panel 5), which are perceived to be less negatively affected by tariffs. Corporate credit spreads have tightened since April (Figure 1.1, panel 6). Given these developments, equity and corporate credit valuations have returned to being fairly stretched, and concentration of valuations at a handful of firms—especially the Magnificent 7 and AI-related stocks in the broad benchmark equity index—is at historical highs (see the section "Equity Markets Exhibit High Valuations and Concentration Risks").[6]

The Dollar, Bonds, and Risk Assets Diverge

Since the April 2025 *Global Financial Stability Report*, longer-term sovereign bond yields in most advanced economies have risen, even as investors expect monetary policy to continue to ease. Term premiums have been driven up by a rising bond supply, and there has been ongoing quantitative tightening by central banks as well as a slowdown in duration demand, including by liability-driven investors (Figure 1.2, panel 1; see also the section "Expanding Fiscal Deficits Exert Pressure on Bond Market Stability").

One noteworthy development has been the weakness in the US dollar against a basket of both G10 and emerging market currencies. This has persisted for several months after the April tariff announcement despite a strong rally in risk assets as well as rising gold prices, even with a wide differential between US and G10 interest rates that had supported the dollar in recent years (Figure 1.2, panel 2). Overall, the dollar has depreciated by about 10 percent so far this year against major currencies. Analysts have put forth a number of possible drivers for dollar weakness, from a revaluation of dollar strength amid concerns over the US fiscal position to a shift in allocation away from US-dollar-denominated assets driven by concerns about US policy uncertainty. Although cross-border data do not support notions of a broad pullback in non-US investor holdings,[7] increased currency hedging activity to mitigate losses on unhedged dollar exposure appears to have emerged as a contributor to recent dollar weakness.

By way of context, non-US investors' holdings of US dollar assets have risen steadily over time, with a large portion not matched by commensurate dollar liabilities. For example, total non-US investor holdings of US securities increased from $16 trillion to $31 trillion from 2015 to 2024. These holdings are characterized by incomplete hedging, given the foreign exchange mismatches they present, and could be subject to sudden, large-scale sell-offs (and therefore can be deemed "need to be hedged"). This rise in exposure has been driven by macroeconomic factors, such as current account surpluses, savings gluts, relatively limited investment opportunities in non-US markets, and yield-seeking behavior. The mutually reinforcing dynamics between trade and finance are facilitated by the unparalleled depth and liquidity of US financial markets (see Chapter 2 of the July 2025 *External Sector Report*).

Although currency hedging can mitigate risks associated with incomplete hedging, the modest depth of foreign exchange markets in many jurisdictions relative to large dollar asset exposures and the dollar's strength over the past decade have made hedging

[4]Pricing for two-year, three-year, and five-year inflation swaps for the United States, along with the five-year inflation swap measure, suggests that medium and longer-term inflation expectations, while more elevated since April, have not become unanchored so far.

[5]As noted in the October 2025 *World Economic Outlook*, tariffs theoretically lead to currency appreciation for the tariff-imposing country, mitigating the impact of tariffs on prices. However, US dollar appreciation has not happened to date. Instead, dollar depreciation may mean that exporters have less room to absorb tariffs without a deterioration in their profits, thus leading to pass-through to importing firms and consumers.

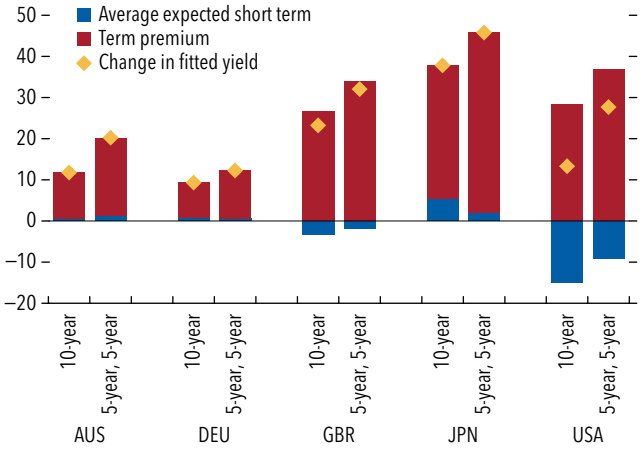
[6]The Magnificent 7 companies are Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia, and Tesla.

[7]After a brief period of outflows in April, Treasury securities experienced net inflows of about $105.5 billion. US equity net inflows were $95.4 billion over April and May, according to Treasury International Capital System data.

Figure 1.2. Some Developing Divergences

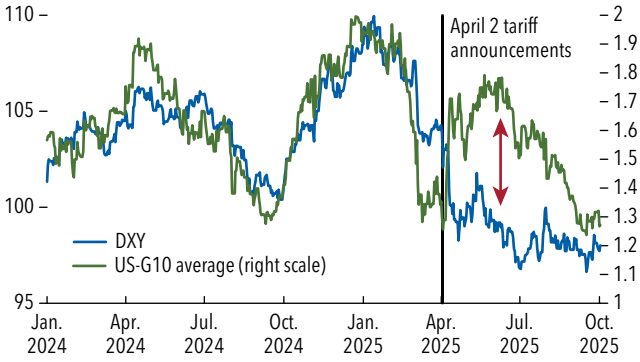
Longer-term bond yields have seen upward pressure from higher term premiums.

1. Decomposition of Changes in Longer-Term Bond Yields since Early April 2025 in Selected Advanced Economies
(Basis points)



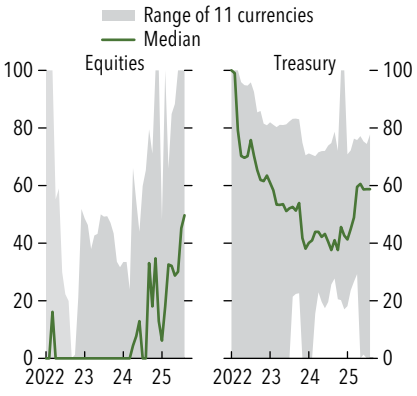
The US dollar has weakened, while also having decoupled relative to interest rate differentials for several months after the April tariff announcement.

2. Dollar versus Interest Rate Differentials
(Index, left scale; percent, right scale)



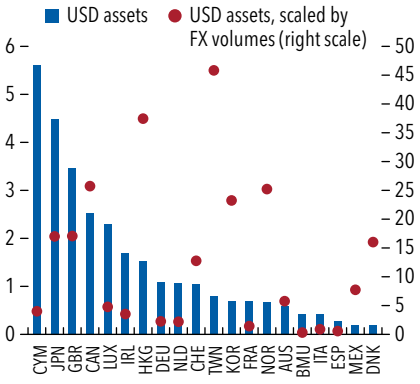
The optimal currency hedging ratio has increased recently, an indication that non-US investors ought to increase their hedging against further dollar depreciation.

3. Optimal Volatility-Minimizing FX Hedge Ratio for Non-US Investors, by Asset Class
(Percent)



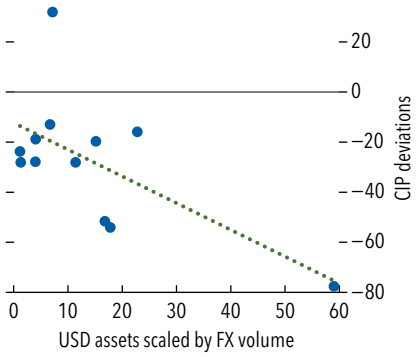
US dollar asset holdings are large across jurisdictions in absolute terms as well as relative to FX market depth.

4. US Dollar Exposures and Ratio Relative to the Size of Local FX Markets
(Trillions of dollars, left scale; ratio, scaled by local FX market monthly transaction volume, right scale)



Jurisdictions with large dollar asset exposures relative to the size of FX markets have wider CIP deviations, resulting in tighter dollar funding conditions.

5. US Dollar Asset Exposures Scaled by FX Transaction Volume and CIP Deviations across Regions
(Basis points, y-axis; ratio, x-axis)



Sources: Bloomberg Finance L.P., BNP Paribas; Bank for International Settlements; US Department of the Treasury; and IMF staff calculations.

Note: The 10-year yield can be split into different time horizons, as different factors may be at work over the near and medium versus the longer term. In panel 1, the 5-year-5-year forward conveys information contained within the latter half of a 10-year bond's maturity–that is, spanning years 6 to 10–thus parsing out the influence of cyclical factors that may be predominant drivers at shorter-term horizons. Term premium estimates follow Adrian, Crump, and Moench (2013). Early April refers specifically to April 3. In panel 2, the US–G10 average is the nominal 10-year interest rate differential between the United States and the average of the G10 countries. In panel 3, minimum return volatility hedge ratios by asset classes are estimated based on Wilcock and others (2025), with two-year rolling volatility and correlation of each local currency exchange rate against the US dollar and S&P 500 index (equities) or J.P.Morgan Global Bond Index local currency US country index (Treasury). The shaded areas indicate the range of the estimated hedge ratio for 11 currencies: British pound sterling, Japanese yen, Canadian dollar, euro, Chinese yuan, Hong Kong dollar, Swiss franc, new Taiwan dollar, Australian dollar, Norwegian krone, and Republic of Korean won. In panel 4, US dollar exposures are estimated by focusing on cross-border portfolio investments, loans, and deposits, using multiple databases, as of 2023 (see Online Annex 1.6 for details). Panel 5 plots the average CIP deviations versus US dollar exposures scaled by the monthly FX transaction volume for 12 currencies, including advanced economies and emerging market economies. CIP deviations are computed as the 12-year average of the difference between the three-month US interest rate and the foreign country's interest rate, adjusted by the annualized forward premium. Data labels in the figure use International Organization for Standardization (ISO) country codes. CIP = covered interest parity; DXY = US dollar index; FX = foreign exchange; USD = US dollar.

expensive. Globally, hedge ratios for insurance companies, pension funds, and mutual funds—which invest in dollar assets and have mostly local-currency-denominated liabilities—are found to be considerably less than 100 percent, as evidenced in, for instance, Du and Huber (2024) and Shin, Wooldridge, and Xia (2025).[8]

More recently, the case to increase hedge ratios has strengthened. A measure of optimal hedge ratio from a non-US investor's perspective—based on the minimization of asset return volatility—has significantly increased recently for portfolios of both US equities and Treasuries across currencies (Figure 1.2, panel 3).[9] Many investors appear underhedged compared with this optimal ratio (Shin, Wooldridge, and Xia 2025). Amid dollar weakening, non-US investors with significant unhedged dollar exposures could be prompted to increase currency hedging to mitigate further losses on these exposures. Such hedging after dollar weakness would involve selling US dollars forward or repatriating dollar deposits, so amplifying dollar weakening in a self-fulfilling manner. Consequently, "rush to currency hedge" behavior reportedly increased in the months after the April 2 tariff announcements (Parsons and Davis 2025).

According to IMF staff analysis, these hedging assets include security portfolios, loans, and deposits, and they are especially large in international financial centers and jurisdictions with large NBFIs. In some economies, dollar exposures are disproportionately large relative to the depth of the local foreign exchange market (Figure 1.2, panel 4; see also Online Annex 1.6).

The financial stability risk of a "rush to hedge" is that selling the US dollar forward could increase dollar funding pressures, especially in shallower foreign exchange markets with limited hedging instruments and where absorption capacity for hedging flows is lower. With many foreign investors selling US dollars forward, the relative price of the US dollar forward versus spot would decline, resulting in larger deviations from covered interest parity (CIP), an indicator for dollar funding pressures. Indeed, jurisdictions with larger US dollar asset exposure relative to foreign exchange market depth currently have wider CIP deviations (Figure 1.2, panel 5).[10,11]

Equity Markets Exhibit High Valuations and Concentration Risks

The rebound in global equity prices since April has outpaced expected future earnings, reflecting buoyant investor sentiment (see the section "Asset Prices Rebound and Volatility Subsides amid Elevated Uncertainty"). In particular, the S&P 500 12-month forward price-to-earnings (P/E) ratio has climbed back to about the 96th percentile since 1990 while continuing to trade at a premium compared with other advanced and emerging markets (Figure 1.3, panel 1).

[8]Based on evidence provided in Du and Huber (2024), hedge ratios for insurers, pension funds, and mutual funds stood at around 44 percent, 35 percent, and 21 percent, respectively, as of June 2020, suggesting incomplete currency hedging. More recent estimates of hedge ratios reveal that these could, in comparison, be even more conservative, as evidenced in Shin, Wooldridge, and Xia (2025). Hedging practices also vary substantially across investor types and countries depending on investment objectives and risk tolerance. Japanese life insurers, for instance, own a sizable amount of US dollar assets against yen-denominated liabilities, which in principle needs to be hedged to minimize currency mismatches. In practice, they typically hedge 50 percent to 70 percent of their bond portfolios (see McGuire and others 2021), as a 100 percent currency hedge may not necessarily be optimal from a risk-management perspective. Other long-term investors, and more specifically pension funds, may decide to not actively currency hedge their dollar exposure, but may instead change allocation to dollar assets through multiyear strategy asset allocation reviews, depending on cross-asset correlations, liquidity conditions, and hedging costs; as well as discretionary views about the market, particularly, the trajectory of the dollar. Some dollar exposures are not necessarily actively managed and thus remain relatively insensitive to market developments. For instance, dollar exposures associated with a non-US firm's direct investment in the United States, where the firm has its operations, may not be currency hedged. Another example is foreign reserve buffers held by monetary authorities, which are not held for investment returns, but rather serve as a first line of defense against excessive exchange volatility and funding pressures. In a longer time horizon, a decline in direct investment in the United States or a decrease in the dollar's share of foreign exchange reserves could contribute to the trend of dollar weakening. In fact, the US dollar share of international reserves has declined since the turn of the century, reflecting portfolio diversification by central bank reserve managers, potentially exerting downward pressure on the dollar over time (Arslanalp, Eichengreen, and Simpson-Bell 2022). US dollar exposures in Figure 1.2, panels 1 and 4, are not aimed to include direct investments and foreign exchange reserves.

[9]From 2021 to 2023, when the dollar strengthened and the correlation between local currencies and dollar assets was higher, the hedge ratio needed to minimize asset returns from a non-US investor perspective was low relative to the current level.

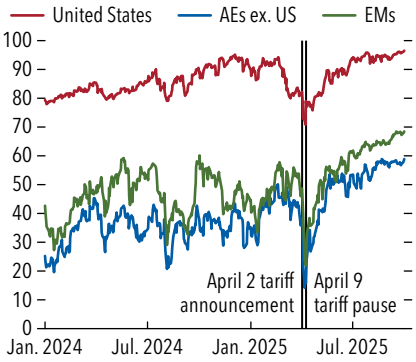
[10]Two related investigations in the literature are those conducted by Du and Huber (2024) and Dao and Gourinchas (2025). Du and Huber (2024) document the strong correlation between hedging activity and cross-currency covered interest parity (CIP) deviations. Dao and Gourinchas (2025) also uncover the relationship between the difference between external dollar assets and liabilities and CIP deviations.

[11]In some cases (for example, the Taiwan dollar), offshore forward transactions are nondeliverable and so are not used for dollar funding.

Figure 1.3. Equity Valuation Pressures

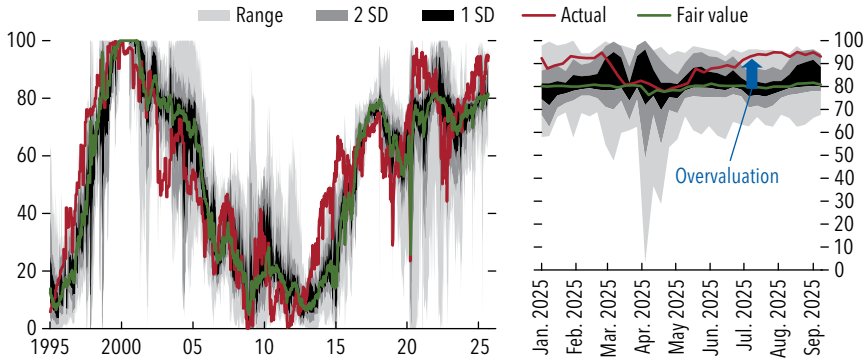
Global equity valuations rebounded with the tariff pause.

1. Twelve-Month-Forward P/E Ratios
(Percentile since 1990)



US equity valuations appear stretched relative to fundamentals, on the basis of staff estimates, but ...

2. Twelve-Month-Forward P/E Ratios versus Model-Implied Estimates
(Percentiles since 1990)

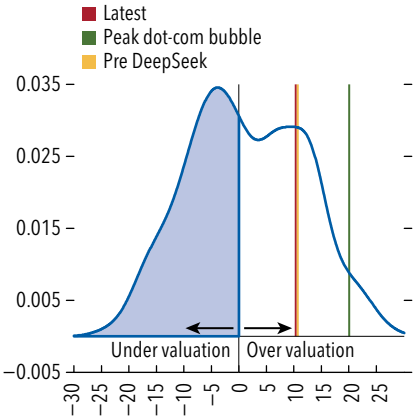


... current overvaluation is still below historical peaks, for example, during the dot-com bubble.

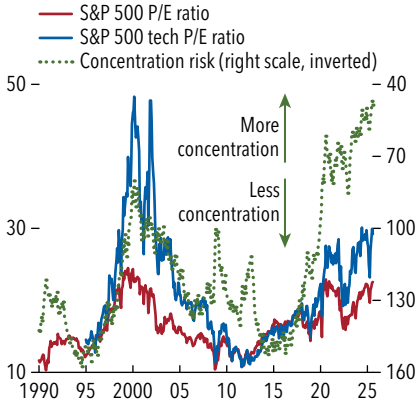
Concentration risk, however, has risen to historically high levels, with a narrow group of IT- and AI-related stocks predominantly driving the S&P 500.

Concentration risk is far less pronounced in other major global indices.

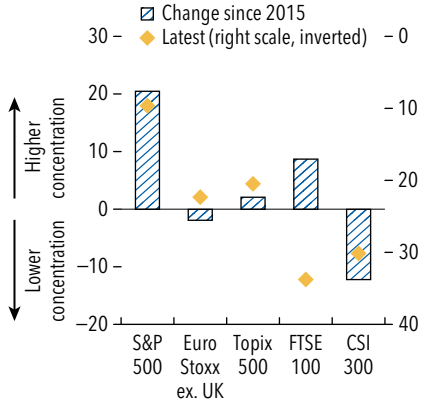
3. Kernal Density of Historical Over- (Under-) Valuations since 1995
(Density, y-axis; percentile points, x-axis)



4. Concentration Risk in the S&P 500
(12-month-forward P/E ratio, percent, left scale; inverse Herfindahl-Hirschman index [concentration risk], right scale)



5. Comparing Normalized Concentration Risk across Selected Indices
(Percentage point change since 2015, left scale; current level, right scale)



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

Note: Panel 1 shows the percentiles of 12-month-forward (P/E) ratios since 1990 or the start of the data series. AEs (excluding the United States) and EMs are MSCI series, while the United States is the S&P 500. Panel 2 compares the US P/E series from panel 1 with the central tendency of distribution of model-implied, fair-value estimates. Estimates are based on weekly data. The model used here is based on an extended equity market asset valuation model discussed in Online Annex 1.1 of the October 2019 *Global Financial Stability Report*, which relates equity index on various proxies for earnings growth, equity risk premium, and term premium. For the analysis discussed here, conditioning variables (proxies) are shuffled over multiple configurations used for parameter estimation through a bootstrapping methodology. The methodology delivers a distribution of 3,600 fair-value estimates at each point in time, based on randomized sampling within the preceding five years of weekly data. The light gray shaded region shows the range of estimates, and the dark gray shaded region shows estimates within two standard deviations around the mode. The black shaded region shows estimates within one standard deviation around the mode. The fair-value series (green line) is the R^2 weighted value of all estimates at each point in time. The distribution's mode generally closely tracks the estimated fair value. Panel 3 shows the model estimation errors, calculated as the percent difference between actual and fair-value estimates, for the entire time series. Positive (negative) error (or deviation) indicates overvaluation (undervaluation). The vertical lines flag this error at each corresponding point. In panel 4, the green dotted line (concentration risk) is the inverse of the Herfindahl-Hirschman Index (with the *y*-axis in reverse order) and measures the effective number of equal weighted stocks driving the index. Normalized concentration risk in panel 5 is the inverse of the Herfindahl-Hirschman Index divided by the total number of constituents within the corresponding index. AEs = advanced economies; AI = artificial intelligence; CSI = China Securities Index; EMs = emerging markets; ex. = excluding; FTSE = Financial Times Stock Exchange; IT = information technology; P/E = price/earnings.

In view of the structure of the economy and equity markets having evolved significantly over the past few decades, a simple historical comparison of the forward P/E ratios may not provide the most adequate assessment of valuations. IMF staff therefore estimate a large set of equity valuation models to ascertain a possible range of fundamentals-based valuation for the S&P 500.

Model estimates suggest that the fair-value forward P/E ratio should be about the 81st historical percentile (Figure 1.3, panel 2, green line). Comparing this model-implied fair value with actual observed forward P/E suggests that the equity valuation is currently stretched, with an estimated overvaluation of about 10 percentage points. However, in several past episodes the overvaluation was even higher; for instance, during the dot-com bubble in the early 2000s (Figure 1.3, panel 3).

Of greater concern, concentration risk within the S&P 500 is at a historic high, with a narrow group of stocks spanning mega-cap IT and AI-related firms driving the broader index. The IT sector accounts for a weight of 35 percent of the total S&P 500, similar to during the dot-com bubble, but with the Magnificent 7 alone accounting for 33 percent of the index. Consequently, a measure of concentration risk based on the Herfindahl-Hirschman Index is now substantially higher than during the dot-com bubble (Figure 1.3, panel 4, green line). Furthermore, while concentration risk for the S&P 500 index has witnessed an increase by about 20 percentage points over the past decade (when normalized by number index constituents) comparable benchmark indices in different jurisdictions have been characterized by far less of an increase over the same period (Figure 1.3, panel 5).[12] Against substantial AI-related investments (for example, information-processing equipment, data centers)[13] the possibility of mega-cap stocks failing to generate expected returns to justify current lofty equity valuations could trigger deterioration in investor sentiment and make the stocks susceptible to sudden, sharp correction.[14] Valuations would collapse as a result, making the broader benchmark index vulnerable to downturns.[15]

Expected returns and valuations depend on expectations for corporate profitability. Investors typically regard higher expected profit margins as a positive signal about the quality and sustainability of earnings, which tends to drive up equity prices. In general, tariffs on imports should increase the cost of goods sold, leading firms to either absorb the costs, thereby directly impacting profit margins, or pass them on to consumers as higher prices.

Over this year, stock analysts have meaningfully revised down expected profit margins for most firms. By contrast, margins for the Magnificent 7 have been revised up (Figure 1.4, panel 1), suggesting that tariffs are not perceived to impact these companies as much as they may hurt other firms. A forward-looking risk is for the effects of tariffs to eventually lead to margin compression across most S&P 500 sectors, including the Magnificent 7.

Looking across regions, some analysts have revised down year-end profit margins on the assumption that the full impact of tariffs has yet to percolate through the global economy. Although current profit margins are high compared with median levels over the past decade (Figure 1.4, panel 2), expectations of lower profit

[12]Concentration risk is measured as the inverse of the Herfindahl-Hirschman Index.

[13]Private fixed investment in information-processing equipment, which can be used a proxy for AI investments in data centers, has contributed around 57 percent of US real GDP growth since the fourth quarter of 2024 (evidence based on data sourced from Federal Reserve Economic Data and US Bureau of Economic Analysis; see also Paul Krugman, "About That Stock Market," August 6, 2025, and "What Happens if AI Hits an Energy Wall?," August 19, 2025, https://paulkrugman.substack.com/.).

[14]As discussed in the April 2025 *Global Financial Stability Report*, in an environment of stretched valuations, materialization of an adverse shock could sour investor sentiment, triggering a sudden stock market correction that reflects a sharp repricing of risk. This repricing may be amplified by abrupt deleveraging of balance sheets, involving asset fire sales to meet margin calls or satisfy risk limits amid a spike in market volatility (see Adrian, Malik, and Wu [2024] for a recent example of such a mechanism playing out). As equity valuations collapse, adverse spillovers to the wider market could also occur because of price correlations across different asset classes. In this context, as the net worth of borrowers falls at an accelerated rate and the risk management constraints of lenders become increasingly binding, credit provision to the wider economy can be significantly impaired, eventually weighing on output. Overall, a market sell-off can be exacerbated by a negative feedback loop playing out between pricing of risk and deleveraging, resulting in tightening financial conditions, with sharp, possibly nonlinear, declines in economic activity (Kiyotaki and Moore 1997; Bernanke, Gertler, and Gilchrist 1999; Brunnermeier, Eisenbach, and Sannikov 2013).

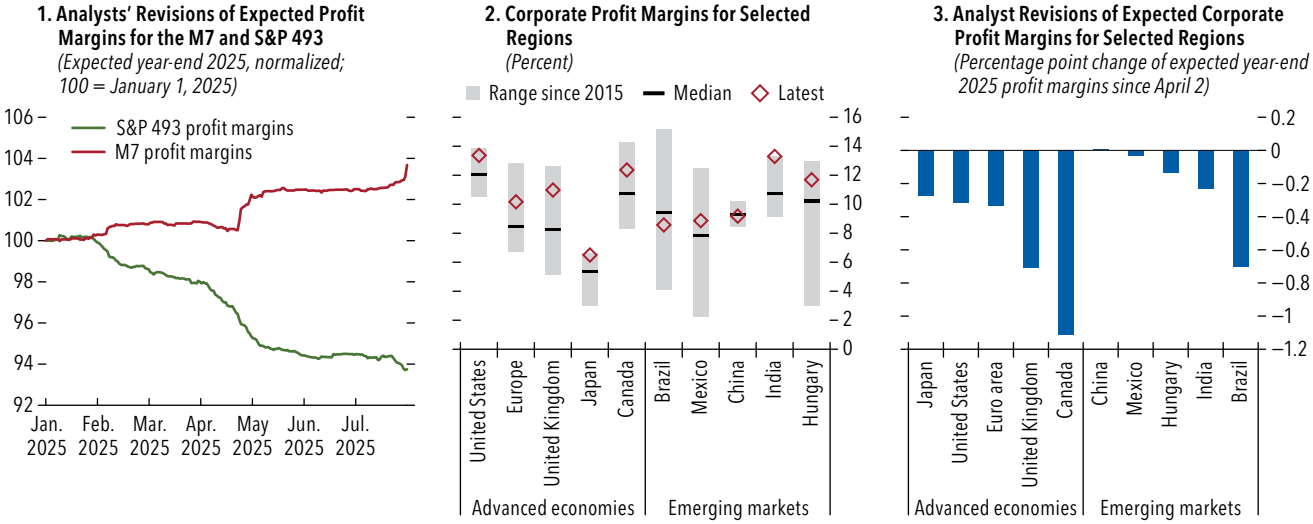
[15]This high concentration comes alongside historically elevated US household exposure to equities (as a share of total household assets), currently about 30 percent and on an upward trajectory since the global financial crisis (see the April 2025 *Global Financial Stability Report* for a discussion). A major portion of rising household exposure is to benchmark indices, in particular the S&P 500 (largely in 401k retirement accounts and through passive investment vehicles and exchange-traded funds). This exposure makes household balance sheets vulnerable to sharp corrections and prolonged declines in the index, potentially more so currently, given high concentration.

Figure 1.4. Expected Profit Margins Have Been Revised Down in Most Cases

Analysts have divergent profit margin expectations for the M7 and the rest of the S&P 500.

Looking across regions, margins are now higher than in the past decade ...

... but declines in expected profit margins after the April 2 tariff announcement may weigh on prices and valuations.



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

Note: Panel 1 shows the year-end 2025 earnings and profit margin estimates for M7 and for S&P 500 companies excluding the M7 (the S&P 493). The M7 is Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia, and Tesla. Expected earnings are calculated as the sum of expected year-end 2025 net income for all companies in the M7 and S&P 493, respectively. Profit margins are calculated as the sum of expected year-end 2025 revenue divided by net income. The series are normalized to equal 100 on January 1, 2025. Panel 2 shows the range of quarterly 12-month trailing profit margins since 2015. Panel 3 bars depict the percentage point change in analysts' estimates for year-end 2025 profit margins since April 2. M7 = Magnificent 7.

margins may weigh on equity prices and valuations for these regions over the near term (Figure 1.4, panel 3).[16]

[16]While tariffs on internationally sourced inputs can lead to higher costs for product-based companies, it is argued that service-based companies—for example, related to AI or encompassed within the Magnificent 7—can also be adversely affected by tariffs weighing on their margins. A tariff-related increase in direct costs necessary for service delivery could lead to higher cost of goods sold (that is, covering products and services), possibly including any raw materials, labor, outsourced services, equipment, and technology, among others. In addition, investments in capital expenditure may be exposed to rising costs if any of the inputs are subject to tariffs. Specifically, tariffs impacting major investment in AI-related infrastructure, including semiconductors and data centers, could compress margins for AI service providers. More specifically, data center inputs include hardware such as server and storage arrays (chips), networking equipment (switches, routers, fiber optics), and power systems (uninterruptible power supplies, generators, transformers); and infrastructure such as real estate, cooling systems, software, racks, and cabling (as well as utilities and labor). To date, tariffs have been initiated on semiconductors (100 percent), steel and aluminum (50 percent), and copper (50 percent), all key inputs of data center infrastructure. Firms providing the infrastructure will likely raise costs to firms providing AI services or purchasing the infrastructure. Sector-specific restrictions, such as the Digital Service Tax in the European Union, can decrease revenues for firms providing services. Last, the latest earnings reports from some AI-related firms have highlighted that tariffs and new export controls have raised costs throughout their supply chains, further indicating that these could undermine financial performance (see, for example, Nvidia Corporation's 10-Q filing for the period ending July 27, 2025).

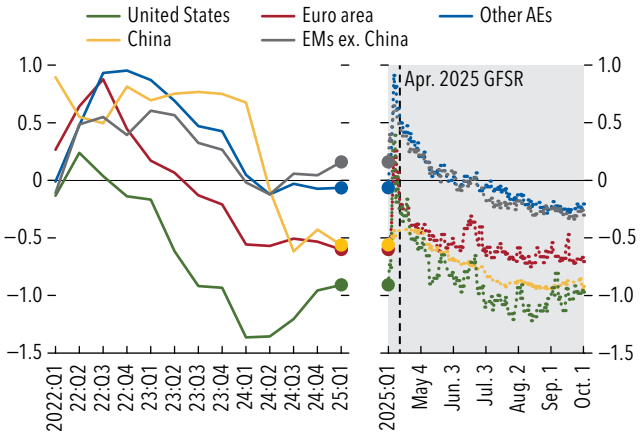
Financial Conditions Ease, but the Growth-at-Risk Metric Remains Elevated

The rebound of asset prices globally since the April 2025 *Global Financial Stability Report*, alongside a weaker dollar, have eased financial conditions around the world (Figure 1.5, panel 1). The abrupt tightening in financial conditions after the April 2 tariff announcement proved short-lived, as financial conditions in the euro area and the United States have returned to levels immediately before the event. Conditions in other advanced economies and emerging markets (including China) have become more accommodative. For the United States, although the softening of real estate prices has continued (Box 1.1, an improvement in corporate valuations (equity prices, corporate bond spreads) amid falling volatility drove financial conditions back into easy territory by historical standards (Figure 1.5, panel 2). In emerging markets (including China), external financing risks have lowered amid a weaker dollar, which has eased their financial conditions. That said, the Financial Conditions Index for China does not capture the recent slowdown in bank lending (Box 1.2).

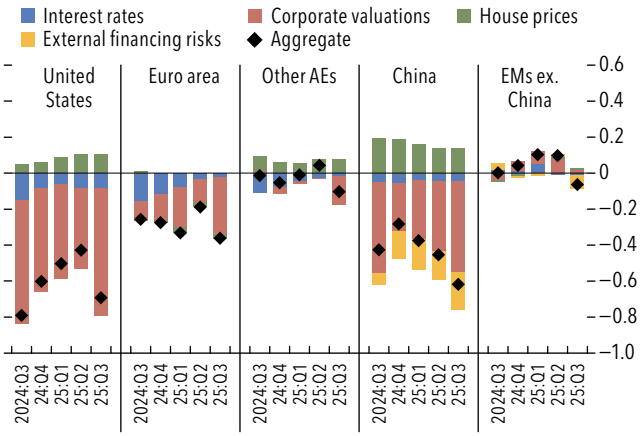
The IMF's updated growth-at-risk (GaR) assessment reveals that near-term downside risks to financial

Figure 1.5. Financial Conditions Index

Financial conditions have eased significantly since early April...



... amid rising corporate valuations and falling volatility.



Sources: Bloomberg Finance L.P.; Dealogic; EUROPACE AG/Haver Analytics; national data sources; and IMF staff calculations.

Note: 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. A lower FCI implies easier financial conditions and vice versa. For details, see Online Annex 1.1 in the October 2018 *Global Financial Stability Report*. In panel 1, the shaded area on the right side shows the daily FCIs starting April 1, 2025. These daily FCIs are approximate values that are estimated using available high-frequency market data, whereas the long-term standard deviations and averages are calculated over Q1 1990 and Q3 2025. In panel 2, the key drivers of the FCI show the contributions of underlying components, which are the weighted average of the *z*-scores of these components. The series "aggregate" represents the sum of these contributions and is similar to the FCI values shown in panel 1. The series "Since April GFSR" shows a simple average of aggregated *z*-scores and their drivers between April 12 and September 11, 2025. AEs = advanced economies; EMs = emerging markets; ex. = excluding; FCI = Financial Conditions Index; GFSR = *Global Financial Stability Report*.

stability have declined since the April 2025 *Global Financial Stability Report*, albeit slightly. Easier global financial conditions were partially offset by a slight slowdown in already sluggish private sector credit growth, which has shifted just below the 10th percentile of its historical distribution. The current GaR metric suggests that one-year-ahead global growth is forecast to fall below 0.5 percent, with a 5 percent chance (Figure 1.6, panel 1, blue dot). Although this reflects a 0.1 percentage point improvement in the GaR metric compared with April (red dot), it is still around the 30th historical percentile, suggesting that risks are still above historical standards (Figure 1.6, panel 2). Overall, the balance of risks to global growth over the next year continues to be tilted to the downside, with the probability of growth falling below 2 percent remaining broadly unchanged compared with April.

Emerging and Frontier Markets

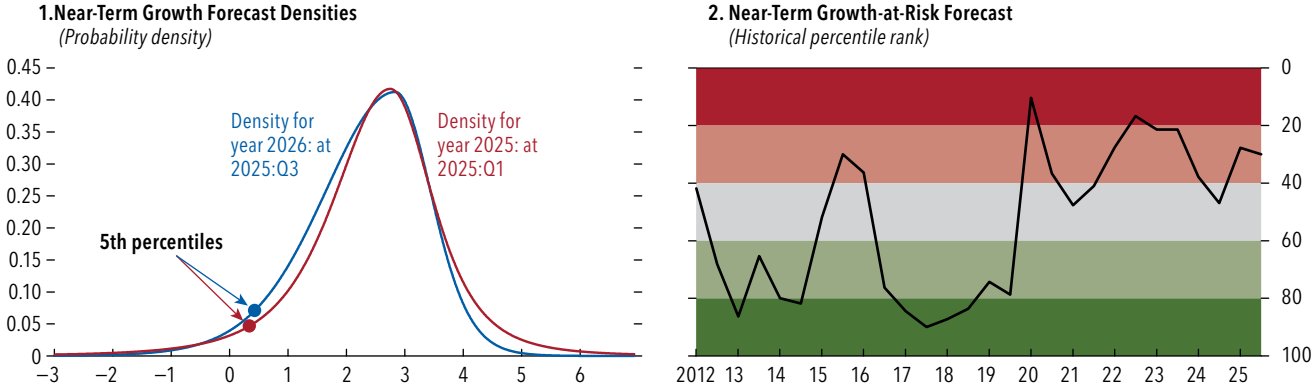
Pressures on Major Emerging Markets Ease, but Investors Remain Cautious

As the dollar weakened and trade deals started to be reached, pressures on emerging market financial markets eased. Although dollar depreciation may reduce the value of emerging market residents' holdings of dollar assets, it has also alleviated pressures on emerging markets' asset and funding markets (Figure 1.7, panel 1). Subdued energy prices have provided some relief by containing import costs and reducing external vulnerabilities, particularly for energy importers. In addition, steady progress on disinflation has allowed several emerging market central banks to ease policy rates and so further support domestic financial conditions. Nonetheless, several emerging market central banks have been cautious in easing policy rates, with rate cuts proceeding gradually as banks focus not only on current headline inflation, but also on the trajectory of inflation and the stickiness of core inflation. Although recent market developments are benign, the large debt burden alongside high real interest costs (r) relative to long-term growth prospects (g) for some emerging markets remains a lingering concern, posing ongoing challenges to fiscal sustainability.

The more favorable external environment has helped narrow hard currency bond spreads, although implied foreign exchange volatility has declined for most markets. Domestic equity markets have rebounded but corporate bond spreads declined. This more conducive environment has catalyzed a rebound in capital flows,

Figure 1.6. Global Growth-at-Risk

Global financial stability risks expected over the near term have declined only slightly since April and remain somewhat elevated by historical norms, with the balance of risks to global growth still tilted to the downside.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; EUROPACE AG/Haver Analytics; IMF, International Finance Statistics database; and IMF staff calculations.

Note: In panel 1, the mode (that is, the most likely outcome) of the latest estimate of growth forecast density accords with the IMF's October 2025 World Economic Outlook database forecast for 2026. Near-term corresponds to growth expected one year ahead. The global conditional forecast density model employed here augments information on current quarter growth and financial conditions (see the April 2018 *Global Financial Stability Report*) with a proxy for global credit growth (Adrian and others 2022). This credit growth variable is constructed as a PPP-GDP weighted aggregate of country-specific quarterly growth rates in total credit to the private nonfinancial sector provided by domestic banks and all other sectors of the economy. Credit data are sourced from the Bank for International Settlements. The sample of countries accounts for 90 percent of total GDP of all systemically important jurisdictions, covering all major advanced and emerging market economies. Given lags in availability of the Bank for International 'Settlements' credit data, credit growth for the current quarter conservatively reflects the latest available reading, available as of 2025:Q1. In panel 2, the black line traces the evolution of the fifth percentile threshold (the growth-at-risk metric) of the near-term forecast densities, where the lower percentiles represent higher downside risk. The intensity of shading depicts the percentile rank for the growth-at-risk metric. The quintiles with the lowest percentile ranks are shaded the brightest red and the highest are shaded brightest green. PPP = purchasing power parity; Q = quarter.

with inflows primarily benefiting funds dedicated to local currency bonds (Figure 1.7, panel 2). The contrast with lackluster flows into hard currency funds suggests that global investors have renewed interest in diversifying their asset holdings into emerging market bonds to avoid being overly exposed to the dollar. Relatively tight spreads on hard currency issuances may also have limited their appeal to global investors, contributing to the subdued fund flows.

Stretched valuations in some emerging market assets could increase the vulnerability of these assets to adverse trade and geopolitical shocks. Hard currency emerging market sovereign spreads have compressed despite persistent macroeconomic uncertainty (Figure 1.7, panel 3).[17] After rising sharply in April 2025, investment-grade emerging market spreads have since narrowed to levels last seen in 2007, while high-yield spreads have fallen to post-pandemic lows, which raises concerns about whether valuations reflect the underlying fragilities and potential external shocks.

Developments in emerging market currency option markets indicate that investors are cautious about emerging market currencies, especially lower-rated ones. The ratio of the implied volatilities of three-month 10-delta butterfly options to three-month at-the-money options—a proxy for the expensiveness of protection against large currency moves—is currently much higher than historical average for sub-investment-grade emerging market currencies (Figure 1.7, panel 4, yellow line), while lower than historical average for investment-grade emerging market currencies. This signals that some investors anticipate sharp currency moves in weaker emerging markets.

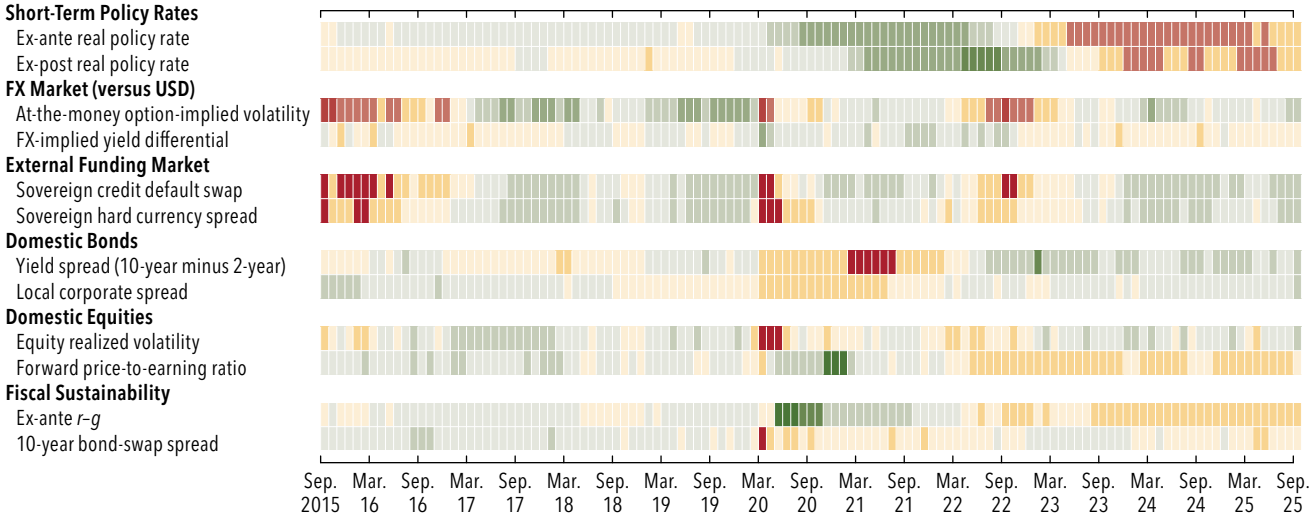
Part of this cautious positioning may stem from concerns about domestic fiscal dynamics. In several emerging markets, elevated debt burdens, high interest costs, and softening growth momentum are raising questions about future fiscal trajectories. Emerging markets with weaker credit ratings also tend to have projected long-term real interest rates higher than their long-term real growth prospects (Figure 1.7, panel 5), which could undermine long-term debt sustainability. This loop of high real interest costs and mounting debt burdens could exacerbate borrowing costs and fiscal pressures, making fiscal consolidation especially challenging for these sovereigns. Moreover, should global financial conditions tighten again or growth underperform, pressure on sovereign creditworthiness could swiftly resurface.

[17]Benchmark spreads are from JPMorgan indices.

Figure 1.7. Pressures on Major Emerging Markets Have Eased, but Uncertainties Linger

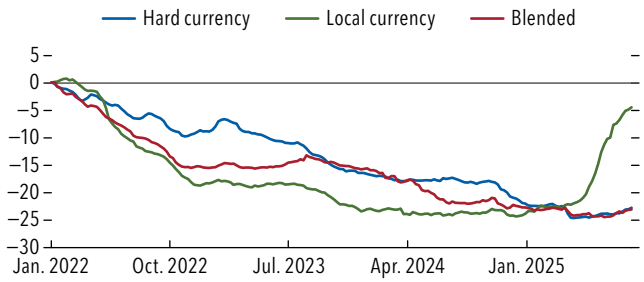
EM stress has declined since the April 2025 *Global Financial Stability Report*, but tight risk pricing masks ongoing uncertainties.

1. EMs' Financial Market Stress Heatmap, September 2015 to September 2025



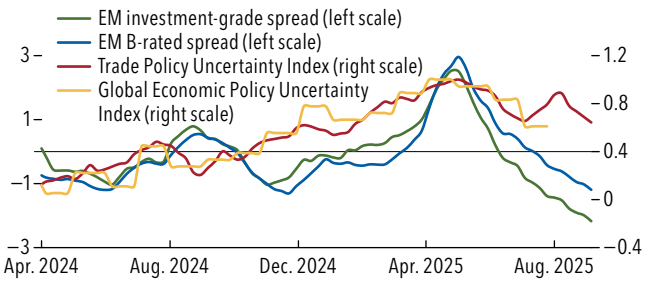
Fund flows have mostly benefited local currency funds, whereas hard currency and blended funds have not had similar inflows.

2. Exchange-Traded Fund and Mutual Fund Cumulative Flows
(Percentage of assets under management, cumulative since the end of 2021)



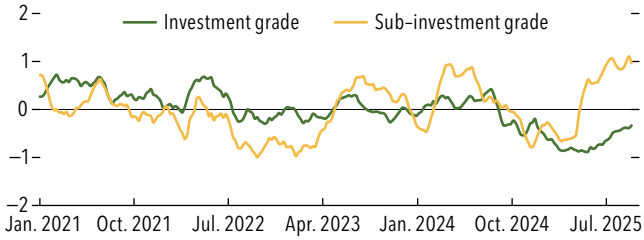
Tight emerging market hard currency sovereign spreads could heighten repricing risk should adverse events materialize.

3. EM Sovereign Spread, Uncertainty Index
(Z-score, left scale; percentile, right scale)



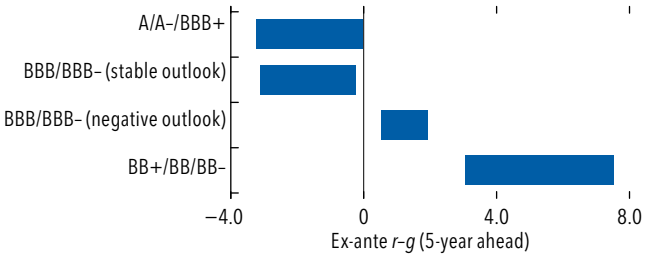
Foreign exchange forward markets for lower-rated emerging markets are weary over potential two-way tail risks.

4. 10 Delta Three-Month Butterfly over Three-Month At-The-Money Option-Implied Volatility
(Z-score)



Lower-rated emerging markets also have a larger interest burden, further complicating fiscal consolidation efforts.

5. Estimated *r–g* (Five-Year Ahead), by Average Credit Rating Band
(Percent)



Sources: Bloomberg Finance L.P.; Consensus Economics; EPFR; EUROPACE AG/Haver Analytics; IMF, World Economic Outlook database forecasts; and IMF staff calculations.

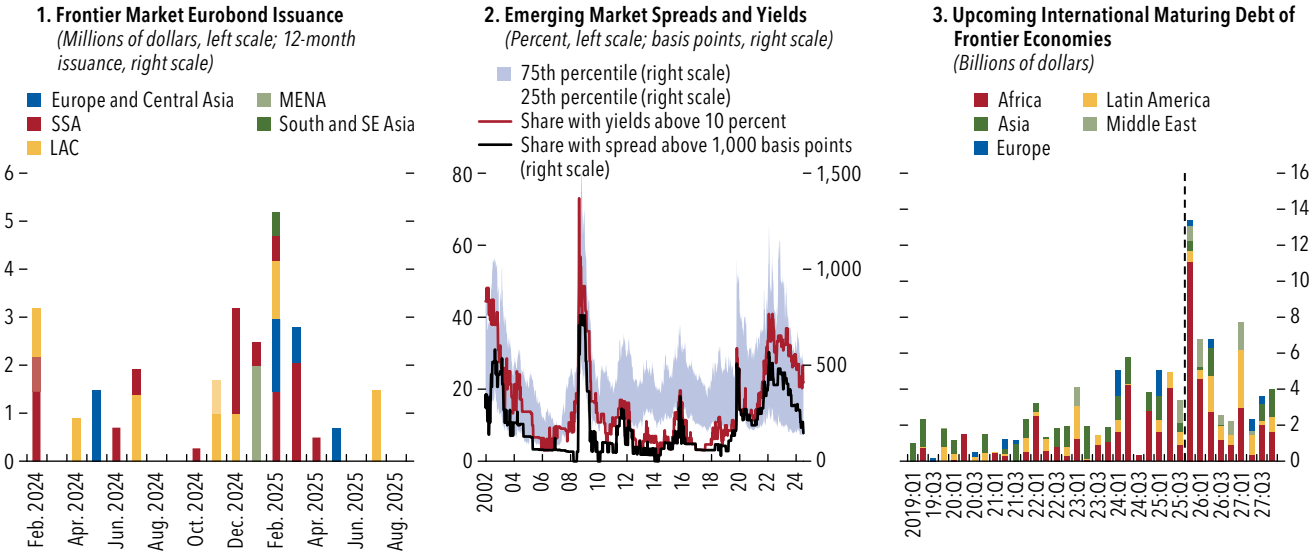
Note: In panel 3, spreads are normalized using a z-score on weekly data points (average from daily observations) from January 2024 to September 2025. Percentiles for the uncertainty indices are derived from weekly and monthly data points starting January 2024. Data for the Global Economic Policy Uncertainty Index are presented as a monthly series, incorporating the most recent available month. In panel 4, the ratio of butterfly to at-the-money option-implied volatility is normalized using a z-score on weekly data points (average from daily observations) from January 2021 to September 2025. In panel 5, the *r–g* estimates are computed from current 5-year, 10-year, and implied 5-year forward yields, considering differences in the term premium. Inflation and growth estimates are from Consensus Economics or, when unavailable, from World Economic Outlook database forecasts. Data include 14 major emerging markets: Brazil, Chile, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, the Philippines, Poland, Romania, South Africa, and Thailand. EM = emerging market; FX = foreign exchange; *r* = long-term real interest rates; *g* = long-term-growth rates; USD = US dollar.

Figure 1.8. Eurobond Issuance Has Remained Robust, but High Yields and the Upcoming Maturity Wall Have Prompted Frontier Economies to Explore Alternative Funding Strategies

International hard currency bond issuance has remained robust in 2025, but market access has been uneven.

Sovereign spreads have tightened for frontiers, but yields remain high ...

... while maturing debt is accelerating.



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

Note: Frontier economies are defined here as countries included in J.P.Morgan's NEXGEM index. LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

Frontier Economies Explore Alternative Funding Strategies

Primary market bond issuance by frontier economy borrowers reached just over $13 billion by the end of August 2025 (Figure 1.8, panel 1) but market access remained uneven. As highlighted in previous issues of the *Global Financial Stability Report*, frontier borrowers have increasingly resorted to shorter tenors and smaller deal sizes to cater to cautious investors amid still-high global yields. Despite the easing of global financial conditions and the weakening of the dollar, the median sovereign eurobond yield among emerging market issuers now exceeds 6.5 percent, and with several frontier economy bonds trading above 10 percent, this raises concerns about refinancing costs (Figure 1.8, panel 2). Rollover risks are amplified because large amounts of bonds need to be repaid in late 2025 and early 2026 (Figure 1.8, panel 3), especially for sub-Saharan issuers.

Under challenging conditions in bond markets, some frontier economies are exploring alternative funding strategies, including private placements, bilateral loans, and other financing instruments. For example, in early 2025, Panama secured a €1.2 billion bilateral loan from a subsidiary of Bank of America with a two-year maturity, according to Panama's Economy Ministry. Egypt issued a $1 billion sovereign sukuk through a private placement as part of its strategy to diversify funding sources. The issuance was fully subscribed by Kuwait Finance House. Angola entered into a $1 billion structured financing arrangement linked to its own sovereign bonds.[18] Although cost-effective relative to market rates, the deal included contingent liabilities that triggered additional payments amid market volatility earlier this year. Even as there may be advantages to some of these alternative funding arrangements, such as when they allow the issuer to pay maturing debt without causing much market pressure, a broader shift toward private funding raises transparency and debt sustainability concerns. This is especially so when these obligations are not subject to the same market discipline or reporting standards as publicly traded bonds. These developments underscore a growing divergence in financing conditions across frontier economies between those able to issue in public markets at reasonable cost and those reliant on less-conventional and potentially more fragile forms of borrowing.

[18]See statements from respective authorities (Egypt Ministry of Finance 2025; Panama Ministry of Economy and Finance 2025).

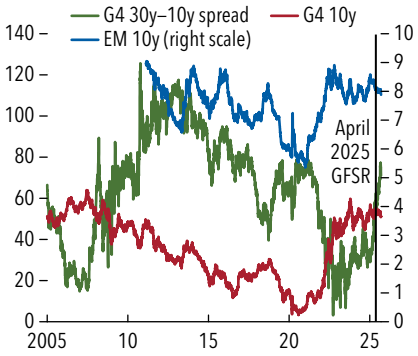
Figure 1.9. Rising Bond Supply across Major Advanced Economies Has Steepened Yield Curves

Longer-term bonds are under increased pressure amid greater supply.

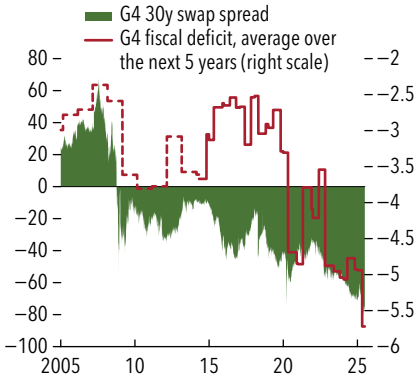
Investor concerns about larger fiscal deficits are increasingly reflected in widening swap spreads ...

... with price-sensitive investors expected to demand higher term premiums as compensation for absorbing rising bond supply, exerting upward pressure on yields.

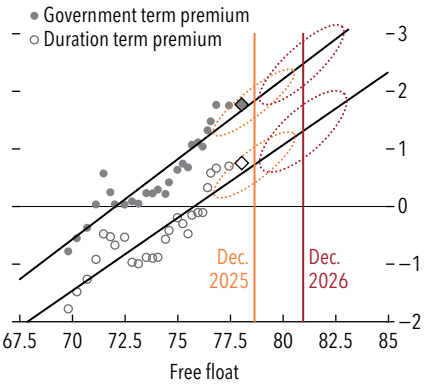
1. G4 and Emerging Market 10-Year Aggregate Yields, G4 30-Year and 10-Year Yield Spreads
(Basis points, left scale; percent, right scale)



2. G4 GDP-Weighted 30-Year Swap Spreads versus Fiscal Deficits
(Basis points, left scale; percent, right scale)



3. G4 30-Year Government and Duration Term Premium Conditional on Projected Free Float
(Percent)



Sources: Bank of England; Bank of Japan; Bloomberg Finance L.P.; European Central Bank; Federal Reserve Bank; JPMorgan; London Stock Exchange Group; US Congressional Budget Office; and IMF staff calculations.

Note: In panel 1, the G4 composite reflects GDP-weighted average yields across the euro area, Japan, the United Kingdom, and the United States. The emerging market composite reflects the GDP-weighted average across Brazil, Chile, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, the Philippines, Poland, Romania, South Africa, and Thailand. In panel 2, G4 fiscal balances are gauged by the GDP-weighted average net lending estimate over the next five years, as seen in the *World Economic Outlook*, at a given point in time. The dashed line extends the historical series by splicing earlier net lending estimates with a linear projection of G4 net lending inferred from Congressional Budget Office deficit data. Swap spreads are computed as the difference between overnight swap rates and sovereign yields of the same maturity. Overnight rates are extended historically using interbank rates. In panel 3, the free float is the share of government bonds outstanding held by private investors, excluding central bank holdings. The term premium is defined as compensation that investors require for bearing the risk that interest rates may change over the life of the bond. These are estimated using Adrian, Crump, and Moench (2013) for rates for US treasuries, bunds, gilts, and Japanese government bonds, then aggregated using G4 GDP weights. Duration term premiums are calculated based on market pricing of fully collateralized and centrally cleared interest rate swaps, which are a key intermediation instrument to strip out pure interest rate risk and isolate credit and spread risk. They reflect compensation for taking on duration risk, which is exclusively driven by conjunctural factors, rather than shifts in perceived creditworthiness. (See Online Annex 1.7 for the definition and methodology of term premium and duration term premium calculations). A diamond indicates the latest observation and a line shows linear fit over the current yield regime. Vertical lines mark projected free-float levels, based on World Economic Outlook database projections and central bank surveys. Ellipsoids show 95 percent confidence bands, obtained through bootstrapped regressions in conjunction with sampling from central bank survey distributions. EM = emerging market; G4 = Group of Four; GFSR = *Global Financial Stability Report*.

Sovereign Bond Markets

Bond market stability is fundamental to financial stability because key sovereign bonds serve as benchmarks for asset prices and collateral in lending and derivative transactions. Although bond markets have stabilized since the abrupt sell-off after the April 2 tariff announcement, steepening yield curves, more negative swap spreads, and the persistent erosion of convenience yields point to bond markets being on shakier footing than they seem.

Expanding Fiscal Deficits Exert Pressure on Bond Market Stability

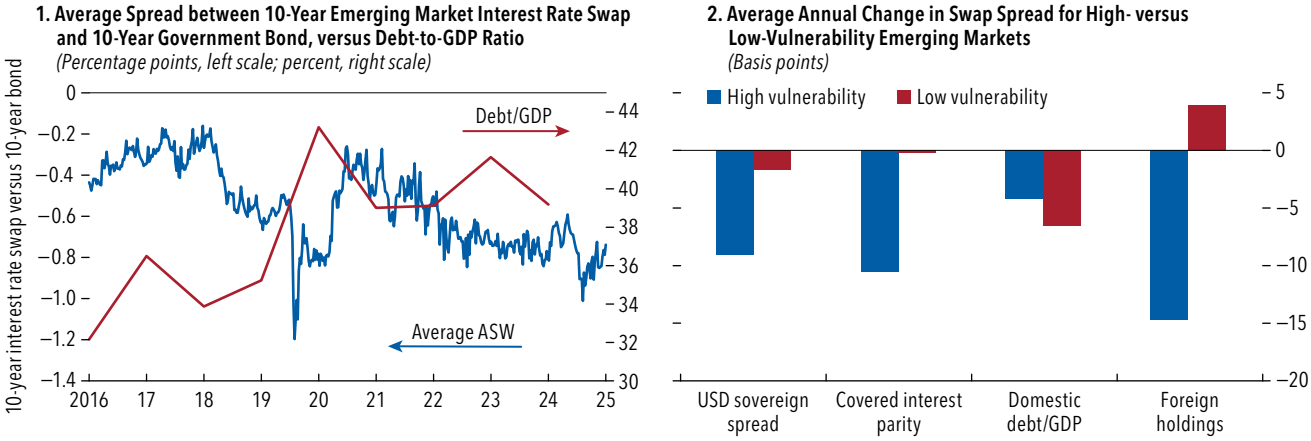
Investor concerns about large fiscal deficits appear to have added more pressure on long-term bond yields. Across major advanced economies, the pressure is evidenced by a notable steepening of yield curves among the G4—US Treasuries, European government bonds, UK gilts, and Japanese government bonds (Figure 1.9, panel 1)[19]—alongside a widening in swap spreads (that is, spreads becoming more negative). The widening of swap spreads, broadly capturing rising credit risk and

[19]Across the G4, the fiscal challenge involves not only the size of the deficit but also the level and the trajectory of public debt (high and rising), weak growth prospects, and high debt-service burdens. For example, in the United States, the One Big Beautiful Bill Act (Public Law 119–21; enacted July 4, 2025) is projected by the Congressional Budget Office/Joint Committee on Taxation to raise US federal deficits by about $3 to $3.5 trillion over the next decade. While the act itself does not include a universal tariff, revenue prospects were linked to later "reciprocal" tariffs enacted under emergency authority through the International Emergency Economic Powers Act. However, these were invalidated by federal courts (with temporary stays in place), rendering any tariff-based fiscal offset legally tenuous and excluded from credible deficit scoring.

Figure 1.10. Widening Emerging Market Swap Spreads Are Increasing the Cost of Financing

The swap spread for median emerging markets has widened (become more negative) as the debt-to-GDP ratio has climbed.

Higher sovereign spreads and covered interest parity deviations are also associated with wider swap spreads.



Sources: Bloomberg Finance L.P.; Citi; EUROPACE AG/Haver Analytics; J.P.Morgan; and IMF staff calculations.

Note: The sample of countries includes Brazil, Chile, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Poland, and South Africa. In panel 1, the swap spread is labeled as ASW. In panel 2, countries are divided into two groups for each variable: those with the largest increase/smallest decline for that variable in a given year and those with the smallest increase/largest decline. The bars show the annual change in swap spreads in each grouping, average over 2016 to 2025. USD = US dollar.

funding pressures in the financial system, has been increasingly driven by fiscal considerations, exhibiting strong co-movement with the projected average budget balance over the next five years (Figure 1.9, panel 2; see also the October 2025 *World Economic Outlook*).[20] In parallel, the continuation of quantitative tightening by major central banks has increased the amount of free-floating bonds in the market to be absorbed by price-sensitive investors, exerting upward pressure on term premiums, all else equal, and keeping yields elevated (Figure 1.9, panel 3; and Figure 1.2, panel 1). Meanwhile, regulatory requirements limiting dealer balance sheets and falling demand from liability-driven investors have likely exacerbated the widening of spreads.

Outside G4 bond markets, emerging markets have also seen their domestic swap spreads widen. In a panel of major emerging markets, the spread between 10-year interest rate swaps and 10-year local currency bonds has turned more negative over the past decade, declining by almost 50 basis points, mirroring the rise in domestic debt as a percentage of GDP (Figure 1.10, panel 1). Some countries (for example, Colombia, Mexico, and South Africa) have experienced a decline in the swap spread by more than 100 basis points. The relative underperformance of bonds can add to fiscal strains, as rising debt is compounded by a higher cost of interest. Assuming an average stock of domestic debt at 40 percent of GDP, a −50 basis point swap spread equates to an increased annual fiscal cost of 0.2 percent of GDP. In addition, the negative swap spread is likely to drive up interest rates of private sector debt or lead to some crowding out of private sector debt. A growing disconnect between bond yields and domestic interest rate swaps could also lead to a lower pass-through of monetary policy on the real economy, given the swap market's close link to policy rates.

Widening emerging market swap spreads reflect a premium that investors require to absorb large sovereign bond issuances, even though increased buying by large domestic investors such as pension funds and insurance companies has kept sovereign bond markets resilient (see Chapter 3). Swap spreads tend to turn more negative for emerging markets whose US dollar sovereign spreads or CIP deviations rose the most during the average year or have experienced the largest increase in the holdings of domestic debt by foreigners during the average year (Figure 1.10, panel 2). Increased foreign buying could be because higher bond

[20]More precisely, swap spreads capture the difference between same-tenor swap rates and government bond yields. The spreads capture the funding advantage of sovereign bond issuers compared with maturity-matched swap rates. A positive value shows that sovereign bond yields are lower than interest rate swap rates.

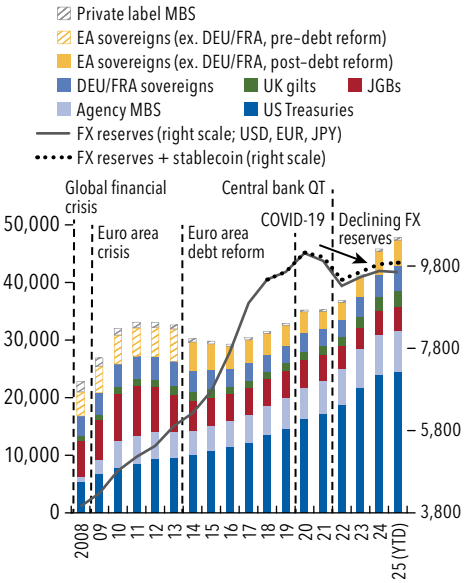
Figure 1.11. Convenience Yields amid Rising Safe-Asset Supply

Safe-asset supply has risen amid fiscal expansion across jurisdictions, putting upward pressure on bond yields.

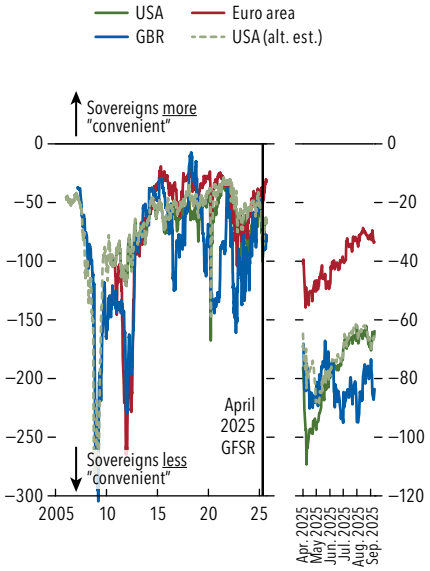
Domestic convenience yields have been mostly stable, although they have seen periods of transitory erosion, particularly in US Treasuries.

The cross-border convenience yield for US Treasuries has seen more structural erosion over the past decade but has remained broadly stable since April.

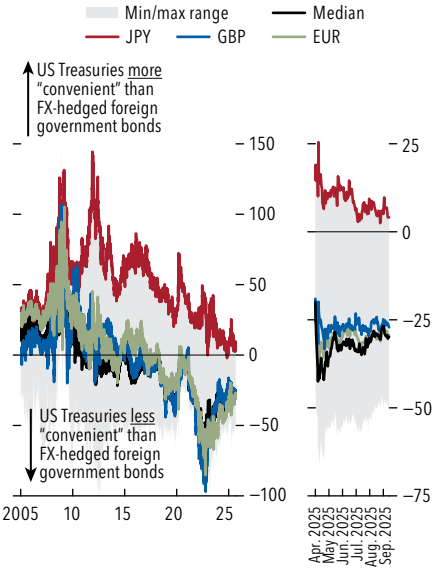
1. Safe-Asset Supply (Excluding Central Bank Holdings) in Primary Reserve Currencies
(Billions of dollars)



2. Domestic Convenience Yields for Five-Year Bonds
(Basis points)



3. Cross-Border Convenience Yields for Five-Year Bonds
(Basis points)



Sources: AG/Haver Analytics; Bloomberg Finance L.P.; Currency Composition of Official Foreign Exchange Reserves; Du, Im, and Schreger 2020; EUROPACE; London Stock Exchange Group; national authorities; and IMF staff calculations.

Note: In panel 1, yearly data are the quarterly averages of free-floating securities, that is, securities not held by central banks for monetary policy purposes. Euro area sovereigns include securities that fall under the definition of Maastricht debt, as defined by the European Union, and so include local government debt (for example, German Länder debt). Agency MBS are MBS issued or guaranteed by the US mortgage agencies: Fannie Mae, Freddie Mac, and Ginnie Mae. Private-label MBS are nonagency MBS. In panel 2, following Krishnamurthy and Vissing-Jorgensen (2012), the domestic convenience yield is measured as the yield spread between five-year AAA-rated corporate bonds and government bonds, adjusted for differences in credit risk. As a robustness check, the dotted line shows an alternative estimate for the United States that obtains as the median over a broad range of five-year domestic convenience yield estimates following Krishnamurthy and Vissing-Jorgensen (2012), Mota (2023), and Acharya and Laarits (2023). In panel 3, following Du, Im, and Schreger (2020), the cross-border convenience yield captures the five-year yield gap between foreign-exchange-hedged foreign government bonds and US Treasuries, bunds, gilts, or Japanese government bonds, whereby the currency and interest rate risk of the former is hedged back into dollars using maturity-matched cross-currency swaps. alt. est. = alternative estimate; DEU = Germany; EUR = euro; ex. = excluding; FRA = France; FX = foreign exchange; GBP = Great Britain pound; GFSR = *Global Financial Stability Report*; JPY = Japanese yen; MBS = mortgage-backed securities; QT = quantitative tightening; YTD = year to date.

yields relative to domestic funding rates are attractive. Foreign investors who prefer interest rate swaps to bonds because of the smaller balance sheet impact or ease of access amid capital controls may have helped compress swap spreads.

Convenience Yields for Longer-Duration Bonds Are Somewhat Stable

Government bonds form the main component of what are known as safe assets—highly liquid instruments with minimal credit risk that are expected to preserve their value even in market stress—and these play a critical role in the global financial system. Fiscal expansion by major economies has ramped up safe-asset supply (Figure 1.11, panel 1), whereas demand for long-duration safe assets has declined, amid a reduction in foreign exchange reserves denominated in the largest reserve currencies.[21] Life insurers and pension funds have also become more cautious buyers amid expectations of elevated interest rate

[21]The largest reserve-currency issuers defined here include those sovereign issuers with the largest share of global reserves, including the United States, issuers in the euro area (particularly Germany and France), Japan, and the United Kingdom.

volatility.[22] Meanwhile, other investors, such as buyers of money market funds (including tokenized ones) and stablecoins, have increased demand primarily toward short-dated safe assets like sovereign bills (see the section "Stablecoins' Growth Could Affect Financial Stability").[23] These trends may have increased the demand and supply imbalance for safe assets with longer duration.

Convenience yields measure the premium investors are willing to pay to hold safe assets. Of particular interest are convenience yields for bonds with longer duration, given the glut of supply. An erosion in convenience yields can both signal and amplify funding market strains, raising concerns about the safe assets' utility as high-quality collateral, especially during stress periods. Lenders in short-term funding and repurchase (repo) markets could demand higher haircuts on safe assets pledged as collateral when convenience yields erode, in turn pushing up funding costs. Banks and investors could diversify toward substitute assets, which will likely encapsulate far fewer safe-asset properties and have shallower market depth, again leading to upward pressure on funding spreads.[24]

Convenience yields can be measured along domestic and cross-border dimensions. The domestic convenience yield (DCY) reflects the premium (or spread) domestic investors forego over high-grade corporate bonds, after credit and liquidity adjustments. The cross-border convenience yield (CCY) refers to the yield discount investors are willing to accept to hold US Treasuries, for example, relative to a foreign-currency-hedged equivalent security issued by another sovereign. From a cross-border investor's perspective, higher currency-hedged yields for other G4 bonds relative to Treasury yields imply that Treasuries are the preferred safe asset.

DCYs for European government bonds, gilts, and US Treasuries have not had clear directional trends over the past few years, although they have seen bouts of volatility. On the other hand, the CCY for Treasuries has seen a secular erosion against other G4 government bonds over the past decade (Figure 1.11, panels 2 and 3, respectively). This suggests that Treasuries' status as the preeminent safe asset may have been reduced and aligns with market commentary that global investors may become more cautious about investing in US assets. The market volatility in April provides some insight into the behavior of the two convenience yield measures during stress. DCYs first declined sharply for European government bonds and US Treasuries, indicating that investors' preference for these government bonds over high-quality corporate bonds strengthened, before gradually returning to their prior levels. CCYs have remained stable, indicating that Treasuries' safe-asset status compared with other G4 government bonds has been broadly maintained.

From a financial stability perspective, the relative stability of convenience yields likely helped keep funding markets orderly during the April episode. The lack of any substantive erosion in convenience yields across the G4 since April may suggest, for now, that substitutes for safe assets—particularly for US Treasuries, the largest contingent of safe-asset supply—are limited among both domestic and cross-border investors. The more secular decline of CCYs, however, indicates that cross-border diversification in safe-asset holdings could be under way.[25]

[22]The reduced structural participation of long-term investors, such as life insurers and pension funds, reflects a combination of factors. These include changes in regulatory capital requirements (for example, Solvency II) and the structural shift from defined-benefit to defined-contribution plans that has curtailed risk tolerance for rising interest rate volatility, particularly affecting long-term bonds.

[23]Results of changes in composition of the demand side of the sovereign bond market structure and the increase in free-float supply is to pressure yields higher. Indeed, swaptions-implied odds imply higher longer-term yields one year ahead, despite ongoing monetary easing in three of the G4. This corresponds with the observation that long-term yields across advanced economies have become more correlated across jurisdictions, increasing the potential for a rapid transmission of shocks across borders (see the October 2024 *Fiscal Monitor*).

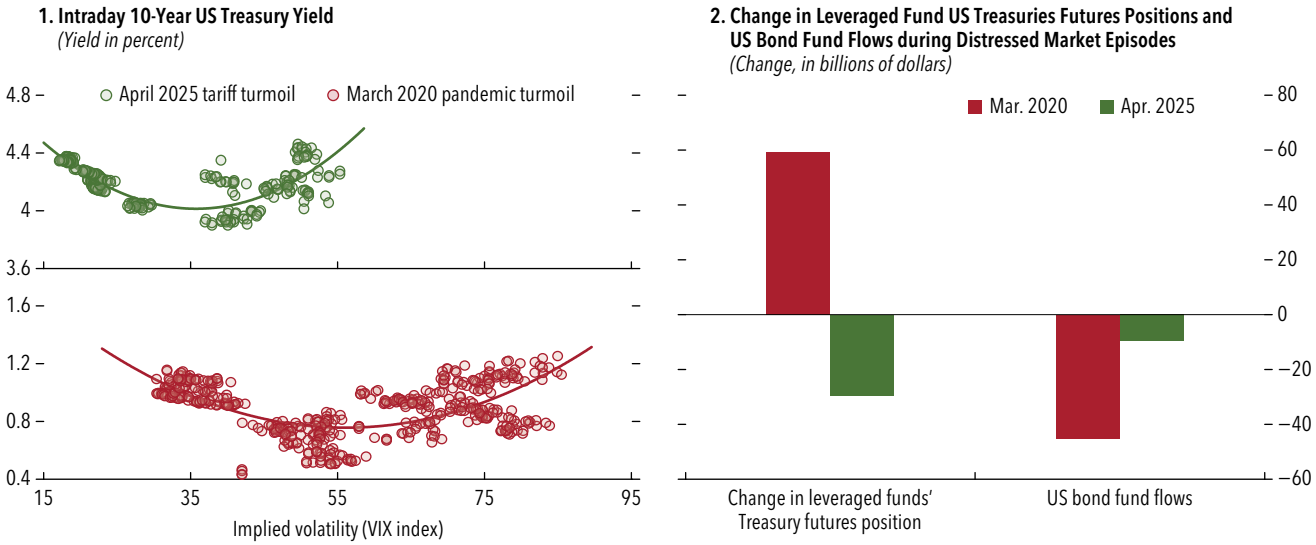
[24]The erosion of convenience yields could trigger a cascade of collateral preference shifts, leading to amplification of funding market stress. If investors lose confidence in US Treasury's safe-asset status, for instance, then repo market haircuts could widen dramatically. Or, in extreme cases, collateral that once traded at zero or near-zero haircuts (as in packaged bond/futures transactions) could suddenly require significant buffers and so offer little protection against forced liquidation spirals. Stress could get magnified through a breakdown of collateral chains. More specifically, the same Treasury bond normally circulates through multiple financing operations, effectively multiplying the system's liquidity. When confidence erodes, institutions become reluctant to pledge these assets along these rehypothecation chains, causing the chains to snap. Consequently, the pool of effective collateral in circulation would shrink, reducing market liquidity and widening funding spreads.

[25]This type of risk could run both ways: disorder in funding markets—whether domestic or cross-border—could quickly spill into bond markets, driving abrupt term premium shifts and spikes in interest rate volatility. Evidence from the euro area sovereign crisis shows that a disorderly repricing of sovereign risk can contaminate swap-based signals. Credit stress may spill over into pricing of high-grade-rated corporate and financial issuers when broader doubts about sovereign repayment capacity trigger extensive degrees of market fragmentation (as explained in Société Générale 2012).

Figure 1.12. Anatomy of Two Stress Episodes from a Treasury Market Perspective, March 2020 and April 2025

During both the March 2020 and the April 2025 market turmoil episodes, US Treasuries started to sell off beyond a certain VIX level ...

... but basis trades did not unwind in April 2025, and bond fund outflows were much more limited.



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

Note: Panel 1 is based on intraday US Treasury yield data between March 26 and April 9, 2025, for the tariff turmoil, and between March 2 and March 20, 2020, for the COVID-19 pandemic market turmoil. Panel 2 shows the change in leveraged fund Treasury futures positions for all maturities between March 25 and April 8, 2025, for the tariff turmoil, and between March 3 and March 17, 2020, for the pandemic market turmoil. US bond fund flows reflect EPFR Fund Flow statistics for March 12 to March 18, 2020, and April 3 to April 9, 2025. Matching dates are not available because of data constraints. VIX = Chicago Board Options Exchange's Volatility Index.

Sovereign Bond Market Functioning Depends on Nonbank Financial Intermediaries

US Treasury markets weathered the April 2025 tariff turmoil, stopping short of the severe dislocations witnessed during the March 2020 "dash for cash" episode. This relative stability raises an important question: does the market's resilience reflect structural improvements, or was the April shock merely less severe or different in nature? Although some structural improvements occurred in the resilience of funding markets, the short-lived nature of the shock limited the unwinding of leveraged hedge fund positions in Treasury securities and outflow pressures from open-ended funds. These NBFIs nonetheless remain vulnerable to large and persistent bond market shocks.

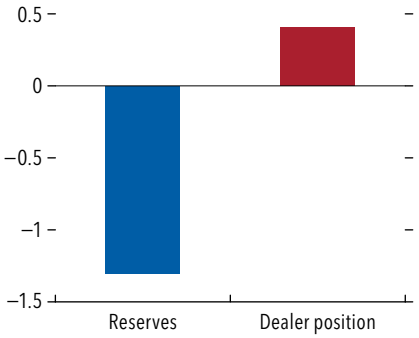
Similar to the pandemic market turmoil of March 2020, in April 2025, Treasury yields initially declined as the Chicago Board Options Exchange's Volatility Index (VIX) increased, reflecting "flight to safety" dynamics (Figure 1.12, panel 1). However, during both episodes, Treasury yields reached a tipping point as market stress continued to increase, with Treasury yields rising beyond a certain VIX level. As market stress increases, redemptions by mutual fund investors can contribute to such a reversal, as funds may be forced to sell more liquid assets, including US Treasuries. But despite fund outflows being relatively limited in April 2025 (Figure 1.12, panel 2), this tipping point was reached earlier (Figure 1.12, panel 1). This could mean that investors had begun to question the liquidity value of US Treasuries, or it could reflect concerns about US fiscal policy (see the section "Expanding Fiscal Deficits Exert Pressure on Bond Market Stability").

NBFIs' amplification of market stress from the side of leveraged funds was limited in April 2025 compared with the March 2020 episode. Cash-futures basis trades—a popular hedge fund arbitrage strategy exploiting price differences between Treasury bonds and futures—did not unwind as they did in March 2020 (Figure 1.12, panel 2). Instead, a different leveraged fund strategy that involves taking a long (or short) government bond position while taking the opposite position in a long-term interest rate swap—the "swap spread" trade—did reportedly unwind and contribute to Treasury market volatility. Nonetheless, the absence of significant unwinding of the much-larger cash-futures basis trades seems to have been crucial to preventing a 2020-like crisis. Risks to financial

Figure 1.13. Structural Resilience in Repo Markets

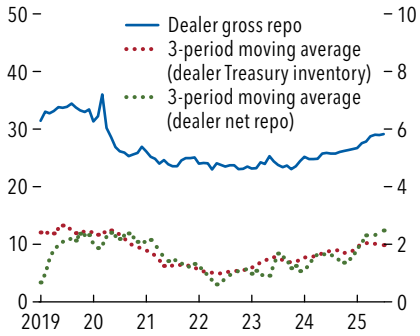
Repo spreads were kept low by abundant reserves in 2025, with dealer balance sheets exerting mild upward pressure ...

1. Sensitivity of Repo Spreads to Changes in Bank Reserves and Dealer Balance Sheets
(Beta coefficients in basis points)



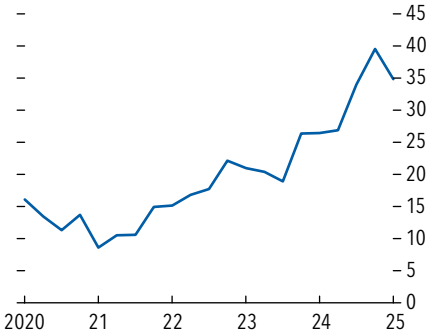
... even though dealers' balance sheets in repos and Treasuries became heavier.

2. Treasury Inventory and Repo (Gross and Net) Positions by US Primary Dealers, 2019–25
(Percent of total marketable debt)



The increase in centrally cleared hedge fund repo (through sponsoring) likely moderated market functioning pressures.

3. Sponsored Repo Share of Hedge Fund Repo Positions, 2020–25
(Percent)



Sources: Bloomberg Finance L.P.; Federal Reserve; Office of Financial Research; and IMF staff calculations.

Note: Panel 1 presents the average beta coefficients for 2025 from regressing repo spreads on changes in reserves and dealer balance sheets in a rolling window of one year. See Online Annex 1.8 for further information. In panel 2, marketable debt excludes Federal Reserve holdings. Panel 3 shows repo volume sponsored by the FICC divided by the total repo exposure of hedge funds that qualify to report under the Securities and Exchange Commission's Private Fund form. As noted by the Office of Financial Research, hedge fund borrowing cash makes up most FICC-sponsored repo volumes. FICC = Fixed Income Clearing Corporation.

stability remain high as large hedge funds still hold near-record net interest rate derivatives and leveraged repo positions, indicating that they still have substantial amounts of basis and swap spread trades. Whereas investors have focused mostly on US Treasury market basis trades, record levels are noted in the United Kingdom (Bank of England 2025) and rising trends are evident in Canada (IMF 2025a) and expected in Europe (ECB 2024).

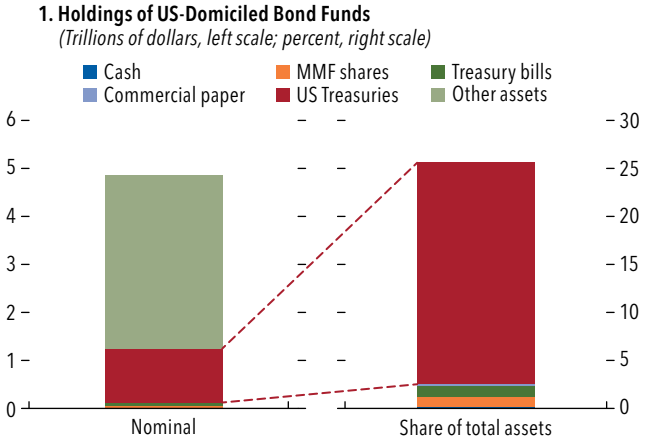
Both circumstantial and structural factors helped support the functioning of the US Treasuries market in April 2025. On the circumstantial side, the April 2 tariff announcement was followed by a policy reversal within a week, limiting the duration and severity of market stress. On the structural side, repo markets—critical for funding basis trade strategies—remained relatively stable during the episode. Regression analysis indicates that repo spreads remained contained overall in 2025 in part because of increased banking sector reserves, likely aided by slower quantitative tightening and supportive standing facilities (Figure 1.13, panel 1), and in part because dealer balance sheet usage exerted only limited upward pressure on rates. Although dealers expanded their Treasury and repo positions (Figure 1.13, panel 2), increased volumes of repo central clearing (through "sponsored clearing") helped preserve dealer balance sheet capacity (Figure 1.13, panel 3). Moreover, higher haircuts involved in central clearing likely curbed repo leverage and enhanced market stability.

Outflows from open-ended bond funds were moderate in April 2025 and did not appear to induce significant forced selling. US-domiciled bond mutual funds manage about $5 trillion in assets, with almost one-quarter allocated to US Treasuries (Figure 1.14, panel 1), making them a major player in this market. Large redemptions can force funds to liquidate Treasury holdings once their liquidity buffers are depleted, putting upward pressure on yields. The magnitude of outflows in the April 2025 scenario is much smaller than in the March 2020 scenario (Figure 1.14, panel 2). Bond funds are highly heterogeneous: Some may have ample liquidity buffers or even experience inflows. Others may face outflows or thin cash buffers. Margin calls on derivative contracts can compound to liquidity pressures, but an analysis of funds' interest rate exposures through swaps and Treasury futures suggests their impact is likely smaller. Under the scenario of a 100 basis point curve shift, variation margin calls would amount to about $20 billion (Figure 1.14, panel 3). Although some funds face margin calls, others receive variation margin credit, underpinning the heterogeneity across funds.

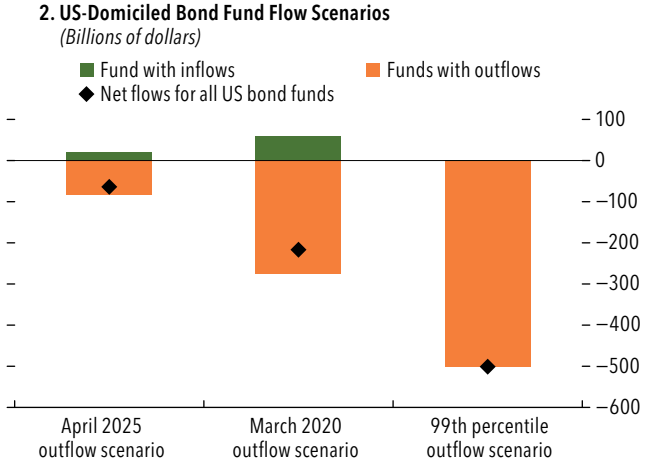
Bond mutual funds and the Treasury market vulnerabilities are intertwined. Combining the outflow

Figure 1.14. Bond Mutual Fund Flows, Treasury Holdings, and Forced Liquidations under Stress

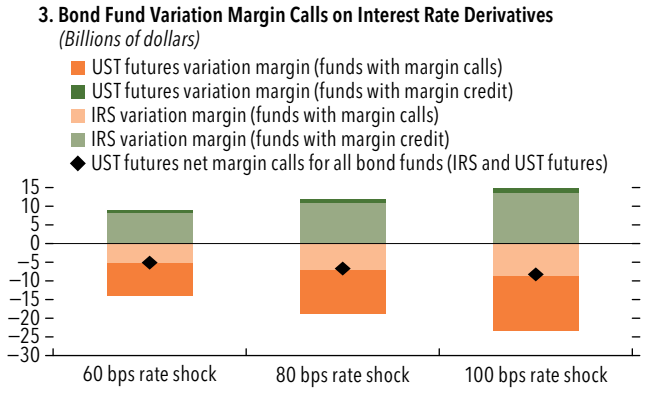
US-domiciled bond mutual funds hold almost $5 trillion in total assets, of which one quarter is in US Treasuries.



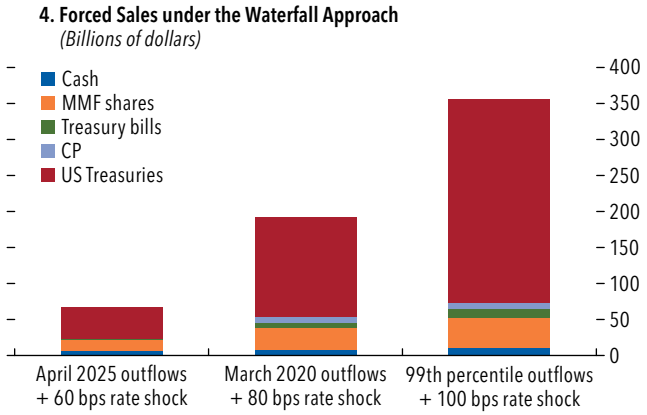
Liquidity pressures stemming from fund outflows can be large.



The liquidity pressures from variation margin calls on interest rate derivatives is less significant, with heterogeneity across funds.



Under a "waterfall" liquidation approach, larger shocks lead to larger Treasury sales by magnitude and by share of liquidated assets.



Sources: Lipper; Securities and Exchange Commission N-PORT; and IMF staff calculations. N-PORT data are taken from the second quarter of the 2025 batch, retaining only submissions for the first quarter of 2025.

Note: See Online Annex 1.4. Scenarios project flow percentages observed during historical episodes to current holdings. If individual fund flow data are missing, the relevant (for example, March 2020) flow percentage assigned is based on the median of its peer group by US mutual fund classification category. Margin calls from derivatives contracts only include Treasury futures contracts and interest rate swaps and are based on a linearized pricing model (estimated contract duration). The 99th percentile outflow scenario considers historical fund flow data for each individual fund, taking its 99th percentile of outflows, that is, its first percentile of flows. All flow data are based on monthly flows. Higher-frequency flow patterns can deviate, and monthly flow data may not be representative of shorter-term inflow and outflow patterns. bps = basis points; CP = commercial paper; IRS = interest rate swap; MMF = money market mutual fund; pct = percentile; UST = US Treasury bonds and notes. Treasury bills have a maturity of one year or less. Treasury bonds and notes have longer maturities.

scenarios and interest rate shocks, forced sales of Treasuries by US bond funds can be estimated using a "waterfall" approach, whereby Treasuries are sold after cash and other liquid assets are depleted. Assuming the outflow patterns seen in April 2025, in conjunction with a 60 basis point increase in interest rates, bond funds' forced sales are estimated at $66 billion, with over half the liquidation being Treasury securities (Figure 1.14, panel 4, left bar). Larger shocks increase the total volume of forced sales and raise the proportion of Treasury holdings liquidated.

Forced sales by bond mutual funds played a pivotal role in making the March 2020 market turmoil disorderly. These risks remain and may have grown as the sector has expanded. By contrast, the absence of large outflows in April 2025 may help explain why conditions remained relatively orderly. Large, rapid forced sales of Treasuries are more likely to overwhelm

dealer intermediation capacity. In a severely adverse scenario in which bond fund outflows reach their 99th historical percentile and interest rates rise by 100 basis points, forced Treasury sales would exceed current dealer Treasury inventories (Figure 1.14, panel 4, right bar), potentially overwhelming dealer intermediation capacity and likely causing disorderly conditions in Treasury markets.

Financial Intermediaries

Higher Capital Ratios Strengthen Global Banks, but the Weak Tail of Banks Remains Substantial

The GST shows the global banking system remaining broadly resilient under the July 2025 *World Economic Outlook* reference scenario.[26] However, under a severe stagflationary scenario, banks representing about 18 percent of global bank assets can be considered weak, as their Common Equity Tier 1 capital (CET1) ratio falls below 7 percent. The share of weak banks has materially improved since the October 2023 *Global Financial Stability Report*, which considered a similarly severe shock to the global economy and found almost one-third of bank assets to be weak.[27] This improvement is mostly a result of improved capitalization across most regions, particularly in the United States and large Chinese banks, which increased the global average CET1 ratio from about 12.5 percent in 2022 to 13 percent in 2024. The steepening yield curve assumed in the adverse scenario also contributed to the results by increasing banks' net interest margins, which overcompensated for rising loan and bond valuation losses.[28]

The GST adverse scenario assumes stagflation with tight financial conditions arising from intense geopolitical turmoil and supply chain disruptions in commodities and goods markets. As documented in Online Annex 1.1, the scenario assumes an across-the-board 10 percent increase in tariffs over the baseline for advanced economies and some emerging markets, higher inflation from supply chain rechanneling in goods and commodities, and a corresponding 1 percentage point increase in policy rates globally in the first year. Higher government debt, including from additional fiscal and demand support, causes investors to panic, raising term premia by 300 basis points to 500 basis points across advanced economies and emerging markets, depending on the scale of government debt.[29] The term spread rises in the first year before quickly reversing as recession sets in. Corporate bond spreads also rise sharply as investors sell bonds, whereas weak consumer confidence and recession lead to reduced sales and higher corporate losses.

Under this adverse scenario, the aggregate global CET1 ratio declines by a modest 70 basis points, from 13 percent in 2024 to 12.3 percent at the end of the stress horizon (Figure 1.15, panel 1). This result is driven primarily by larger loan losses and operating expenses, partially offset by improved net interest income from a steeper yield curve (Figure 1.15, panel 2). However, these results vary across regions. Capital depletion is larger for banks in the euro area and other non-US advanced economies than in other regions because of greater sensitivity to macrofinancial shocks (output, unemployment, and higher long-term interest rates) that translate into larger loan losses. There are also significant differences within emerging markets, as emerging market banks outside China benefit from higher net interest margins (Box 1.3).[30]

Although most banks remain resilient, the CET1 capital ratios of 82 of 669 banks globally are projected to fall below 7 percent (the CET1 plus capital conservation buffer plus relevant global systemically important bank buffers) in the adverse scenario. Under stricter criteria—either a CET1 ratio falling

[26]The Global Stress Test (GST) examined 669 banks from 29 countries, accounting for 74 percent of global sector assets. The 29 countries in the sample are Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Greece, India, Indonesia, Ireland, Italy, Japan, Korea, Mexico, The Netherlands, Norway, Portugal, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Türkiye, the United Kingdom, and the United States. The July 2025 baseline scenario assumes stable unemployment, a slight decline in global GDP growth before recovering to about 3 percent in 2027, and falling short-term interest rates to support GDP recovery and growth that contribute to improvement in the global CET1 ratio of 6 basis points.

[27]The severity was similar, but the shock is more protracted than in the 2023 stress test (see the October 2023 *Global Financial Stability Report*).

[28]See IMF (2025a; 2025b) for more detailed stress testing results of banks and nonbank financial intermediaries using country specific scenarios and supervisory data.

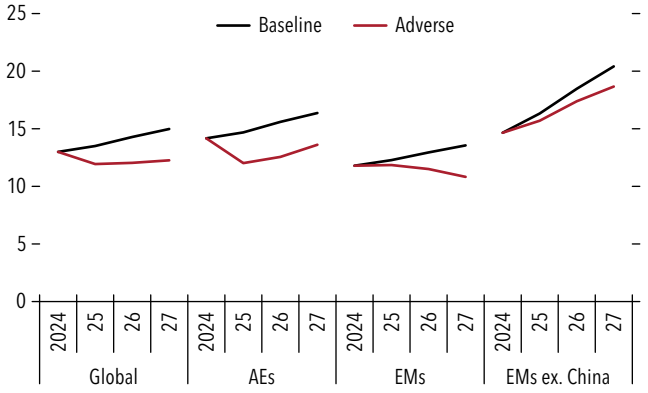
[29]Central banks react based on Taylor-type rules (see Vitek 2018), while fiscal authorities provide demand support in large jurisdictions, except in high-debt countries.

[30]The assumption of a constant net interest margin—and of net interest margins being maintained in an adverse scenario—is based on econometric results that do not show economically meaningful pass-through coefficients from short-term interest rates to deposit and lending rates.

Figure 1.15. Global Bank Stress Tests Results

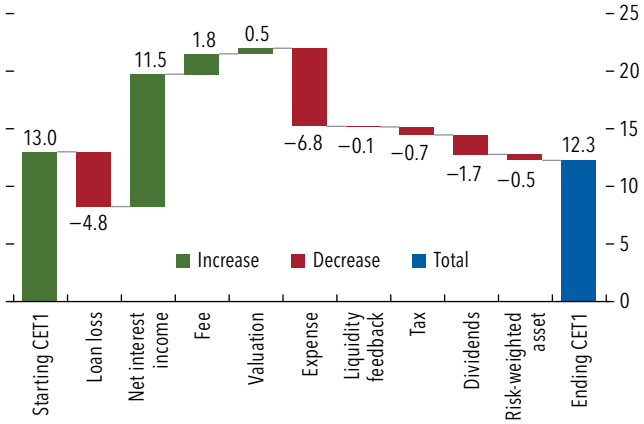
In aggregate, global banks are resilient to the adverse macro scenario, in part because of high starting capital ratios.

1. CET1 Ratio by Region, 2024–27
(Percent)



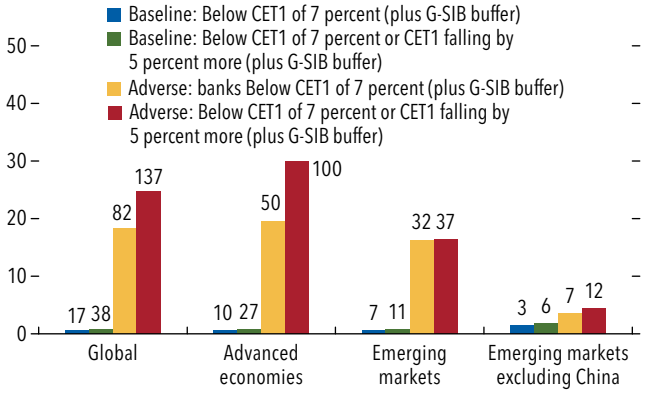
Rising loan losses and expenses are the main force behind capital depletion under the adverse scenario.

2. Global Contribution to CET1 Ratio Change
(Percentage points)



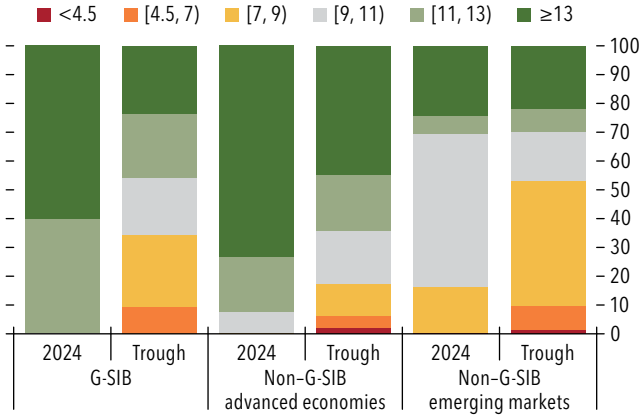
The weak banks with CET1 ratio below 7 percent account for 18 percent of banking sector assets.

3. Share of Total Assets in Weak Banks, by Region
(Percent; number of banks)



A few banks would fall below the minimum 4.5 percent CET1 ratio threshold.

4. Distribution of Banks in Adverse Scenario, by CET1 Ratio
(Percentage of total assets)



Sources: Fitch Connect; Fitch Solutions; and IMF staff calculations.

Note: In panel 2, "loan loss" refers to loan loss provisions and "valuation" to valuation losses. "Expense" refers to operating costs, assumed to be constant over time and across scenarios as a share of risk-weighted assets. Liquidity feedback is based on the extra funding cost of pledging securities at stressed prices and the extra cost of accessing central bank facilities. In panel 3, "global" refers to all banks in the sample. Recent FSAPs to two systemically important jurisdictions have found similar results for the largest banks, using supervisory data provided for the stress tests performed by IMF staff. CET1 = Common Equity Tier 1 capital; G-SIB = global systemically important bank.

below 7 percent or a decline of 5 percentage points or more—the number of weak banks increases to 137 globally, accounting for 25 percent of global bank assets (Figure 1.15, panel 3). These weak banks have persistent vulnerabilities: most were already considered weak in the April and October 2023 issues of the *Global Financial Stability Report*. Rising bank exposures to NBFIs could further increase capital depletion (see the section "Stronger Bank-Nonbank Nexus Increases Contagion and Liquidity Risks").

Although no country's banking system would fail to meet the minimum 4.5 percent CET1 ratio under the adverse scenario, a few institutions would not meet the requirement under the adverse scenario. These distressed cases account for about 1 percent of global assets and would require a $25 billion recapitalization to bring the CET1 ratio back to 4.5 percent. None of the banks that would fall below the minimum 4.5 percent threshold are global systemically important banks (Figure 1.15, panel 4).

In the United States and the euro area, about 10 percent of total loans go to the manufacturing, retail, and wholesale trade sectors, which are vulnerable to trade tensions. Persistent geoeconomic tensions could lead to turmoil in financial markets. This is what happened in the first quarter of 2025, when expected default frequencies, an indicator of the probability of default, increased by 100 basis points for trade sectors in the United States before subsiding by July. However, even if such a rise in expected default frequencies were to continue for a year, the additional effects on banks would be small: the average additional CET1 ratio would decline by 10 basis points in the United State and by 20 basis points in the euro area. The most affected banks also have higher capital ratios.

Stronger Bank-Nonbank Nexus Increases Contagion and Liquidity Risks

As NBFIs increase their share and importance in the global financial system, they are becoming increasingly reliant on banks for funding.[31] Banks lend to a variety of NBFIs, including mortgage companies, investment funds, broker-dealers, and securitization vehicles. In turn, these NBFIs lend directly to businesses and consumers, and conduct activities in government bond and other capital markets (see Box 1.3 and section "Sovereign Bond Market Functioning Depends on Nonbank Financial Intermediaries"). Banks' exposure to NBFIs is large: in Europe and the United States, NBFI loans represent, on average, 9 percent of banks' loan portfolio, with exposures amounting to about $4.5 trillion, of which $2.6 trillion corresponds to loans and the rest to undrawn commitments.[32]

The growing exposure to NBFIs is generating concentration risk among some banks in the United States and Europe (Figure 1.16, panel 1). In the United States, banks representing almost 50 percent of the sample assets have exposures to NBFIs exceeding their Tier 1 capital. While large banks serve as the primary lenders to NBFIs—accounting for 90 percent of all lending to these intermediaries—exposure concentration is more severe among large regional banks and those with assets under $100 billion. In Europe, some large banks also have concentrated exposures. Exposure to private equity and credit funds alone is substantial ($497 billion) and growing rapidly, up 59 percent between the fourth quarter of 2024 and the second quarter of 2025 (Figure 1.16, panel 2).[33] Banks are increasingly lending to private credit funds because these loans often deliver higher returns on equity than traditional commercial and industrial lending, thanks to the lower capital requirements allowed by their collateral structure. Concentration among private equity and private credit borrowers is also increasing: five large fund managers account for about one-third of the aggregate loan commitments of the entire private credit and equity industry (Levin and Malfroy-Camine 2025; Pandolfo 2025). US banks with high NBFI exposure, defined as exposure greater than 100 percent of Tier 1 capital, also have a more fragile funding structure than their low-exposure peers, relying more on noncore and wholesale funding (Figure 1.16, panel 3).

Banks' growing exposures to NBFIs mean that adverse developments at these institutions—such as downgrades or falling collateral values—could significantly affect banks' capital ratios. IMF staff assessed the potential impact on euro area and US banks under a scenario in which the average risk weight for NBFI exposures rises from 20 percent to 50 percent and borrowers draw down 100 percent of credit lines and undrawn commitments. The results suggest that the impact on banks' solvency ratios could be substantial. CET1 ratios would decline by more than 100 basis points in about 10 percent of US banks and 30 percent of European banks (Figure 1.16, panel 4). Furthermore, the IMF GST adverse scenario, combined with an additional NBFI shock for euro area and US banks, projects an increase in the share of weak banks—mostly in Europe, as the most affected US banks are already classified as weak (Figure 1.16, panel 5). The average additional CET1 ratio impact is 120 basis points for euro area banks and 65 basis

[31]The growth of the global NBFI sector outpaced banking sector growth, with its share of total global financial assets at 49.1 percent (or $239 trillion) in 2023 (FSB 2024).

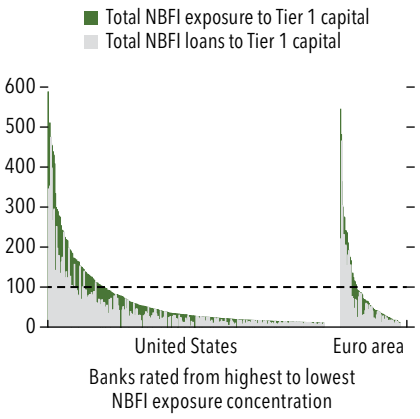
[32]NBFI loan amounts are based on aggregate data for European banks for the fourth quarter of 2024 and bank-level data for US banks for the second quarter of 2025, as reported by the European Banking Authority and the Federal Financial Institutions Examination Council's Consolidated Reports of Condition and Income.

[33]NBFI exposure is defined as the sum of NBFI loans and NBFI unused commitments. US banks report NBFI loans and unused commitments by type of intermediary (mortgage, business, consumer, private equity funds, and other). Private equity funds include capital call commitments and other subscription-based facilities to private equity and venture capital funds, or any other partnership funds that raise capital through limited partnership arrangements. Loans in this category include capital call subscription facilities, which are loans to private equity and private credit funds secured by their limited partners' undrawn capital commitments to the fund, and net asset value loans that are secured by one or more of the fund's existing equity or debt assets. Amounts are based on 134 banks reporting this level of public disclosure in the second quarter of 2025.

Figure 1.16. Bank Exposure to Nonbank Financial Intermediaries

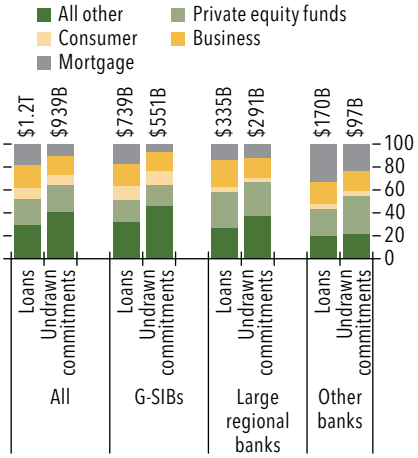
Several banks in the US and the euro area have exposures to NBFIs exceeding their capital.

1. Banks' NBFI Exposure to Tier 1 Capital
(Percent)



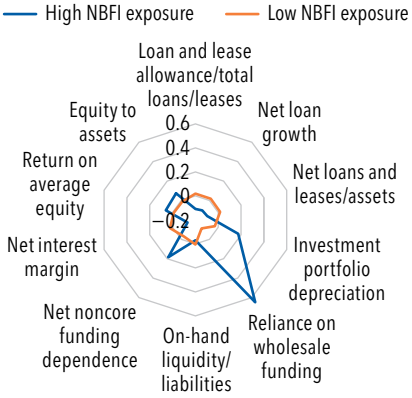
US banks have substantial undrawn commitments with private credit and equity funds.

2. NBFI Exposure, by Type
(Percent of total exposure by bank group)



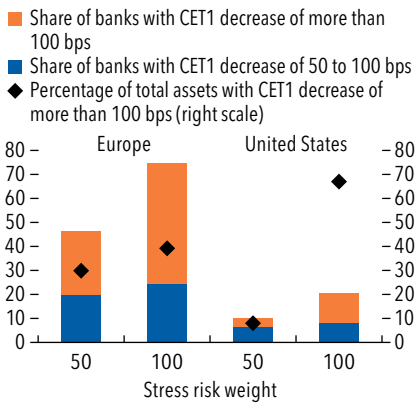
US banks with high NBFI exposure concentration tend to rely more on wholesale funding.

3. Characteristics of Banks with High versus Low NBFI Exposure Concentration
(Based on standardized z-scores for each financial metric)



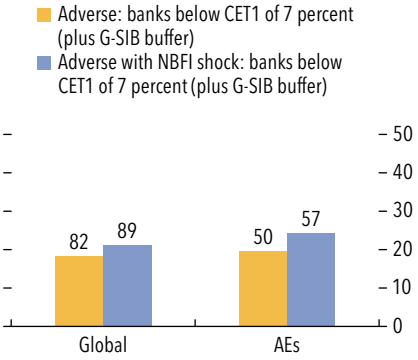
A deterioration in NBFI credit risk, combined with the withdrawal of all unused commitments, could materially affect banks' capital ratios.

4. Decline in CET1 Ratio and Share of Banks' Total Assets
(Share of banks in sample, left scale; percentage of total assets, right scale)



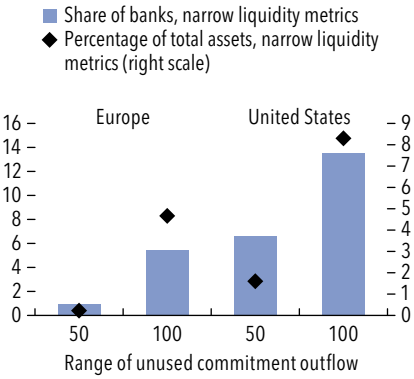
Adding NBFI stress to the Global Stress Test adverse scenario for EU and US banks would increase the share of weak banks.

5. Share of Total Assets of Weak Banks, by Region
(Percentage of assets, vertical axis; number of banks, bars)



A few banks could face liquidity pressures to cover potential outflows from NBFI credit and liquidity lines.

6. Number of Banks with Negative Net Available Liquidity
(Share of banks in sample, left scale; percent of total assets, right scale)



Sources: Consolidated Reports of Condition and Income; European Banking Authority; Fitch Connect; Fitch Solutions; S&P Capital IQ Pro; and IMF staff calculations.

Note: Panel 1 shows total NBFI exposure, which includes loans and undrawn commitments for the United States as of June 2025, and exposures for the euro area as of June 2024 that include an estimate of unused commitments among banks. Concentration is measured by the ratio of NBFI exposure to Tier 1 capital; each bar represents a bank; and the sample includes banks reporting NBFI exposures of at least 10 percent of Tier 1 capital. Panel 2 shows the breakdown of NBFI loans and undrawn commitments by NBFI loan type (business, consumer, and mortgage intermediaries, private equity funds, and all other NBFIs) for banks whose regulatory reports show total assets exceeding $10 billion. The "All other" category includes exposures to insurance companies, hedge funds, investment funds, and pension funds. "Private equity funds" includes private credit. "Large regional" banks refers to non–G-SIBs with total assets of at least $100 billion; and "Other banks" refers to banks with total assets of less than $100 billion. Panel 3 shows standardized *z*-scores for each financial metric for banks with high and low NBFI exposure concentration in the United States (see Online Annex 1.2 for definitions of each financial metric). Panel 4 is based on 2024 second quarter data for 109 banks in the euro area and 2025 second-quarter data for 362 banks in the United States. The shock assumes that the risk weights for NBFI exposures increase from 20 percent to 50 percent and 100 percent and that NBFIs draw all unused commitments available. Panel 5 shows the number of banks falling below the 7 percent CET1 plus G-SIB buffer under the IMF GST adverse scenario, with an additional NBFI shock for euro area and US banks. See the section "Higher Capital Ratios Strengthen Global Banks, but the Weak Tail of Banks Remains Substantial" for a description of the IMF GST severe scenario. The NBFI stress assumes that risk weights increase from 20 percent to 50 percent and that all available commitments are drawn. Panel 6 shows the number of banks where the net available liquidity becomes negative. The assessment considers a narrow liquidity metric that includes cash and balances at banks. AEs = advanced economies; bps = basis points; CET1 = Common Equity Tier 1 capital; G-SIB = global systemically important bank; GST = Global Stress Test; NBFI = nonbank financial intermediaries.

points for US banks, with the larger effect in Europe reflecting higher NBFI exposure relative to risk-weighted assets.[34] In a more conservative scenario in which commitments are fully drawn down and risk weights reach 100 percent, CET1 ratios fall by 100 basis points or more in 50 percent of banks (representing 39 percent of total assets) in Europe and 12 percent of banks (representing 67 percent of total assets) in the United States (Figure 1.16, panel 4).[35]

Furthermore, although most euro area and US banks have sufficient liquidity buffers to honor their NBFI commitments, a few could face liquidity pressures and may need to use less-liquid assets to cover potential outflows from NBFI credit and liquidity lines. Sensitivity analysis shows that if NBFI borrowers were to fully draw these lines, 4 percent of US banks (representing less than 1 percent of total assets) would lack enough liquid assets to meet the outflows, turning their net available liquidity negative. The number of banks under severe liquidity stress would rise to 5 percent of banks (representing 5 percent of sample assets) in the euro area and 14 percent of banks (representing 8 percent of sample assets) in the United States if a stricter definition of liquid assets is applied, including only cash and deposits at other banks (Figure 1.16, panel 6). The impact of these outflows is concentrated among smaller US banks and large euro area banks that provide large liquidity and credit facilities relative to their size. These banks also have lower liquidity ratios, higher asset encumbrance in the euro area, and, in the United States, a higher share of noncore deposits and a lower initial CET1 ratio compared with peers. There could be additional impact of liquidity stress on the solvency of these banks, which is not considered.

Banking Sector Stability Depends on Navigating Interest Rate Challenges

The ability of banks to maintain stable interest margins and keep bond portfolio losses at bay is crucial for financial stability, particularly in an environment marked by fluctuating interest rates. Despite significant monetary policy easing across major economies, banks' interest margins have shown remarkable resilience (Figure 1.17, panel 1).[36] Banks seem to be positioning themselves for additional interest rate declines. European and North American banks have reduced the sensitivity of their net interest income to downward interest shocks (Figure 1.17, panel 2).

By contrast, banks may be more vulnerable to abrupt increases in bond yields and interest rates. Two years after heavy bond portfolio losses led to the demise of Silicon Valley Bank, stress test results show that global banks could incur valuation losses of about 1 percentage point of the CET1 ratio in an adverse scenario in which longer-term government bond risk premiums surge by 300 basis points to 500 basis points across advanced and emerging market economies—perhaps driven by fiscal risks or eroding convenience yields. However, losses are much more meaningful for North American and European banks, reaching 2.5 percentage points and 1.5 percentage points of their respective CET1 ratios (Figure 1.18, panel 1). In addition, in Europe, the sensitivity of banks' economic value of equity to upward shifts in interest rates has increased, making them more vulnerable to a rise in long-term bond yields as a result of more bond supply or quantitative tightening (Figure 1.18, panel 2). European banks may therefore be sensitive to a steepening of the yield curve, with net interest income also under pressure if policy rates are cut.

Stablecoins' Growth Could Affect Financial Stability

Stablecoins—crypto assets issued by private institutions that promise a stable nominal value in a given currency—have become a key component of the digital asset ecosystem. The market grew rapidly from about $3 billion in 2019 to almost $300 billion at the end of September 2025 driven mainly by USDT (Tether), USDC (Circle), and other fiat-backed stablecoins pegged to the US dollar (Figure 1.19, panel 1). The rise of stablecoins could have three main financial stability implications: (1) weaker economies may face currency substitution and reduced effectiveness of policy tools, (2) the bond market structure could change with potential implications on credit

[34]The methodology for the NBFI shock assumes that risk weights for NBFI loans increase from 20 percent to 50 percent and that unused commitments are fully withdrawn. The capital and liquidity impacts do not incorporate credit valuation adjustments related to banks' derivative links with NBFIs, which could affect banks' risk-weighted assets and liquid asset needs.

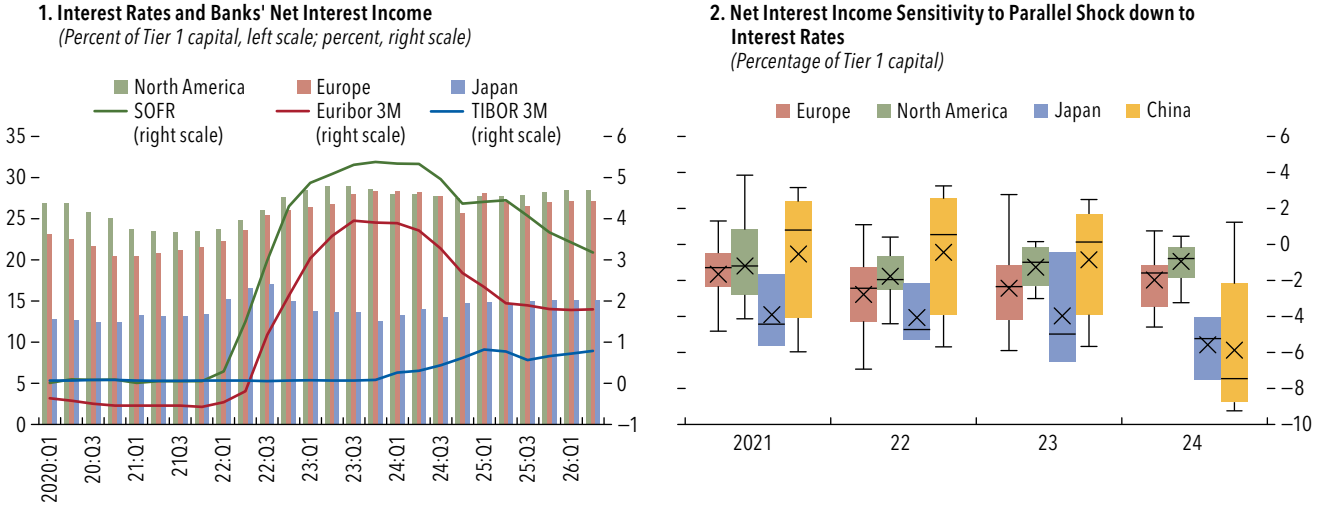
[35]Liquidity shocks are based on second-quarter 2024 data for 109 euro area banks and second-quarter 2025 data for 362 US banks. This sample is also used for the sensitivity analysis in Figure 1.16 (panel 4), and it differs from the one used for the GST, which includes a smaller set of banks with more complete data on a wider set of variables.

[36]See Box 1.2 for a discussion about banks in China.

Figure 1.17. Banks' Interest Margins Remain Resilient amid Concerns about Potential Valuation Losses

Banks' interest margins have demonstrated remarkable resilience.

European and North American banks have improved their sensitivity to downward interest shocks.



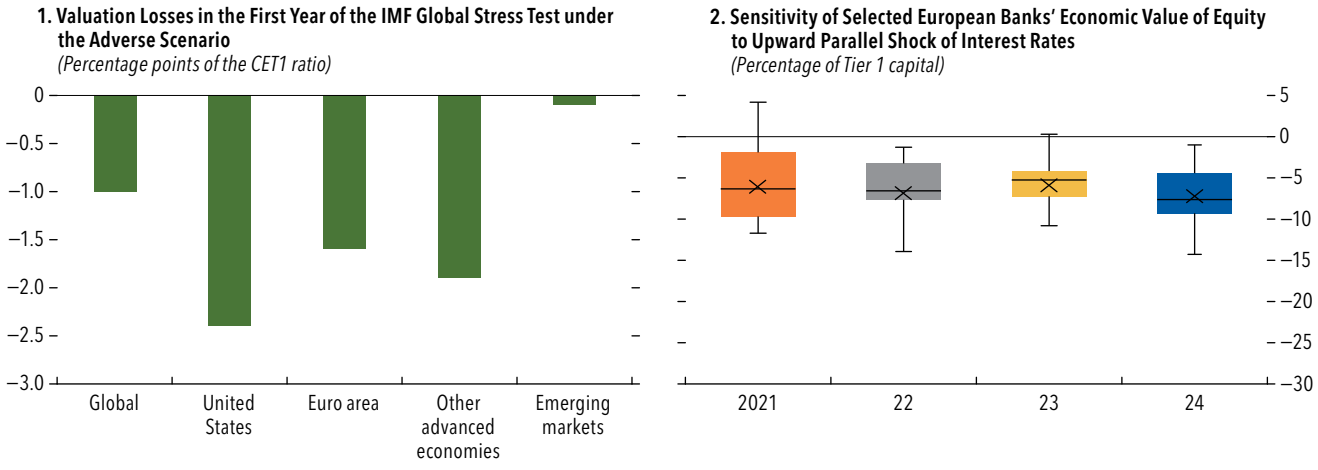
Sources: Bloomberg Finance L.P.; Capital IQ; Visual Alpha; and banks' Pillar III disclosures, including regulatory filings.

Note: Panel 1 shows banks with shares quoted on stock exchanges. Panel 2 illustrates banks' net interest income sensitivity over the next 12 months to a parallel interest rate shock across maturities as defined by the Basel Committee standard on the interest rate in the banking book (for example, generally −200 basis points for major currencies). The sample of banks encompasses global systemically important banks and the largest regional banks in the United States (10 banks) and Europe (20 banks). 3M = three-month; Q = quarter; SOFR = secured overnight financing rate; TIBOR = Tokyo Interbank Offered Rate.

Figure 1.18. Potential Valuation Losses Remain a Concern

The IMF's Global Stress Test identifies significant risks to valuations in case of a substantial increase in rates.

European banks are marginally more exposed to an upward shift of rates curve.



Sources: Banks' Pillar III disclosures; and the IMF's GST.

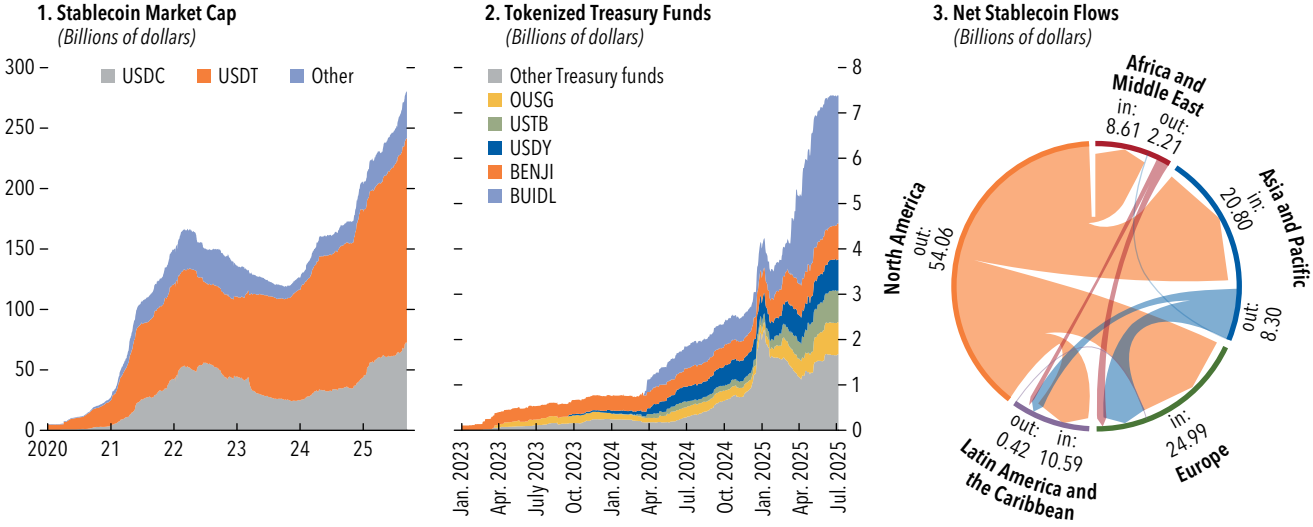
Note: Panel 1 includes a sample of banks in the IMF's GST. Bars show valuation losses in an adverse scenario in which government bond term premiums surges by 300 to 500 basis points, according to the GST scenario. Panel 2 includes a sample of European global systemically important banks and the largest 20 European banks. EVE is defined as the present value of assets less the present value of liabilities of the banking book (under a static balance sheet perspective), excluding own equity and other instruments that do not generate interest. When assets or liabilities do not have a specific contractual maturity or embed implicit optionality, as is typically the case of demand deposits, banks are allowed to make behavioral assumptions on the expected duration of those assets or liabilities. EVE sensitivity is calculated as the EVE change after six interest rate shock scenarios as defined for currencies in the Basel interest rate in the banking book standard; the most impactful scenario is largely the parallel upward shock presented here (that is, an interest rate shock of generally +200 basis points for major currencies). CET1 = Core Equity Tier 1 capital; EVE = economic value of equity; GST = Global Stress Test.

Figure 1.19. Stablecoins Are Growing alongside Tokenized Assets, with Notable Cross-Border Flows

The stablecoin market has risen rapidly and now stands at record heights.

The tokenization of Treasury funds is also growing fast.

Cross-border flows of stablecoins reflect strong dollar demand outside the United States.



Sources: Bloomberg Finance L.P.; Reuter 2025; RWA.xyz; and IMF staff calculations.

Note: Panel 1 appears in Reuter (2025). Panel 3 shows estimates by Reuter (2025) of bilateral net outflows of stablecoins in 2024 across regions. Orange areas represent net flows from North America, blue arrows represent flows from Asia and the Pacific, red arrows represent flows from Africa and the Middle East, and purple areas represent flows from Latin America and the Caribbean. BENJI = Franklin OnChain US Government Money Fund; BUIDL = BlackRock USD Institutional Digital Liquidity Fund; OUSG = Ondo Short-Term US Government Bond Fund; USDC = US Dollar Coin, issued by Circle Internet Group Inc.; USDT = US Dollar Tether, issued by Tether Limited; USTB = Superstate Short-Duration US Government Securities Fund.

disintermediation, and (3) runs faced by stablecoins may generate forced selling of reserve assets. Potential systemic effects would be conditional on stablecoins' continued growth.

Recent global legal and regulatory initiatives could foster the issuance and integration of stablecoins into the financial system by providing clarity on issuance and oversight parameters (IMF, forthcoming).[37] Major US banks are preparing for a shift from cautious observation to active participation and adoption amid a flurry of new fiat-backed stablecoins emerging in 2025.[38]

Nevertheless, the speed and volume of the adoption of stablecoin remains unclear. Projections by the US Treasury Borrowing Advisory Committee of an eightfold increase in stablecoin market capitalization to about $2 trillion by 2028—roughly $500 billion annually—are driven primarily by expectations of broader use in payments and cash management. However, increased adoption faces significant challenges: different stablecoins often operate on separate blockchains, increasing transaction costs and fragmentation in payments; they typically do not offer yields, making them less attractive than money market funds (Nikolaou 2025); and ongoing improvements in traditional payment systems could reduce the need for blockchain-based alternatives.[39]

[37]The Guiding and Establishing National Innovation for US Stablecoins Act, signed into law in July 2025, establishes a framework for stablecoins intended to be used for payments. Aiming to reduce legal uncertainty and support broader crypto adoption, the law establishes an oversight framework for stablecoins, reserve assets requirements, and compliance with anti-money laundering/combating the financing of terrorism (AML/CFT) legislation. The Digital Asset Market Clarity Act complements these efforts by providing legal and regulatory clarity for digital assets and reinforcing the legitimacy of private sector innovations that accept stablecoins as payment on blockchain platforms. These US initiatives are in step with global trends: The European Union's Markets in Crypto-Assets Regulation enforces a framework for crypto assets, including licensing and transparency standards and anti-money laundering/combating the financing of terrorism requirements for stablecoin issuers and providers of crypto services across Europe. Hong Kong SAR's new regime positions stablecoins and tokenized assets at the heart of its fintech strategy.

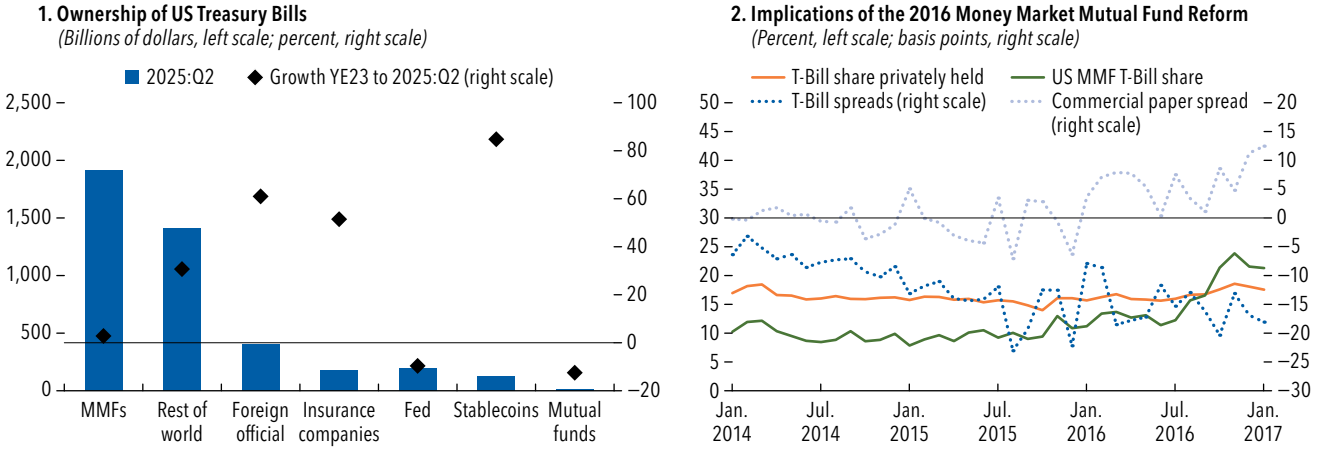
[38]JPMorgan has partnered with Coinbase to expand stablecoin access among clients starting in Fall 2025. Bank of America is developing its own stablecoin, with Citigroup and JPMorgan also evaluating issuance of their own stablecoins. Meanwhile, new US dollar–backed stablecoins have emerged (for example, USDS), while mainstream payment and e-commerce platforms have integrated stablecoins (PayPal with PYUSD).

[39]Stablecoin transactions exhibit fragmentation, although, in practice, major stablecoins partner with exchanges, which offer yield to incentivize users to hold the stablecoin.

Figure 1.20. The Rise of Stablecoins Comes with Potential Concerns over Financial Stability

Dollar-backed stablecoins are buying more Treasury bills.

The 2016 money market mutual fund reform spurred a large increase in demand for Treasury bills, affecting the relative prices of other assets.



Sources: Bloomberg Finance L.P.; Crane data; US Z.1. Statistics; and IMF staff calculations.

Note: The Treasury bill growth rate is calculated on the basis of outstanding total US Treasury debt, after excluding Federal Reserve Treasury holdings. The Treasury bill spread is calculated as the difference between the three-month Treasury bill rate and the three-month overnight index swap rate. The spread for commercial paper is the difference between 90-day nonfinancial commercial paper and the three-month overnight index swap rate. Fed = US Federal Reserve; MMF = money market fund; Q = quarter; YE = year end.

At the same time, traditional financial instruments such as deposits and money market mutual fund shares have turned to tokenization, creating representations of them as digital tokens on a blockchain (Box 1.2 in the October 2024 *Global Financial Stability Report*). The tokenized market has grown substantially (Figure 1.19, panel 2), although it remains small compared with stablecoins, which dominate blockchain-based payments and settlements. Tokenization may allow these instruments to compete with stablecoins, though both could grow in parallel.

To date, net stablecoin flows are largely flowing outward from North America to the rest of the world, reflecting dollar demand in those regions (Figure 1.19, panel 3; see also Reuter 2025). Easy access to dollar-denominated stablecoins raises concerns about currency substitution and reduced monetary policy transmission, particularly in jurisdictions with weak macroeconomic fundamentals. In addition, a shift from physical currency to stablecoins could reduce seigniorage, affecting central bank income and dividend distribution. Stablecoins also pose risks to capital flow management, notably for emerging market economies, as they allow US dollar liquidity to move outside regulated channels, potentially weakening the effectiveness of capital flow and foreign exchange measures and increasing risks for illicit uses of stablecoins (Cardozo and others 2024).

Stablecoins are typically legally required to be backed by high-quality liquid assets such as short-term government bonds, demand deposits, and government money market funds. The mainstreaming and continued growth of stablecoins could have substantial implications for these assets. Stablecoin issuers already hold significant volumes of short-term government debt and are among the largest buyers (Figure 1.20, panel 1), already putting downward pressure on US Treasury bill yields (Ahmed and Aldasoro 2025).

The 2016 US Securities and Exchange Commission money market mutual fund reform illustrates how regulatory or structural shifts can abruptly reshape demand across asset classes and affect market pricing. The reform triggered a large reallocation from prime money market mutual funds to government money market mutual funds, doubling demand for Treasury bills by nearly $500 billion during a period when supply remained broadly stable, along with reducing demand for commercial paper and other short-term private sector debt. This shift modestly lowered Treasury bill yields and raised commercial paper yields (Figure 1.20, panel 2).

The expansion of stablecoins could have similar effects, depending on whether it creates new demand for short-term sovereign bonds, as in the money market mutual fund reform case, or simply reallocates demand. If stablecoins grow at the expense of money

market mutual funds, yield effects may be muted, as demand will be reallocated from the funds. However, if stablecoins displace bank deposits, which fund longer-term bonds and loans, demand could shift toward Treasury bills. Such a shift may steepen yield curves and raise concerns about credit disintermediation as banks could face reduced funding capacity for lending to households and businesses. Altering yield curve dynamics can also complicate interest rate control by central banks. These concerns would be amplified were stablecoins denominated in foreign currencies to be widely adopted. The impact would depend on the geographic adoption patterns, asset allocation strategies, and supply of short-term government bills: an increase in bill issuance can mitigate price pressures, though at the cost of higher exposures to short-term interest rate risk for the government.

Implications of a wider stablecoin adoption can stretch beyond their impact on the yield curve. Because stablecoins may be subject to run risk, fire sales of stablecoins' reserve assets—such as bank cash deposits and government securities—could spill over into bank deposits and government bond and repo markets. This could increase volatility and require central bank intervention. Moreover, in a scenario of broader adoption, any loss of parity with the reference currency would also impose direct losses and heightened uncertainty on a large user base. Financial fragmentation in payment systems resulting from limited interoperability among stablecoins, and between stablecoins and existing financial market infrastructure, may further accentuate these risks.

Corporate Credit Risk

The Corporate Sector Is Resilient to Tariffs So Far

Even though corporate profit margins have been revised downward since the April 2025 *Global Financial Stability Report*, corporate balance sheets in many countries are still healthy in aggregate, keeping corporate credit risks at bay, although vulnerabilities remain unresolved. In the United States, interest income on assets has increased more than liabilities during high-interest-rate years, lowering firms' net interest payments (Figure 1.21, panel 1) and propping up their cash buffers. Net interest payments have recently started to increase, as maturing corporate debts need to be refinanced at higher fixed rates (see the October 2023 *Global Financial Stability Report*).

One factor contributing to stretched valuations is that instead of using cash flow for investments (Figure 1.21, panel 2), firms have engaged in financial engineering to support valuations. Share buybacks have kept on growing—for example, so far this year, US financial, technology, and communications services firms have bought back near $1 trillion of stocks on an annualized basis (Figure 1.21, panel 3). In Japan, the ratio of share buybacks to market capitalization is on pace to reach around 2.4 percent in 2025, in contrast to 1.1 percent in 2024. The elevated valuations are, however, facilitated at the cost of investments in future growth opportunities.

High valuations in stock markets and buoyant risk sentiment also may have helped lower corporate funding costs. In reality, default rates, especially for leveraged loans, have been climbing, even though some of the defaults are voluntary liability management exercises, including debt exchanges (Khoda and others 2025; Figure 1.21, panel 4). This suggests that some weaker firms are struggling in the current environment. Indeed, funding liquidity is strained among vulnerable borrowers (see the section "Some Private Credit Direct Lending Borrowers Remain Vulnerable").

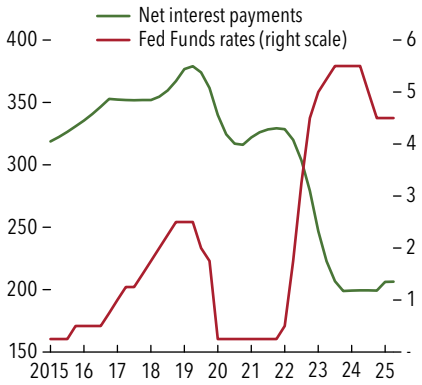
Looking ahead, stretched valuations in stocks and corporate bonds are vulnerable to correction, owing to the likelihood that tariffs will dampen corporate profitability (see the section "Equity Markets Exhibit High Valuations and Concentration Risks"). Tariffs could also have larger-than-expected effects on inflation and growth as a result of firms passing rising input costs to consumers, potentially leading to higher inflation with stagnant demand. Empirical evidence shows that inflation and growth shocks cause corporate spreads to widen and stock prices to decline (Figure 1.21, panel 5). Lower stock prices worsen the effect of tariffs on credit fundamentals, while higher term premiums may put additional pressure on corporate debt issuers (see the section "Expanding Fiscal Deficits Exert Pressure on Bond Market Stability").

IMF staff have developed a more comprehensive assessment of the cross-country costs for firms resulting from higher effective tariff rates on their US exports. Tariff-related costs also depend on the share of exports to the United States in a country's total exports, the proportion of exporting firms in the country, and country corporate-level factors (see Online Annex 1.5 for more details). For the average country, additional tariffs would reduce firms' profit margin by 1 percentage point (Figure 1.22, panel 1,

Figure 1.21. Corporate Fundamentals and Risks

In the United States, ample interest income on financial assets had largely offset interest payments until recently.

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

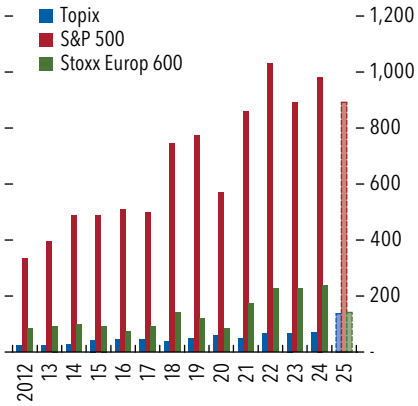


Saving surpluses (cash flow as a percentage of GDP) have reflected steady earnings amid a lack of attractive investment opportunities ...

2. Global Nonfinancial Corporate Capital Expenditure and Cash Flow
(Percent of GDP)

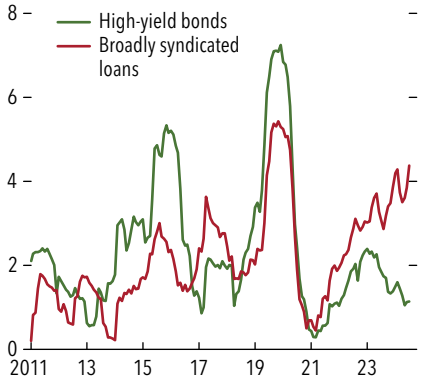
... enabling firms in many cases to engage in financial engineering to support equity valuations.

3. Share Buybacks
(Billions of dollars; 2025 bars are year-to-date annualized)



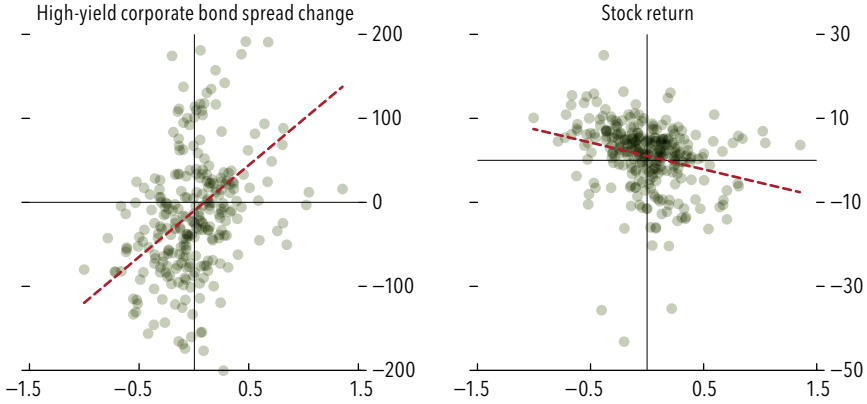
Elevated corporate valuations have enabled firms to restructure loans, leading to higher loan default rates than for bonds.

4. US Corporate Debt Default Rates
(Percent)



That said, valuations are vulnerable to "stagflation"—high-inflation and low-growth surprises.

5. Sensitivity of Global Risk Assets to the Stagflation Surprise Index
(Basis points, percent, y-axis; points, x-axis)



Sources: Bank of America; Bloomberg Finance L.P.; Bureau of Economic Analysis; European Central Bank; EUROPACE AG/Haver Analytics; Federal Reserve Bank of St. Louis; IMF, World Economic Outlook database; Japanese Ministry of Finance; Refinitiv DataStream; US Department of the Treasury; and IMF staff calculations.

Note: Panel 2 shows the GDP-weighted average of the euro area, Japan, and the United States. In panel 5, the Stagflation Surprise Index is defined as the GDP-weighted average of the spread of the Inflation Surprise Index and the Growth Surprise Index between the United States, the euro area, the United Kingdom, and Japan. A higher index value means a larger stagflation surprise, indicating higher inflation, lower growth, or combined surprise relative to market expectations. High-yield corporate bond spread changes are based on the Bloomberg Global High-Yield Corporate Bond Index, and stock returns are based on the MSCI All Country World Index.

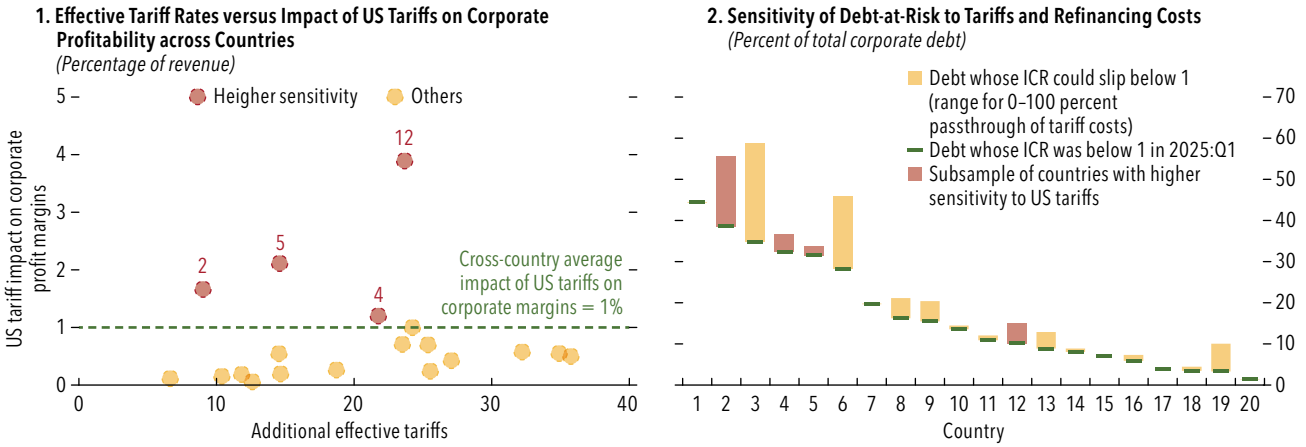
green line). Some countries have firms with much higher sensitivity to additional tariffs (Figure 1.22, panel 1, red bubbles) and could experience a steeper erosion of margins.

These estimated tariff costs can be translated into effects on corporate earnings and debt servicing capabilities (Figure 1.22, panel 2). Two extreme scenarios can provide an estimated range of deterioration in earnings. First, a 100 percent cost pass-through from a country's exporters to US consumers and second, a 0 percent pass-through with an equal distribution of tariff-related costs between import-

Figure 1.22. Corporate Debt Sensitivity Analysis

Tariff costs faced by firms are more pronounced for some countries, eroding their profit margin by 1 percent on average ...

... resulting in large shares of firms with an interest coverage ratio below 1 for a broad set of countries, while also accounting for higher debt refinancing costs.



Sources: Dealogic; IMF, World Economic Outlook database; S&P Capital IQ; US Tariff Tracker, Center for Global Development; and IMF staff calculations.

Note: The sample includes Bangladesh, Brazil, Canada, Chile, China, Colombia, France, Germany, India, Japan, Korea, Malaysia, Mexico, the Philippines, South Africa, Spain, Türkiye, the United Kingdom, the United States, and Vietnam. Countries are assigned numbers for both the panels. The additional tariffs are calculated relative to January 20, 2025, and as of July 12, 2025. For panel 1, the impact of US tariffs on corporate profitability for a country is estimated by the interaction of the additional tariffs, the share of export revenue exposed to US firms engaged in exports, and the proportion of exporting firms in total, which is proxied by goods exports as a percentage of GDP in 2024 (see Online Annex 1.5 for details). Countries whose companies face a larger-than-average increase in implied tariff costs (that is, greater than 1 percent of revenue) are identified as having higher sensitivity (red bubbles). The corresponding labels for the red bubbles show the assigned country number. The horizontal dashed green line is the simple average across countries in the sample, excluding the United States. Panel 2 shows the possible range of increases in debt-at-risk under varying degrees of cost pass-through scenarios for each country in the sample and higher refinancing costs. Debt-at-risk is defined as the share of debt with an interest coverage ratio below 1 in total. The countries are sorted by the size of debt-at-risk as of the first quarter of 2025 (see Online Annex 1.5 for details on scenario construction and calculations). ICR = interest coverage ratio.

ing and exporting firms. A sensitivity analysis of both scenarios shows that since debt refinancing costs are rising in coming years as large volumes of debt mature (see the October 2024 *Global Financial Stability Report* and the April 2025 *Global Financial Stability Report*), a sizable share of firms could end up with an interest coverage ratio (the ratio of earnings over interest expenses) below 1, especially in countries where tariff costs are high (Figure 1.22, panel 2, red bars). Some countries already operating with a low percentage of risky corporate debt (debt with an interest coverage ratio below 1) could experience a large increase in their share, and this would heighten credit risk. In addition to corporate debt serviceability, higher tariff costs would be a drag on macroeconomic fundamentals. Firms sensitive to tariffs would have limited scope to absorb the additional tariff costs through improvement in operational efficiency. At the same time these firms would be reeling under higher refinancing costs. Hence, they would be cornered into passing the additional costs to consumers to manage their profit margins and ensure sustainable operations, potentially raising inflation.

Some Private Credit Direct Lending Borrowers Remain Vulnerable

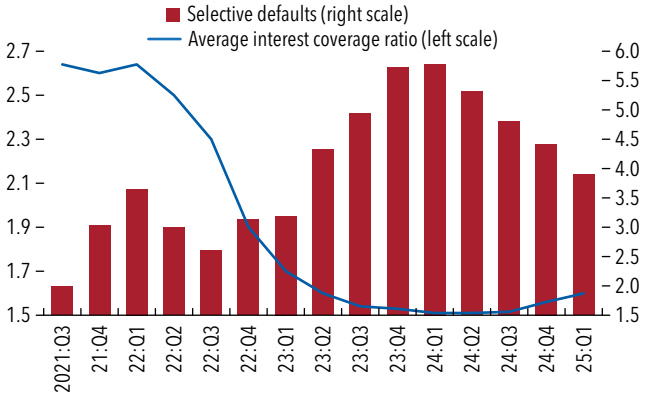
Elevated policy rates and uncertainty continue to exert pressure on direct lending borrowers, although the industry has demonstrated flexibility in managing short-term pressures. Continued earnings growth, declining policy rates, the use of payment-in-kind features of payment-in-kind features—that is, paying interest with additional debt—and recent restructurings (Figure 1.23 panel 1, red bars) have helped lift some cash-flow pressure from borrowers. As a result, although the overall interest coverage ratio remains low (Figure 1.23, panel 1, blue line), the share of borrowers with a cash-only interest coverage ratio below 1 has declined considerably, returning to levels observed before the interest rate hiking cycle (Figure 1.23, panel 2).

Despite the wave of restructurings, liquidity remains strained among the more vulnerable borrowers,

Figure 1.23. Credit Risk and Fundamentals of Direct Lending

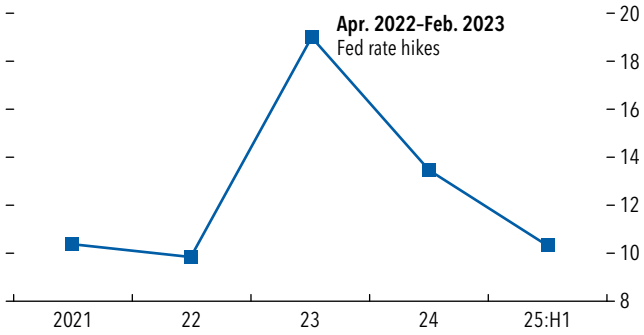
Elevated policy rates keep the interest coverage ratio low, and selective defaults, or restructurings, have declined.

1. Average Interest Coverage Ratio for Direct Lending Borrowers and the Debt Restructuring (Selective-Default) Rate
(Ratio, left scale; percent, right scale)



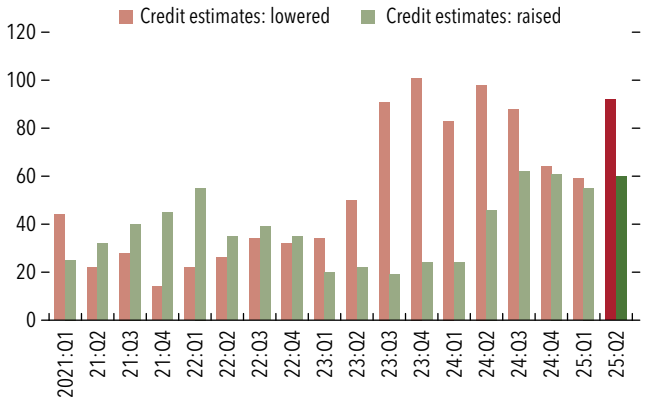
The series of adjustments helped better position direct lending borrowers to service their debt in the short term.

2. Credit Rating Assessments with Cash Interest Coverage below 1
(Percent of total number of S&P Global credit estimates)



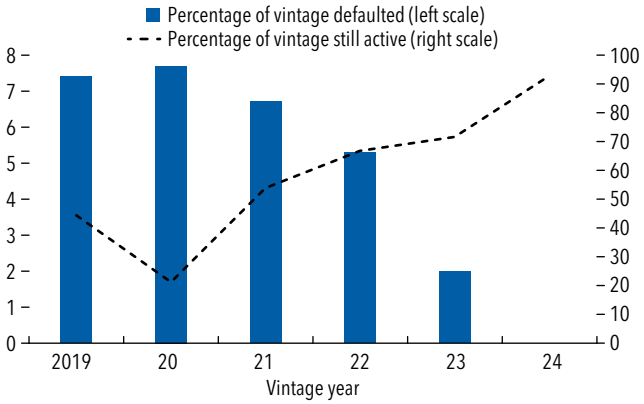
A vulnerable tail of direct lending borrowers is under pressure from weak liquidity ...

3. Number of Ratings Upgrades and Downgrades of Direct Lending Borrowers
(Number of actions in S&P Global Credit estimates)



... with vintages before rate hikes having a higher share of weaker direct lending borrowers.

4. Default Rates of Direct Lending Borrowers across Vintages
(Percent in Morningstar DBRS sample)



Sources: Morningstar DBRS 2025; and S&P Global Ratings 2025.
Note: In all four panels, data are based on the sets of direct lending borrowers reviewed by Morningstar DBRS and S&P Global (Morningstar DBRS 2025; S&P Global Ratings 2025). In panel 1, selective defaults are defined in S&P Global Ratings (2025) and include amend-and-extend transactions and payment-in-kind switches allowing borrowers to choose to pay interest expenses by issuing more debt. In panel 2, the interest coverage ratio is based on the cash-only portion of interest expense, excluding the accrued payment-in-kind portion of the coupon's interest rate. The interest coverage ratio is defined as earnings before interest, taxes, depreciation, and amortization divided by interest expense.Fed = US Federal Reserve.

contributing to a rise in borrower downgrades (Figure 1.23, panel 3). Overall, defaults remain more common among firms that borrowed from private credit before monetary policy began to tighten in 2022 (Figure 1.23, panel 4). These older vintages of borrowers also include more firms constrained by liquidity (Morningstar DBRS 2024). Because direct lending involves high leverage and is structured with variable rates, borrowers depend on economic growth continuing, and on the pace at which policy rates normalize.

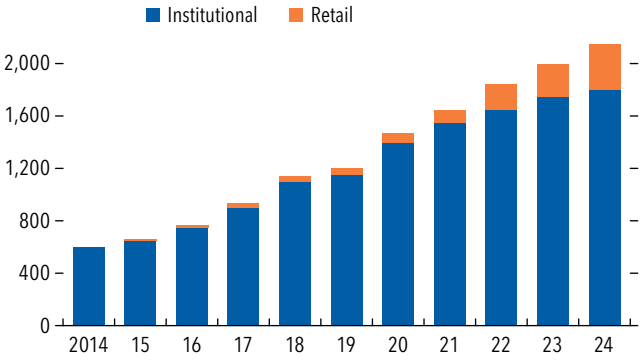
Broader Retail Participation in Private Credit Can Generate New Risks

Retail investors have become—and are expected to remain—major contributors of new funds for the expansion of private credit (Figure 1.24, panel 1).

Figure 1.24. Cyclicality and Liquidity Risk for Increasing Retail Participation in Private Credit

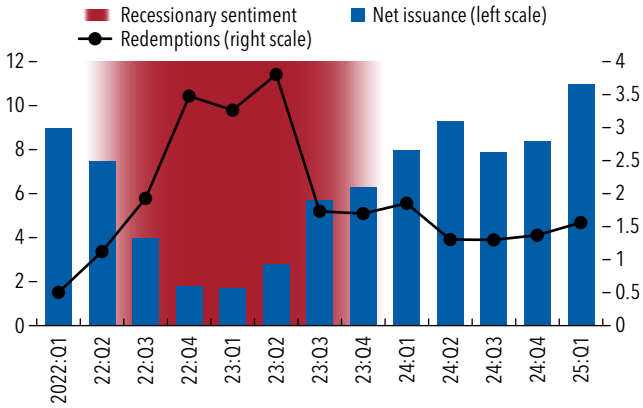
Retail funds have become a major part of private credit assets under management.

1. Assets under Management for Private Credit Funds
(Billions of dollars)



Perpetual nontraded business development companies' funds closely followed market sentiment in 2022–23

2. Perpetual Nontraded Business Development Companies' Quarterly New Issuance and Redemptions
(Billions of dollars, left scale; percent, right scale)



Sources: Capital IQ; and PitchBook.

Note: In panel 2, the recessionary sentiment is Bloomberg's consensus forecast of the recession probability in the United States within one year.

Private credit asset managers are developing new products to attract retail investors, including retirement savings accounts, countering the slowdown in institutional fundraising. The increasing share of retail investors in private credit can change the industry in two important ways: by introducing higher liquidity risks and by making investments more procyclical.

Most private credit funds currently pose little maturity transformation risk because traditional structures like private credit collateralized loan obligations and closed-end funds do not typically allow redemptions during the fund's lifespan. The expansion to retail investors is associated with the growth of semiliquid investment vehicles that offer periodic windows of liquidity, ranging from quarterly redemptions (regular or discretionary) to exchange-traded funds with daily liquidity.

Broader retail participation in private credit may also add procyclicality to fund inflows and outflows. Some evidence suggests that private credit lending could be more stable than similar leveraged loans and less responsive to shocks than high-yield bond markets (see Chapter 2 of the April 2024 *Global Financial Stability Report*). However, products with stronger retail participation, such as perpetual nontraded business development. companies (BDCs), seem to track the cyclicality of market sentiment more closely (Figure 1.24, panel 2).

These vulnerabilities underscore the need for robust asset-liability management and sufficient sources of liquidity to cover crowded redemptions during a shock. Perpetual nontraded BDCs—vehicles that allow periodic redemption windows—usually maintain leverage meaningfully below the regulatory maximum. This gives them room for additional borrowing if unexpected redemptions occur. However, a key risk to this liquidity management strategy is asset devaluation during an economic shock, which would mechanically increase the actual leverage, lower collateral value, and potentially reduce borrowing capacity.

Another liquidity management tool used by perpetual nontraded BDCs is holding larger portfolios of marketable assets (mostly traded leveraged loans). These portfolios amount to 10 percent to 40 percent of total assets, compared with the 1 percent to 3 percent range typically observed in publicly traded BDCs that do not permit redemptions. While part of this marketable portfolio may temporarily hold newly raised funds before deployment into private credit loans, it can also serve as a liquidity cushion against idiosyncratic redemption shocks and, to a lesser extent, against economywide downturns. That said, the effectiveness of marketable securities as a buffer has its limits, considering that liquidity in semiliquid assets may evaporate during times of stress.

Investment Funds Dominate the High-Yield Bond Market

Open-ended investment funds and exchange-traded funds own a large share of high-yield bonds outstanding. Since 2015, these funds' share of the US high-yield bond market has risen from 37 percent to 45 percent. By comparison, their shares in other fixed-income markets, such as investment-grade products and US Treasuries, have also risen but are significantly smaller (Figure 1.25, panel 1).

This increased presence makes high-yield bonds more vulnerable to the behavior of open-ended funds and exchange-traded funds, particularly because these funds might face sudden runs. Monthly flow data for high-yield bond funds and exchange-traded funds over the past decade show that in eight episodes globally, outflows exceeded 2 percent of assets under management (over $10 billion of outflows). This is much worse than other fixed-income sectors, which have suffered outflows over 2 percent of assets in only one or, at most, two instances during the same period (Figure 1.25, panel 2). Furthermore, considering the high-yield market is relatively illiquid, the impact of these outflows on bond yields can be substantial. In the United States, which makes up about 60 percent of the global high-yield bond market, average monthly trading volume is about $200 billion.[40] This implies a high outflow-to-trading-volume ratio compared with other fixed-income markets (Figure 1.25, panel 3). The liquidity mismatch means that funds may face more significant and faster losses during market stress, as they are compelled to sell assets to meet redemption requests. A clear example occurred in March 2020, when US high-yield bonds experienced a mark-to-market loss of 12 percent, considerably larger than the 7 percent loss in US investment-grade bonds.[41]

Increasing ownership of high-yield bonds by funds and exchange-traded funds can also heighten the concentration risks of bond issuers. Bond funds and exchange-traded funds that are not dedicated to the high-yield asset class or indexed to high-yield bond benchmarks have increased their holdings (Figure 1.25, panel 4). Funds that are not indexed to benchmarks can overinvest in certain issuers. For example, a single investment fund can hold a substantial portion of the bonds issued by certain borrowers, particularly those rated CCC or lower (Figure 1.25, panel 5). Although this concentration may be less concerning for the funds themselves, because they typically manage large volumes of relatively diverse assets, it is a risk for issuers, for whom prices could fall were a dominant debt holder to exit the market. This situation could become especially problematic were it to coincide with a period when the company needed to refinance debt.

Exchange-traded funds have also grown their share of the US high-yield bond market to 7 percent in 2024, from 3 percent in 2015. The sensitivity of high-yield bond exchange-traded funds to S&P 500 returns is higher than the sensitivity of their underlying index to S&P 500 returns (Figure 1.25, panel 6). This suggests that the rise in exchange-traded funds may increase contagion risk and possibly amplify price moves across asset markets during periods of stress.[42]

Policy Recommendations

The ground is shifting in the financial system. Some shifts have already been under way, but their growing intensity requires policymakers to remain vigilant and respond promptly to changing circumstances as they unfold.

To ensure macroeconomic stability, central banks should stay attentive to the risks to inflation associated with tariffs. So far, central banks that have started easing cycles have cut interest rates gradually, in part as insurance against the possible impact of tariffs on the economy, including potentially weaker demand in tariffed jurisdictions, has yet to fully materialize. In jurisdictions where inflation is still well above target and where tariffs might constitute a supply shock, central banks need to proceed carefully with any easing and maintain their commitment to price stability mandates. This cautious approach should also help temper further valuation pressures in risk assets. Central bank operational independence remains critical for anchoring inflation expectations and enabling central banks to achieve their mandates (see Chapter 1 of the October 2025 *World Economic Outlook* for key institutional features that can help preserve this independence).

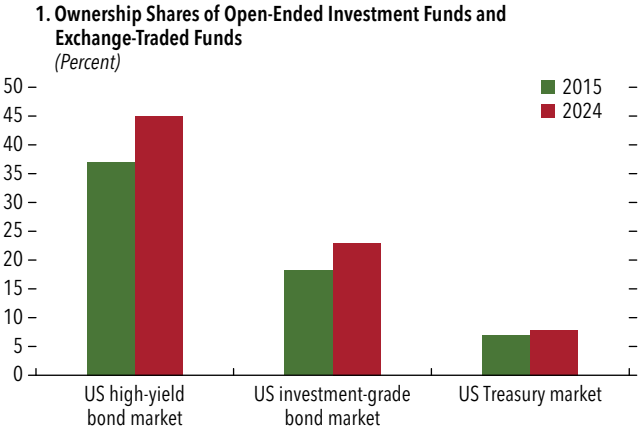
[40]Average monthly trading volume on the high-yield bond market is according to Tradeweb TRACE data.

[41]Total return percentages in March 2020 are from the ICE Bank of America US High-Yield and US Corporate Bond Indices.

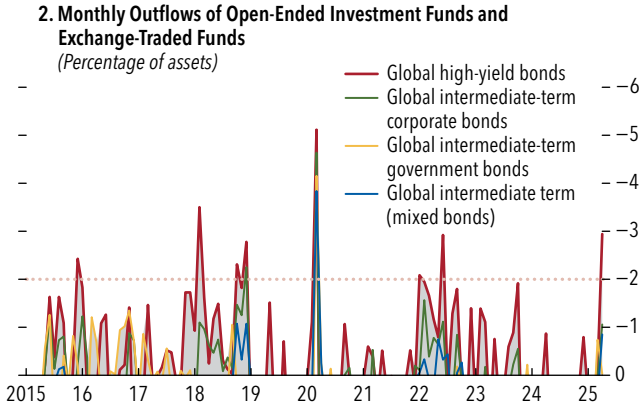
[42]Greater investment in passive investment strategies, such as exchange-traded funds, may be related to the rise in cross-asset correlations during periods of stress, which is one of the main attributes of contagion. Benchmark-focused investors are more likely to be driven by common shocks than by idiosyncratic fundamentals of the assets they invest in (see Chapter 1 of the April 2018 *Global Financial Stability Report*).

Figure 1.25. Vulnerabilities Posed by the Rising Ownership of the High-Yield Bond Market, by Investment Funds and Exchange-Traded Funds

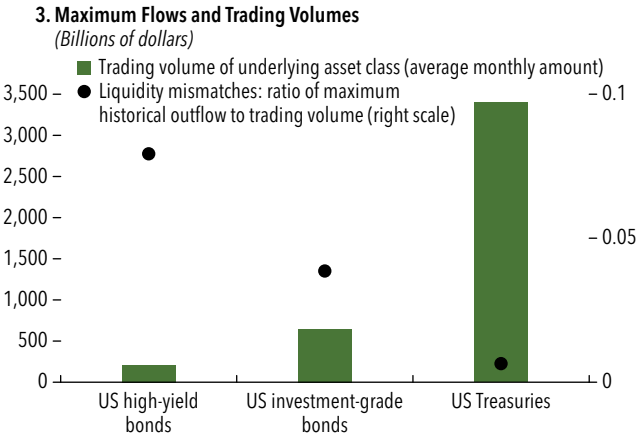
Investment and exchange-traded funds own a large and rising share of the high-yield bond market ...



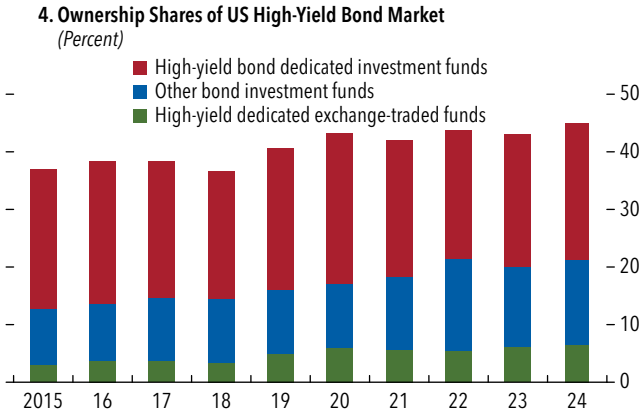
... and their investor base is more flight prone.



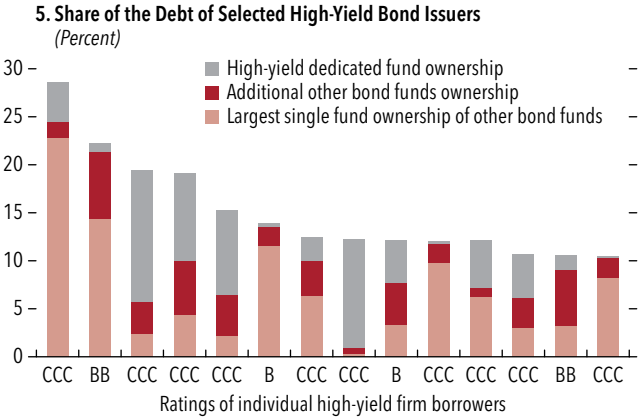
The negative effects of outflows from the high-yield bond market can be worsened by its low liquidity.



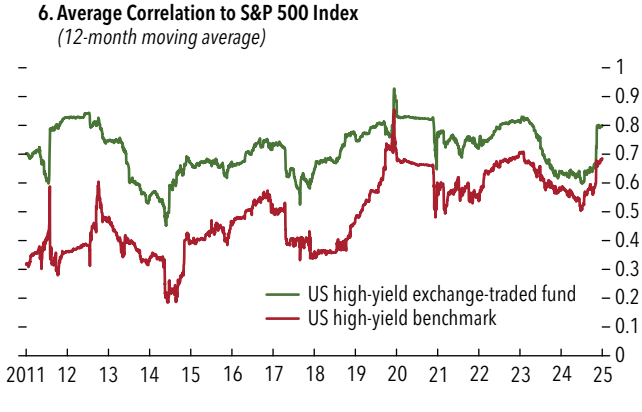
The growing share of investment and exchange-traded funds has been driven by other bond investment funds and high-yield exchange-traded funds.



Other bond investment funds can own a large share of the debt of some issuers, increasing their concentration risk ...



... whereas the greater sensitivity of exchange-traded funds to major liquid markets increases contagion risks.



Sources: Bloomberg Finance L.P.; EPFR Global; EUROPACE AG/Haver Analytics; J.P. Morgan; TRACE; Tradeweb; and IMF staff calculations.

Note: The total debt of the issuing firms in panel 5 amounts to $90 billion, about 4 percent of the ICE Bank of America Global High-Yield Index. Panel 6 uses the iShares iBoxx $ High-Yield Corporate Bond Exchange-Traded Fund as the proxy.

Strengthening global financial safety nets and foreign exchange market transparency and resilience can mitigate the impact of abrupt asset price corrections—especially in light of recent dollar depreciation—when market volatility spikes. The capacity and operational readiness of global financial safety nets,[43] including bilateral and regional currency swap lines, are crucial to preserve stability in funding and foreign exchange markets amid unforeseen ramifications of dollar weakening during periods of market stress.[44] Over the medium term, the growing role of NBFIs and other new foreign exchange market participants underscores the need for better data reporting and transparency, stronger systemic risk monitoring and stress testing (especially on foreign exchange mismatches), and greater operational resilience among key intermediaries to contain financial stability risks (see Chapter 2).

Urgent fiscal adjustments to curb government deficits and improvements in market structure are crucial to the resilience and functioning of core sovereign bond markets.[45] High debt and delayed fiscal adjustments in many countries could further raise borrowing costs for governments, underscoring the need for more ambitious fiscal measures to reduce sovereign risks. In addition, sustained trust in the institutional foundations in G4 economies has underpinned their sovereign bonds' safe-asset status for decades and needs to be preserved.[46] These foundational elements can be complemented by improvements in market structure, particularly a continued migration toward the central clearing of cash bond and repo transactions to reduce counterparty risk, strengthen intermediaries' capacity through balance sheet netting, and increase transparency. Standing liquidity facilities that backstop core government bond markets are equally crucial.

Emerging markets should deploy policies consistent with the IMF Integrated Policy Framework to mitigate external pressures while further deepening local financial markets, especially bond markets. A softer dollar has tempered the external headwinds for emerging markets in recent months, and rate cuts could induce more global flows into emerging market assets. That said, emerging markets with weaker fiscal positions—for example, real financing costs outpacing real growth—are vulnerable to abrupt changes in investor sentiment. To counteract the effects of capital inflow or outflow pressures, the use of foreign exchange interventions, macroprudential measures, and capital flow management measures may be appropriate under the Integrated Policy Framework for economies, especially if indicators of fragility such as rising inflation expectations and surges in exchange rate and capital flow volatility are observed. For example, provided buffers are available, countries can deploy reserves through foreign exchange interventions or temporarily relax macroprudential constraints to mitigate risks to macroeconomic and financial stability from capital outflow pressures. Such measures, however, should not impair progress on necessary fiscal and monetary adjustments or on the further development of local bond markets (see Chapter 3). Frontier economies should exercise caution against excessive reliance on less-conventional and potentially more fragile forms of borrowing, such as private placements and bespoke instruments.

The growing importance of NBFIs in financial intermediation highlights the need for sound oversight of this segment. Regulators should improve data collection, coordination, and analysis—particularly across borders—to ensure consistent oversight.

To address liquidity mismatches in investment funds, it is key to further improve and expand the availability and usability of liquidity management tools.[47] Timely and consistent implementation of revised recommendations and guidance from the Financial Stability Board (FSB) and International Organization of Securities Commissions is crucial to address structural vulnerabilities in open-ended funds. The use of swing pricing and other antidilution mechanisms can also be effective in mitigating liquidity

[43]Following IMF (2023), the global financial safety net refers to the network of bilateral, regional, and multilateral liquidity arrangements that provide countries with access to foreign exchange liquidity during periods of financial stress. The arrangements include central bank swap lines, regional financing arrangements, and IMF lending instruments.

[44]Both unipolar and multipolar international monetary system configurations can serve as a stable backstop for the global economy. However, risks of volatility and potential instability would rise during the transition between configurations (Chapter 2 of the July 2025 *External Sector Report*).

[45]"Core sovereign bond markets" includes markets covered in the section "Expanding Fiscal Deficits Exert Pressure on Bond Market Stability."

[46]See Gourinchas and Jeanne (2012), who argue that a global safe asset must be backed not only by sufficient fiscal capacity and liquidity support, but also by central bank independence and institutional safeguards that prevent the monetization of debt and preserve monetary credibility to prevent a fiscal-monetary nexus.

[47]Evidence from recent IMF Financial Sector Assessment Programs indicates that there is room to further improve and expand the availability of liquidity management tools to fund managers.

mismatches by reducing incentives for investors to redeem shares ahead of others, especially during periods of market stress (see Chapter 2 of the October 2022 *Global Financial Stability Report*). More definitive guidance to lengthen redemption frequency for funds investing in illiquid assets—including high-yield bonds—could more fundamentally address liquidity mismatches, although they may require amendments to the legal frameworks in some jurisdictions (IMF 2021).

Broader retail participation in private credit could translate into herd behavior to redeem investments during stress episodes. In line with FSB recommendations, private credit funds should create and redeem shares at a low frequency or require long notice or settlement periods. Regulators should implement stringent requirements to ensure that private credit firms use liquidity management tools and conduct stress testing to assess the sufficiency of these tools during economic downturns or episodes of procyclical redemptions. Securities market regulators should also ensure funds that permit retail participation clearly and comprehensively disclose potential risks and redemption limitations to their investors. Increasing retail participation requires close supervision of conduct risks, as more frequent redemptions may exacerbate concerns about valuations. Furthermore, the potential use of continuation funds would require stricter oversight.

Global banking stress tests have found that improved capitalization is key to addressing weak banks and enhancing banking sector resilience. To preserve financial stability amid high economic uncertainty, it is vital to implement Basel III and other internationally agreed-upon standards that ensure sufficient capital and liquidity in the banking sector. The efficiency of regulations should be ensured by reviewing any undue complexity without undermining the overall resilience of the banking sector or international minimum standards. The increased interconnectedness between banks and NBFIs means that strains at weaker, lightly regulated financial institutions can have significant consequences for banks and the broader financial system. Supervisors should carefully monitor banks' exposures to NBFIs by assessing the solvency and liquidity implications of these exposures under adverse scenarios. Supervisors from all financial sectors and macroprudential authorities need to coordinate more closely to establish sound governance structures, mechanisms, and processes to monitor banks and NBFIs from a systemwide perspective. In countries with insufficient buffers, policymakers should consider whether macroprudential buffers can still be built at the current juncture to increase resilience against a range of shocks while avoiding a broad tightening of financial conditions. Were a downturn in activity to lead to substantial financial stresses, such buffers could be released to help banks absorb losses and support the provision of credit to the economy, thereby reducing financial amplification of the downturn.

In light of risks to financial stability from weak banks, continued efforts to strengthen the financial sector safety net are critical. Central banks should establish frameworks for emergency liquidity assistance and stand ready to provide support to solvent and viable banks facing temporary liquidity shortfalls, subject to strong safeguards (for example, forward-looking solvency and viability assessments, appropriate interest rates, collateralization, and appropriate haircuts). Furthermore, all banks should periodically assess their access to central bank lending, including their ability to mobilize collateral quickly. Further progress on enhancing recovery and resolution frameworks is essential to ensure that authorities are well positioned to manage potential shocks without systemic disruption or exposure of taxpayers to losses.

Potential increasing adoption of stablecoins could impact safe-asset markets, financial intermediation, and monetary sovereignty. Effective regulation, supervision, and oversight of stablecoin arrangements is crucial to mitigate financial stability and integrity risks, including those associated with stablecoin runs. A comprehensive policy, legal, and regulatory response for crypto assets is necessary to address the risks they pose to macroeconomic and financial stability. Policymakers should implement the FSB's high-level recommendations for crypto assets and the broader IMF-FSB policy recommendations, ensuring that market and prudential authorities possess adequate powers, effective risk management frameworks are in place, anti-money laundering and combatting the financing of terrorism measures in line with international standards are effectively implemented, and relevant authorities cooperate with one another. It is also necessary to guard against excessive capital flow volatility and adopt unambiguous tax treatment of crypto assets. Sound macroeconomic policies and credible institutional frameworks can ensure monetary sovereignty is preserved, even as the stablecoin market continues to develop.

Box 1.1. Global Real Estate Update

Global commercial real estate (CRE) prices across all regions have continued their tenuous recovery since the April 2025 *Global Financial Stability Report* (Figure 1.1.1, panel 1). The recent price recovery may not have captured ongoing challenges in some sectors, such as offices. Indeed, in the United States, delinquency rates, as indicated by CRE that backs commercial mortgage-backed securities, rose to 7.29 percent for August, driven by continued stress in the office sector (Figure 1.1.1, panel 1). Rising CRE prices coincide with positive investment momentum: after bottoming out in 2023, the direct CRE investment growth rate recovered to 34 percent year-over-year in the latest quarter (Figure 1.1.1, panel 2), reaching $185 billion. Investment has been buoyed by sectors experiencing strong structural demand, such as logistics, data centers, and multifamily housing. Market analyses suggest that growth remains driven by liquid debt markets, stronger institutional demand, and increased cross-border activity.

Developments in the office market are heterogeneous around the world. Some markets, such as in London, Paris, Sydney, and Tokyo, are experiencing strong rental and leasing growth. Others, especially major cities in the United States, continue to experience elevated vacancy rates, reflecting differences across cities in tenant preferences and adaptability to new workplace standards (Figure 1.1.1, panel 3).

Looking ahead, private CRE markets are still facing headwinds. Real estate sentiment surveys indicate that the share of investors expecting improvements in market conditions has declined in recent months, reportedly over concerns about market volatility, construction cost pressures, and uncertainty around funding spreads (Figure 1.1.2, panel 1). An index of CRE market liquidity, which tends to lead to changes in CRE valuations, deteriorated during the brief global market turmoil in April (Figure 1.1.2, panel 2), suggesting that CRE sentiment is sensitive to broader

This box was prepared by Corrado Macchiarelli.

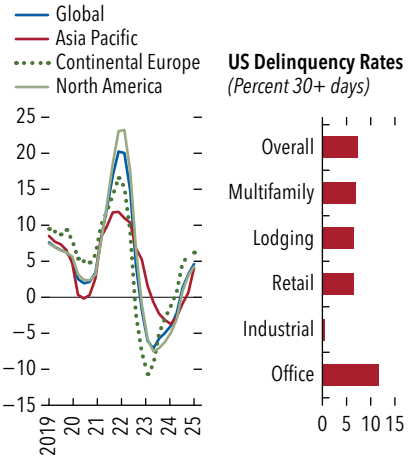
Figure 1.1.1. Commercial Real Estate Activity

Recent commercial real estate activity suggests an uneven recovery.

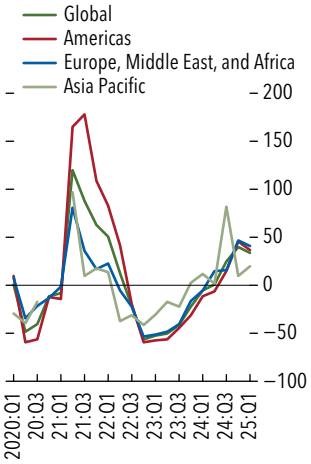
Capital flows are driving growth in direct real estate transactions ...

... with some cities witnessing a rebound in leasing and occupancy more than others.

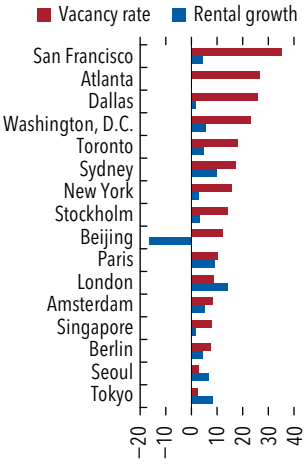
1. Global Property Fund Index and Commercial Mortgage-Backed Security Delinquencies
(Index growth, annualized; percent)



2. Quarterly Year-over-Year Change in Direct Investment, by Region
(Percent)



3. Commercial Real Estate Vacancy Rates and Rental Growth Rates in Major Cities
(Percent)



Sources: MSCI; Trepp; JLL Research; and IMF staff calculations.

Note: In panel 1, the change in the MSCI Global Quarterly Property Fund Index is annualized. The last observation is for the second quarter of 2025. "US delinquency rates" refers to August 2025. In panels 2 and 3, the last observation is for the first quarter of 2025. In panel 3, transactions larger than $5 million exclude land/development and entity-level deals.

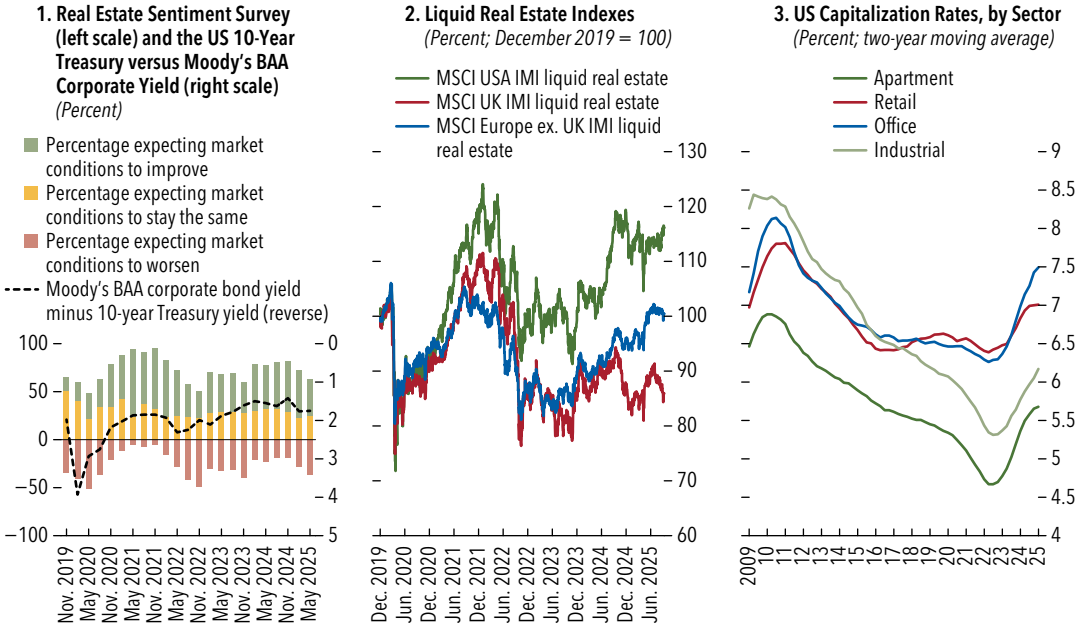
Box 1.1 *(continued)*

Figure 1.1.2. Commercial Real Estate Headwinds

Forward-looking commercial real estate sentiment has become somewhat more downbeat ...

... as reflected in liquid real estate indices.

Capitalization rates are widening, indicating that investors are demanding lower prices.



Sources: JLL Research; Federal Reserve Bank of St. Louis, Federal Reserve Economic Data; Bloomberg Finance L.P.; MSCI; and IMF staff calculations.

Note: Panel 1 shows the response to the following question in JLL Research's Real Estate Sentiment Survey: "Over the next six months, do you think market conditions will improve, stay the same, or worsen?" Panel 2 illustrates the indexed performance of MSCI IMI Liquid Real Estate indices for Europe (excluding the United Kingdom), the United Kingdom, and the United States. These indices track the performance of publicly traded real estate securities, offering a liquid proxy for regional real estate dynamics. Index values are normalized to December 2019. The last observation is for September 2025. Panel 3 displays a two-year moving average of quarterly capitalization rates for four major US commercial real estate sectors. Capitalization rates are calculated as the ratio of net operating income to property value, proxying real estate yields. In panels 1 and 3, the last observation is for the second quarter of 2025. ex. = excluding; IMI = Investable Market Index.

market sentiment. Finally, CRE capitalization rates in the United States have increased in office and retail segments, suggesting that new CRE investors will likely demand lower property prices before they invest (Figure 1.1.2, panel 3). This repricing process makes refinancing of CRE debt more challenging at a time when a substantial volume of US CRE debt is due to mature in a higher interest rate environment (see the April 2025 *Global Financial Stability Report*).

Similar to CRE, after rising strongly immediately after the COVID-19 pandemic and then being weighed down by higher interest rates in 2022 and 2023, residential real estate markets are entering a phase of uneven recovery. In some advanced economies, price growth has resumed modestly, supported by falling interest rates (Figure 1.1.3, panels 1 and 2). Where household leverage and debt-servicing capabilities have eased, real home prices have in some cases also demonstrated stronger growth (Figure 1.1.3, panel 3). This indicates that less-constrained borrowers are also more likely to support housing demand through increased credit uptake, thereby reinforcing price momentum, although the relationship varies considerably across countries.

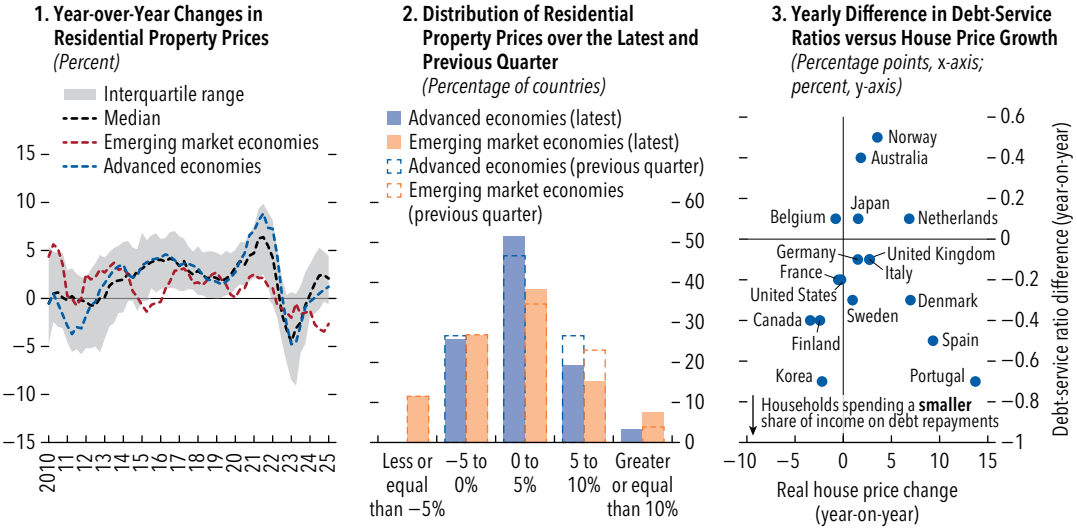
Box 1.1 *(continued)*

Figure 1.1.3. Residential Real Estate Activity

Residential real estate markets globally are entering a phase of uneven recovery.

Some emerging market economies are facing extended declines.

Lower debt-service burdens are associated with stronger real house price growth.



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

Note: In panels 1 and 2, advanced and emerging market economies are calculated by the Bank for International Settlements, using rolling GDP and purchasing power parity exchange rate weights. In panels 1, 2, and 3, the last observation for real house prices is for the first quarter of 2025. In panel 3, the last observation for debt-service ratios is for the fourth quarter of 2024.

Box 1.2. Low Interest Rates in China Could Imperil Bank Profits and Lending

Since 2022, China's economy has endured relatively weak growth compared with historical rates and sustained low inflation (IMF 2024, 2025b). In response, the People's Bank of China has lowered key interest rates to stimulate growth, bringing the benchmark policy rate down to 1.4 percent from 2.2 percent three years ago. Meanwhile, bond yields have fallen to near historical lows. This decline in interest rates has weighed on banks' margins and profitability. Such erosion, combined with banks' ongoing challenges to generate capital organically (for example, through retained earnings) could imperil bank balance sheets and stifle credit supply, raising financial stability concerns as well as imperiling China's economic growth.

Banks' profitability pressures have intensified amid continued margin compression. Average net interest margins across the banking system declined to a historic low of 1.42 percent in the second quarter of 2025, as the benchmark seven-day reverse repo rate also reached a historical low (Figure 1.2.1, panel 1). The deposit spread—proxied by the gap between the one-year China government bond yield and the one-year time deposit rate—compressed sharply in late 2024 as bond yields fell faster than deposit rates, underscoring pressure on asset yields. The loan spread (China's one-year loan prime rate minus one-year government bond yield) has remained elevated (around 150 basis points), suggesting that banks have sought to partially offset the erosion in asset yields by maintaining loan rates at a relatively high level to preserve profitability (Figure 1.2.1, panel 2).

If this erosion in asset yields were to persist, banks' equity base might weaken, hindering the sector's ability to withstand negative shocks. Weighed by net interest margins, both return on equity and return on assets for the banking sector have declined, falling to 8.2 percent and 0.63 percent in the second quarter of 2025, near their lowest in a decade, compared with 8.9 percent and 0.69 percent a year earlier (Figure 1.2.1, panel 3). This decline in nominal rates could constrain lending—a scenario known as "reversal interest rates," whereby persistently low rates cut into banks' profits and capital base, curbing lending, despite accommodative monetary policy (Abadi, Brunnermeier, and Koby 2022; Wang 2025). Currently, capital buffers at the largest banks are adequate (IMF 2025b). Still, despite such buffers and low rates, loan growth at these banks has slowed below the five-year average on subdued demand (Figure 1.2.1, panel 4). Earlier this year, the authorities injected 500 billion yuan (or about $69 billion) of capital into large state-owned banks to help expand lending capacity, reflecting concerns that declining profitability could constrain credit supply. Such concerns underscore the difficult trade-offs policymakers face as they ease rates to low levels: whereas low rates support growth in the short term, sustained low rates could weaken bank profitability and reduce lending capacity over time.

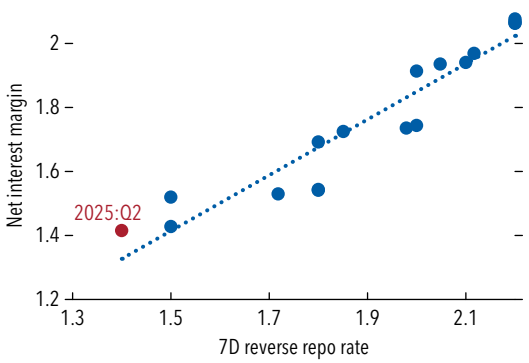
This box was prepared by Sally Chen, Lawrence Tang, and Jing Zhao.

Box 1.2 *(continued)*

Figure 1.2.1. Low Interest Rates Have Weighed on Bank Profitability in China

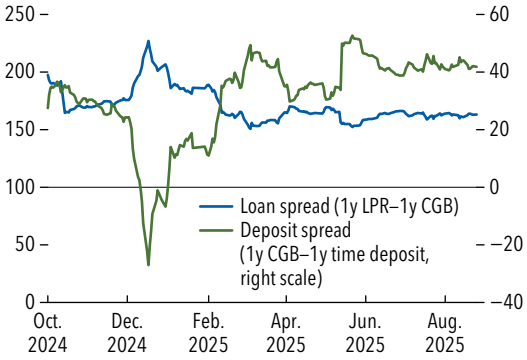
The net interest margin is at a historical low ...

1. Banks' Net Interest Margin and the Seven-Day Repo Rate, First Quarter of 2021 to the Second Quarter of 2025
(Percent)



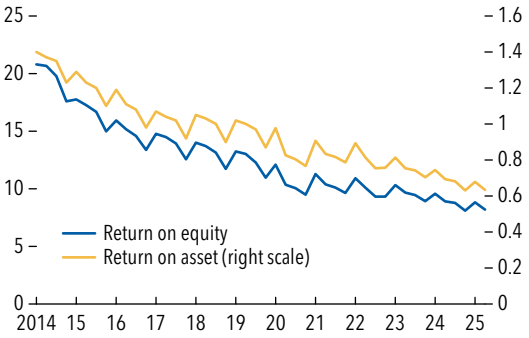
... while deposit income has fallen and loan spreads are stable.

2. Deposit Income versus Loan Spreads
(Basis points)



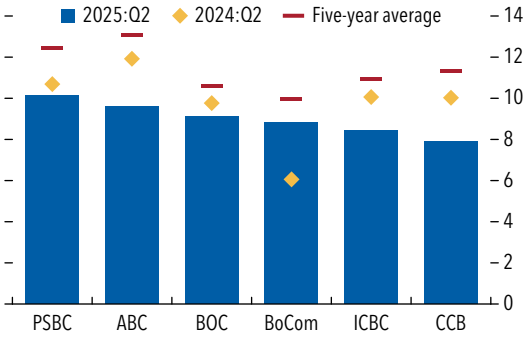
Bank profitability is at a 10-year low ...

3. Return on Assets and Equity
(Percent)



... and loan growth has slowed.

4. Loan Growth at Large Banks
(Percent; year-over-year)



Sources: Bloomberg Finance L.P.; CEIC; J.P. Morgan; and WIND.

Note: In panels 1 and 3, net interest margin, return on equity, and return on assets reflect data for the entire banking sector in China. In panel 2, the one-year time deposit rate is estimated by J.P. Morgan, currently at 0.95 percent, while the PBOC's official benchmark one-year deposit rate stands at 1.5 percent, which is generally viewed as the ceiling, and the one-year lending prime rate, which is a weighted average of rates submitted by 20 quoting banks, stands at 3 percent currently. In panel 4, the loan growth analysis focuses on the six largest state-owned banks: Postal Savings Bank of China (PSBC), Agricultural Bank of China (ABC), Bank of China (BOC), Bank of Communications (BoCom), Industrial and Commercial Bank of China (ICBC), and China Construction Bank (CCB). CGB = China government bond; LPR = loan prime rate; Q = quarter.

Box 1.3. Banks and Insurers Are Deepening Ties with the Private Credit Ecosystem

The exponential growth of private credit has raised concerns that credit provision is migrating from strictly regulated banks and relatively transparent public markets to the comparatively lightly regulated and opaque private credit industry. The emerging financial system, however, is marked by intertwined operations whereby traditional institutions like banks and insurers, as well as alternative nonbanks like private credit funds, are not substitutive entities but instead part of an increasingly integrated system. Recent partnerships among the private credit industry, banks, and insurers highlight that cooperation can generate significant economic benefits for the parties involved. To realize these benefits for the broader economy, adjustments to supervisory and regulatory approaches are needed to address the buildup of risks across sectors and borders.

Banks

In the past decade, the private credit industry has built a sizable channel for raising long-term capital from institutional investors. The "patient" nature of capital in most private credit balance sheets gave it a competitive advantage in originating and retaining credit in the riskiest areas, like leveraged finance to middle-market borrowers or subordinated debt to commercial real estate transactions—areas often avoided by strictly regulated banks. To tap into other types of clients and credit products, several private credit managers have entered more than 20 partnerships with banks in various countries in the last three years. Larger private credit managers have been partnering with global banks with a wide network of clients (in particular, global systemically important banks) or smaller banks with deep expertise in a particular lending niche (for example, asset-based finance). Such partnerships often aim to distribute private credit products to banks' wealth management clients or create channels for banks to offload capital-intensive assets to private credit funds, in line with sales of banks' loan portfolios or the growing trend of synthetic risk transfers (see the October 2024 *Global Financial Stability Report*). Smaller private credit managers look for anchor bank partners to back their growth by providing leverage to their private credit funds and strengthening their pipeline of lending deals.

Many partnerships assume the "originate-to-distribute" model that relies on banks' network of potential borrowers: banks earn fees for originating and servicing corporate loans and asset-based finance, which are consequently booked in private credit funds (for example, forward-flow origination). Often, such partnerships are complemented by an agreement that banks provide leverage to engaged private credit funds and additional banking services to private credit borrowers, including revolving lines of credit. Although such partnerships in principle are beneficial for banks and private credit managers, they have not yet been tested over time. Some market participants raise concerns that the partnerships may lead to looser underwriting standards and weaker loan monitoring.

Insurance Companies

Private credit has long been an important component of insurers' portfolios, especially in North America, where it represents about one-third of total investments (Figure 1.1.3, panel 1). Private credit instruments offer insurers additional spread for illiquidity and supply long-duration assets to match their long-term liabilities. However, increasing exposure to private credit requires advanced asset-liability management to account for higher asset illiquidity, policy surrender risk, and single-name concentrations. Whereas some private credit investments represent simple credit originated by nonbank lenders, a significant and growing portion of insurers' private credit portfolios is in structured instruments providing leverage to the high-yielding part of the private credit ecosystem: for example, securitized products (such as middle-market collateralized loan obligations and commercial real estate collateralized loan obligations), fund financing through feeder notes, collateralized fund obligations, and private placements of private credit funds' debt. A growing share of insurers' private credit exposure is sourced through either affiliated private credit managers or partnerships with private credit managers, which requires special attention because of potential conflicts of interest and the lack of transparency (Cortes, Diaby, and Windsor 2023).

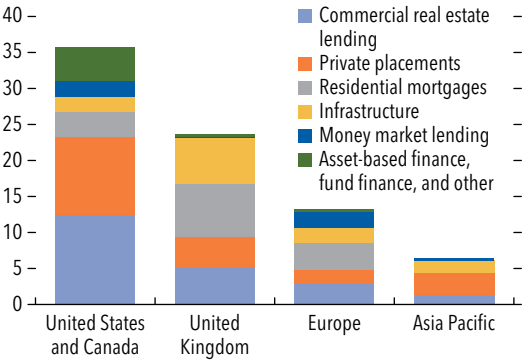
Most insurers' exposure to private credit is classified as investment grade, and many private credit instruments would be much less appealing if classified as below investment grade. The investment-grade status allows favorable risk-capital treatment and considers the instruments' cash flows sufficiently reliable to qualify for asset-liability matching. Insurers' search for private credit exposures classified as investment

Box 1.3 *(continued)*

Figure 1.3.1. Insurers' Exposure to Private Credit

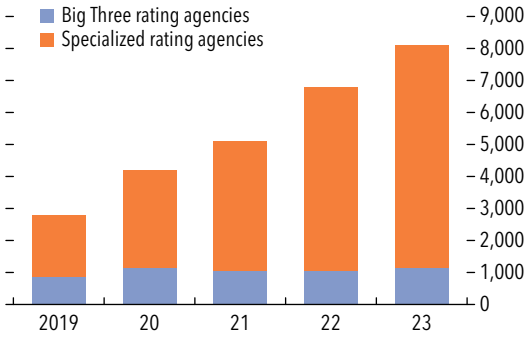
Insurers have diverse exposure to private credit instruments, especially in North America and the United Kingdom.

1. Moody's Survey of Insurers' Average Positions in Private Credit Instruments
(Percent of total investments)



Private ratings have been growing in number and importance in the United States.

2. Privately Rated Securities Held by US Insurers
(Number)



Sources: Moody's; NAIC; and IMF staff calculations.

Note: Panel 1 refers to Moody's 2024. In panel 2, the "Big Three rating agencies" are Moody's Investors Service, Standard & Poor's, and Fitch Ratings.

grade has changed the rating landscape in the United States, with an increasing share of the assessment being conducted by smaller rating agencies specializing in the private credit ecosystem (Figure 1.3.1, panel 2).

Misclassification of below-investment-grade instruments into the investment-grade bucket may result in default losses significantly exceeding those expected during an economic shock, leading to the erosion of insurers' capital and potentially causing liquidity gaps because of insufficient cash flow from the defaulted entities. Because reliable private ratings are key for insurers' prudential regulation, it is imperative to keep the risk of inflated ratings minimal by ensuring the soundness of private rating assessments and requiting adequate transparency of methodologies and reports.

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CHAPTER 2

RISK AND RESILIENCE IN THE GLOBAL FOREIGN EXCHANGE MARKET

Chapter 2 at a Glance

- The global foreign exchange (FX) market plays a key role in the international monetary and financial system, and its smooth functioning is essential for maintaining global financial stability.
- Structural shifts, such as the increasing involvement of nonbank financial institutions (NBFIs) and growing trade in derivatives, offer benefits but may also raise the global FX market's vulnerability to adverse shocks.
- This chapter finds that increased macrofinancial uncertainty can strain FX market conditions by significantly raising funding costs, impairing liquidity, and amplifying excess exchange rate return volatility.
- The effect of shocks is more pronounced for emerging markets and for currencies with high NBFI participation, concentrated dealer networks, and elevated hedging activity.
- FX market stress can spill over to other asset classes, tightening financial conditions and posing risks to macrofinancial stability—especially in countries with significant currency mismatches and fiscal vulnerabilities.
- Outages in critical payment systems and risk of settlement failure significantly impair market liquidity and increase excess exchange rate return and its volatility, raising the cost of FX transactions.
- Amid elevated uncertainty and a shifting global economic landscape, investor strategies are evolving. Following the US tariff announcements in early April 2025, investors in some countries reduced their US dollar holdings, whereas others maintained exposures, highlighting diverging cross-country responses.

Key Policy Recommendations

- Enhance FX market surveillance through systemic risk monitoring, stress testing, and scenario analysis to capture liquidity shocks and spillovers.
- Close critical FX data gaps by improving reporting and transparency, especially in regard to NBFIs and bilateral exposures outside centralized infrastructures.
- Ensure robust liquidity and capital buffers, backed by effective safeguards, such as access to central bank liquidity with proper oversight, sufficient international reserves, and expanded central bank swap lines.
- Strengthen operational resilience of financial market infrastructures and financial institutions through cyber risk frameworks, contingency planning, and coordinated oversight.
- Reduce settlement risks and market inefficiencies in over-the-counter FX markets by encouraging payment-versus-payment adoption and exploring digital innovations to develop interoperable financial platforms.

Introduction

The global foreign exchange (FX) market is a cornerstone of the international monetary and financial system. With an average daily turnover exceeding $9.6 trillion, the FX market has grown over the years into the largest and most liquid financial market in the world (BIS 2025a; Figure 2.1, panel 1). It facilitates cross-border trade and financial transactions by enabling currency conversion and influencing exchange rates.[1] Cross-border transactions account for about two-thirds of global FX market turnover, with the

The authors of this chapter are Yuhua Cai, Andrea Deghi (co–team lead), Seungduck Lee, Taneli Mäkinen, Yuan Tian, Tomohiro Tsuruga (co–team lead), and Mustafa Yenice, under the supervision of Mario Catalán and Mahvash Qureshi. Angelo Ranaldo served as an expert advisor.

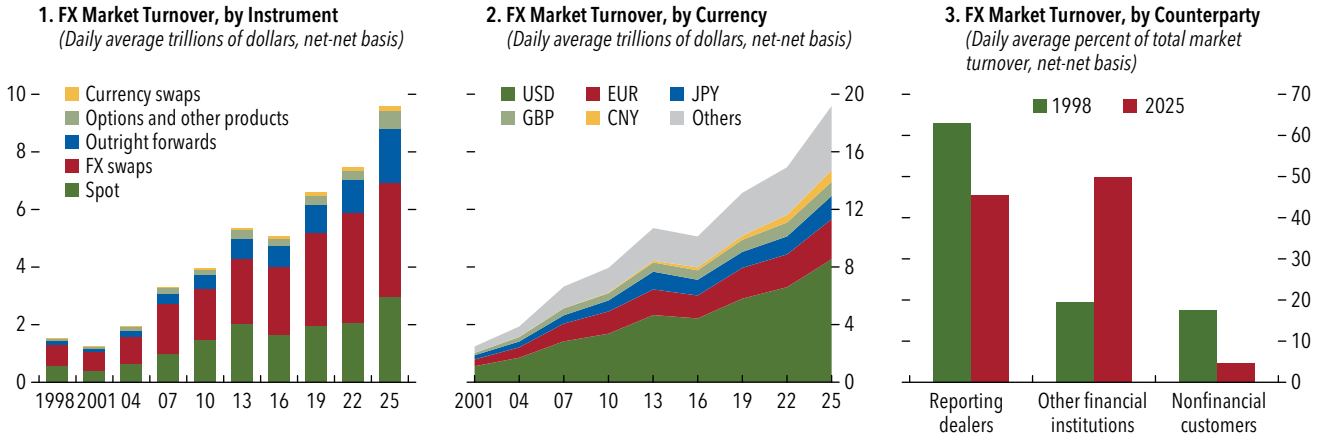
[1]The global FX market is broadly defined as a decentralized global marketplace for trading currencies. It encompasses spot transactions (that is, immediate exchanges of currencies at current rates) and a range of derivative instruments, including outright forwards, FX swaps, currency swaps, and currency options, commonly used for hedging, funding, and speculative purposes. See Online Annex 2.1 for definitions of technical terms.

Figure 2.1. Key Developments in the Global Foreign Exchange Market

The FX market has grown substantially, driven mainly by an increase in swap trades.

The US dollar continues to be the dominant currency in global FX trading.

The shares of participants have shifted, with nonbank financial institutions taking a greater role.



Sources: BIS 2025a; and IMF staff calculations.

Note: Daily averages correspond to April. The BIS Triennial Central Bank Survey (2025a) adjusts figures reported on a net-net basis to correct for double counting in local and cross-border interdealer transactions. In panel 2, because each foreign exchange transaction involves two currencies, the sum of the individual currencies is twice that of the total turnover involved. CNY = Chinese yuan; EUR = euro; FX = foreign exchange; GBP = British pound; JPY = Japanese yen; USD = US dollar.

US dollar being the dominant trading currency (BIS 2022; Figure 2.1, panel 2).

The structure of the global FX market has evolved across multiple dimensions, including the diversification of market participants, the expansion of traded instruments, and broader changes in the FX trading ecosystem (Schrimpf and Sushko 2019; Chaboud, Rime, and Sushko 2023; Chaboud and others 2024). For example, whereas trading in the 1990s took place mostly between large dealers, such as commercial and investment banks, nonbank financial institutions (NBFIs) have since become increasingly important players (Figure 2.1, panel 3).[2] The share of spot trading has declined, whereas the use of derivatives, especially FX swaps, mostly for funding and hedging currency risk, has grown notably (Figure 2.1, panel 1). The number of execution methods and trading platforms has also expanded with the increasing electronification of the market.

These shifts in the FX market have enhanced competition and efficiency but have also introduced challenges for macrofinancial stability. For example, increasing NBFI participation contributes to more diversity in FX markets, potentially increasing liquidity, reducing transaction costs, and strengthening price discovery and risk sharing. However, many NBFIs are subject to less regulatory oversight than traditional banks and may lack access to central bank facilities. NBFI trading strategies, often driven by leverage, short-term arbitrage, and high-frequency trading, can amplify market swings and shift inventory risk onto market-making dealers.[3] Moreover, many NBFIs (such as mutual funds) exhibit liquidity mismatches, funding longer term or less liquid assets with short-term liabilities. This structural fragility can heighten systemic risk during market volatility, as tighter funding conditions and rapid unwinding of positions may amplify liquidity pressures in FX markets (see the October 2022 and April 2023 issues of the *Global Financial Stability Report*; FSB 2025).

The growing use of FX derivatives has enhanced liquidity and risk management by enabling institutions to hedge currency exposures and access foreign currency funding. However, it has also facilitated leveraged investments and increased interconnectedness. During stress, margin calls and forced deleveraging can amplify volatility and liquidity strains (Borio,

[2]The decline in FX activity by nonfinancial firms suggests that trade plays a more limited role than financial flows in driving FX transactions.

[3]Under stress, algorithmic and high-frequency traders often withdraw, reducing liquidity and amplifying volatility (BIS 2020).

McCauley, and McGuire 2022; Nenova, Schrimpf, and Shin 2025). Moreover, the opacity of over-the-counter derivatives markets, which dominate FX trading, complicates risk monitoring for regulators and central banks, potentially obscuring the buildup of systemic risks.[4]

Compounding these challenges are two structural vulnerabilities: high dealer concentration and currency mismatches. Nearly half of global FX turnover is intermediated by a small group of dominant dealers—mostly large, regulated banks—leaving the market exposed should these institutions scale back activity during stress (BIS 2022).[5] Meanwhile, persistent currency mismatches, in which liabilities and assets are in different currencies, drive sustained demand for short-term FX derivatives, increasing rollover and funding risks when conditions tighten (FSB 2022). Disruptions in these markets can sharply raise hedging costs, prompting the unwinding of positions that reinforce volatility and further elevate costs.[6]

In addition to structural fragilities, the global FX market is exposed to a range of external and operational risks. The market's central role in global finance makes it highly sensitive to macroeconomic developments and policy shifts that influence cross-border trade and financial flows and affect currency valuation. For example, an increase in macroeconomic uncertainty can change investor risk sentiment and interest rate expectations, triggering rapid portfolio adjustments, liquidity strains, and volatility (see, for example, Berger, Chaboud, and Hjalmarsson 2009).[7] These shocks can interact with underlying vulnerabilities, such as dealer concentration and currency mismatches, magnifying stress and propagating instability across financial markets. Historical episodes of elevated global macrofinancial uncertainty show that FX funding and market liquidity pressures, reflected in wider cross-currency bases (a measure of deviation from the covered interest parity, or CIP), bid-ask spreads, and excess exchange rate return volatility, tend to rise with uncertainty (Figure 2.2).[8]

These FX market dynamics are especially relevant in today's conditions of elevated policy uncertainty and a shifting global macrofinancial landscape. Structural changes in global trade and financial flows, driven by evolving trade policies, supply chain realignments, and geopolitical considerations, may be reshaping currency demand and FX market behavior (*External Sector Report* 2025; Box 2.1). At the same time, heightened uncertainty around these developments raises the risk of abrupt shifts in investor sentiment and expectations, affecting capital flows and FX market conditions, particularly in economies with less liquid FX markets.

Moreover, the expansion of FX trading has heightened exposure to settlement risk: the possibility that one party will deliver its currency without receiving what the counterparty owes. This risk is particularly acute in cross-border transactions, in which time zone differences and operational delays can lead to failed settlements and trigger liquidity shortfalls and systemic stress. Although certain risk mitigation arrangements, such as payment-versus-payment (PvP), have been adopted over the years, most emerging market currencies remain outside these frameworks.[9] With the growing prominence of emerging market currencies in the global FX market (Figure 2.1, panel 2), their exclusion from such mechanisms leaves a substantial portion of

[4]Other changes in the FX ecosystem, such as trading platform proliferation and increased electronification, have improved market access, speed, and transparency but have also added complexity, fragmentation, and operational risk. For example, algorithms help align prices in stable market conditions, but they can break down during volatility, generating price discrepancies and a flight to more liquid platforms ("liquidity mirage"; BIS 2020). Electronification can also deepen informational asymmetry, giving technologically advanced traders an edge and distorting price discovery (Ranaldo and Somogyi 2021).

[5]During stress episodes, regulatory constraints can limit dealer capacity, further reducing liquidity, raising transaction costs, and impairing trade execution (Aldasoro, Huang, and Tarashev 2021; Huang and others 2025).

[6]See, for example, Borio and others (2016); Barajas, Deghi, Raddatz, and others (2020); Du and Schreger (2022); and Kloks, Mattille, and Ranaldo (2023).

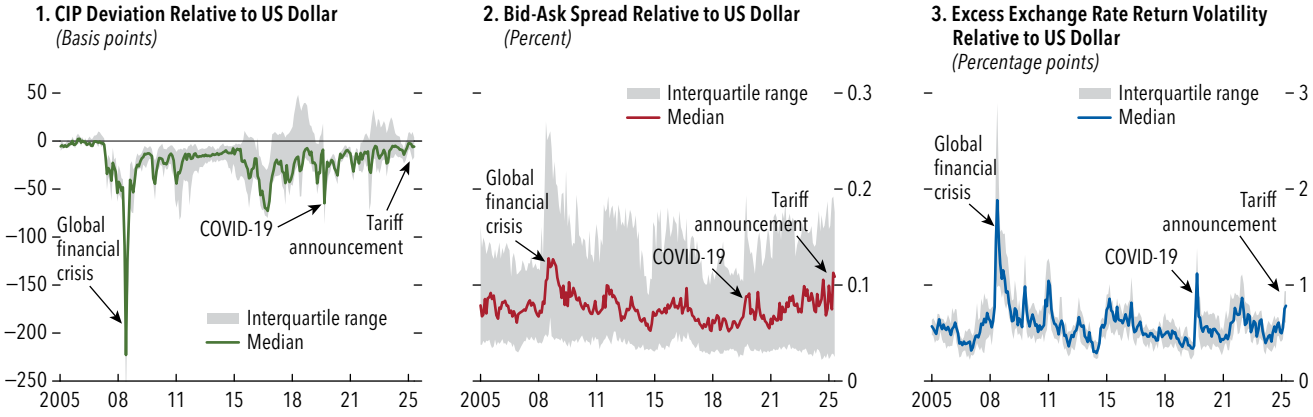
[7]Geopolitical disruptions, such as armed conflicts or sanctions, can also have an impact on FX markets by affecting cross-border trade and financial flows (April 2023 and April 2025 issues of the *Global Financial Stability Report*; Hui 2021; Hossain, Masum, and Saadi 2024).

[8]The cross-currency basis measures the CIP deviation, reflecting the cost of swapping one currency for another; a widening basis signals stress in FX funding markets. The bid-ask spread captures the difference between the prices at which a dealer is willing to buy (bid) and sell (ask) a currency; wider spreads suggest reduced market liquidity and higher transaction costs. Excess exchange rate return volatility reflects the movement in returns unexplained by macroeconomic fundamentals; it captures the influence of factors like shifts in investor sentiment, liquidity conditions, or risk aversion.

[9]The CLS foreign exchange settlement system reduces settlement risk for 18 currencies through its PvP mechanism, which settles both sides of an FX transaction simultaneously. Some regional PvP systems offer similar functionality for select currencies traded against the US dollar but lack global integration, limiting efficiencies. Many currencies remain outside PvP systems because of technical, regulatory, and economic constraints (Glowka and Nilsson 2022).

Figure 2.2. Macrofinancial Uncertainty and Foreign Exchange Market Conditions

Foreign exchange funding and market liquidity conditions deteriorated significantly during the global financial crisis and the COVID-19 market turmoil.



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

Note: In panel 1, CIP deviation is calculated using three-month overnight index swap rates for 12 currencies against the US dollar. A negative widening basis signals stress in dollar funding markets. Panel 2 shows the bid-ask spread calculated as [(ask rate − bid rate)/mid rate] × 100. Wider spreads suggest reduced market liquidity. In panel 3, excess exchange rate return = log(exchange rate at time t/exchange rate at time $t-1$) − log(forward rate at time $t-1$/exchange rate at time $t-1$). In all panels, "tariff announcement" refers to the April 2, 2025, US declaration of new import tariff rates. See Online Annex Figure 2.3.1 for details on the construction of the measures used in this figure and illustrations by country group (that is, advanced economies and emerging market economies). CIP = coverage interest parity.

FX transactions exposed to settlement risk (Box 2.2). This exposure is exacerbated by the risk of operational disruptions to FX market infrastructure: technical failures, cyberattacks, or power outages could impair FX market functioning, generating liquidity strains and volatility and making delayed or failed settlements more likely.[10]

Stress in FX markets can spill over to markets for other asset classes, posing risks to macrofinancial stability. Elevated FX volatility and hedging costs, reflected in wider cross-currency bases, raise uncertainty and the cost of managing currency exposure, potentially affecting yields and risk premiums. Higher funding costs can also erode the intermediation capacity of financial institutions, tighten financial conditions, and amplify systemic stress, triggering an adverse macrofinancial feedback loop (Adrian and Shin 2014).[11]

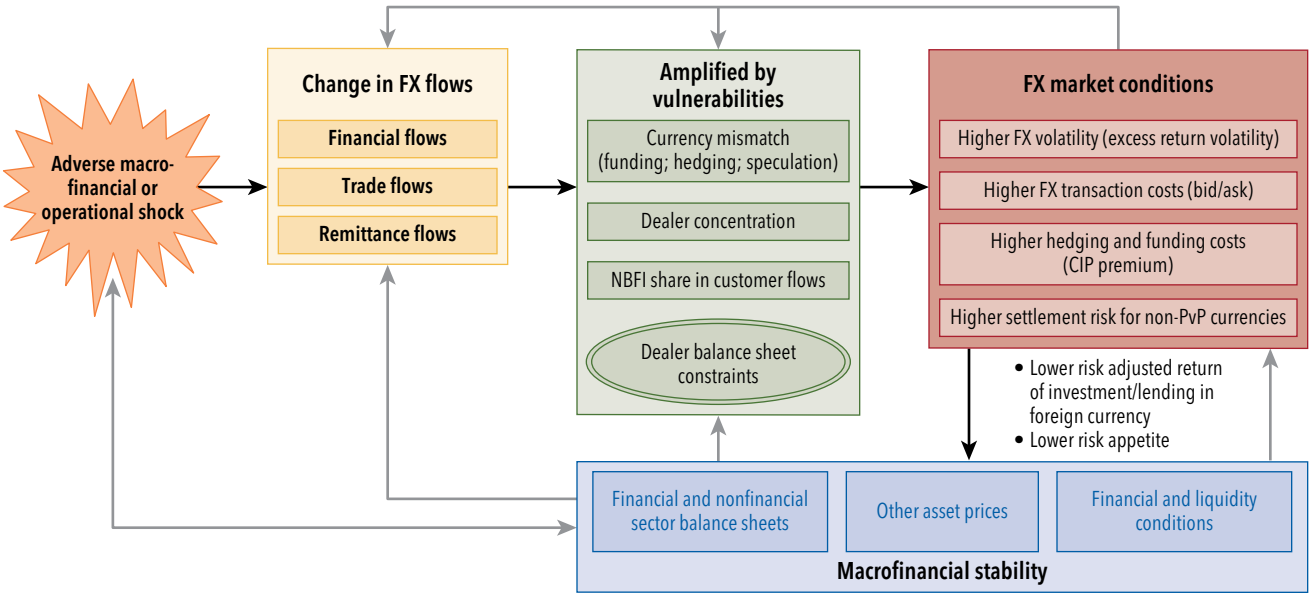
[10]Recent examples of operational disruptions to critical payment infrastructure include the 2018 Fedwire cyber incident and the 2000 and 2025 TARGET2 outages. Even as contingency measures within FX settlement infrastructure helped prevent systemic fallout, these events revealed operational fragilities and the importance of resilient and coordinated backup systems (Khiaonarong, Leinonen, and Rizaldy 2021).

[11]See, for example, Bruno and Shin (2015); Du, Tepper, and Verdelhan (2018); Hofmann, Shim, and Shin (2020); Greenwood and others (2023); and Liao and Zhang (2025) for discussions of the different channels through which tighter FX market conditions may be transmitted to the broader financial system.

Against this backdrop, this chapter explores recent developments, vulnerabilities, and risks in the global FX market and discusses policy options for mitigating the risks. This chapter begins with a conceptual framework for how shocks stemming from macrofinancial uncertainty or operational disruptions can affect FX market conditions and financial stability. It then presents stylized facts on the evolution of FX markets, covering key currencies, participants, and interconnectedness. Next, it empirically analyzes three key questions: (1) How do different macrofinancial uncertainty shocks affect FX trading across market participants? (2) How do these shocks influence FX market conditions, as measured by cross-currency basis, excess exchange rate return volatility, and bid-ask spreads, and are the effects amplified by structural market fragilities? (3) Does FX market stress spill over into other financial markets, such as those for sovereign bonds and equities, with broader implications for financial stability?

To address these three key questions, this chapter draws on a unique data set covering FX spot and swap transactions across major advanced economies and emerging market economies. The data, sourced from CLS Group, provide daily and weekly information from January 1, 2015, to May 31, 2025, on FX flows and pricing for 18 major currencies, disaggregated by four institutional sectors: banks, investment funds, other

Figure 2.3. Shock Transmission to Foreign Exchange Market Conditions and Macrofinancial Feedback Effects



Source: IMF staff.

Note: Black arrows in the figure indicate the direct transmission channels. CIP = covered interest parity; FX = foreign exchange; NBFI = nonbank financial institution; PvP = payment versus payment.

NBFIs, and nonfinancial firms.[12] Macrofinancial uncertainty is captured using three commonly used indicators: the Chicago Board Options Exchange Volatility Index (VIX), the Merrill Lynch Option Volatility Estimate (MOVE) index, and the economic policy uncertainty (EPU) index of Baker, Bloom, and Davis (2016).

Macrofinancial Shocks and the Global Foreign Exchange Market: A Conceptual Framework

The global FX market, as a decentralized, mostly over-the-counter arena, enables continuous and flexible trading across time zones. It draws on a wide range of participants, including dealers (banks and NBFIs that act as market makers), nondealer banks and NBFIs, nonfinancial firms, central banks, and retail investors. It is broadly segmented into spot and derivatives markets, each catering to different investment horizons, risk profiles, and participant needs.

An increase in global macrofinancial uncertainty can trigger significant shifts in cross-border trade and financial activity, with direct implications for FX flows and market conditions (Figure 2.3). For example, a surge in financial uncertainty, often captured by the VIX, which measures option-implied volatility in the US stock market, can dampen investor risk appetite and prompt a flight to quality, with investors reallocating portfolios toward safer assets, such as those denominated in US dollars (Figure 2.3; Caballero and Krishnamurthy 2008).[13]

Rebalancing of this type increases demand for dollar-denominated assets while leading to the unwinding of positions in other currencies. Concurrently, financial institutions outside the United States, such as nondealer banks, investment funds, and insurers, may seek to hedge their increased dollar exposures using FX swap contracts, which involve buying US dollars in the spot leg of a contract while agreeing to sell them back in the forward leg of the contract. Dealer banks that intermediate the transactions involved in these contracts must expand their balance sheets to meet the increased demand, often borrowing dollars

[12]Online Annex 2.2 provides further details on CLSMarketData and the sample of economies included in the analysis.

[13]US-dollar-denominated safe assets have long anchored the international monetary system, reflecting the dollar's central role in global trade and finance. Although geopolitical and economic shifts could affect the use of international reserve currencies and the dollar's status as a global safe asset, evidence of any significant structural change in recent months remains limited (Chapter 1; *External Sector Report* 2025, Chapter 2).

in the process. This can be costly when regulatory constraints limit dealer banks' ability to supply liquidity.[14] As a result, the cost of these swaps rises and the cross-currency bases between the dollar and other currencies widen, effectively placing a limit on the extent of portfolio rebalancing by tightening FX market conditions.[15]

Portfolio rebalancing triggered by a shock can create a vicious cycle. In addition to their use for hedging, FX swaps are used for speculation, such as carry trades, and for short-term dollar funding of longer-term asset positions, a form of maturity transformation (October 2019 *Global Financial Stability Report*). When the US dollar–foreign currency basis widens, it signals rising costs and reduced availability of dollar funding, particularly for institutions outside the United States. The funding strains imposed by these changes can force unhedged exposures or asset sales, increasing market volatility. Heightened volatility, in turn, may fuel investor risk aversion and flight to safety, intensifying demand for safe assets and FX swaps, further widening the cross-currency basis and deepening funding stress (Huang and others 2025).[16] The resulting feedback loop pressures dealer balance sheets and constrains dealers' ability to absorb risk, amplifying systemic risk and disrupting global financial intermediation. Such transmission effects can be mitigated by requiring financial institutions to hold adequate foreign currency liquidity buffers and stable dollar funding such as customer deposits. In addition, historical episodes of high macrofinancial uncertainty, such as the global financial crisis and the COVID-19 market turmoil, have highlighted the importance of central bank interventions, including those through dollar liquidity swap lines, for breaking cycles generated by shock-induced portfolio rebalancing and restoring market functioning (Barajas, Deghi, Fendoglu, and Xu 2020; Aizenman and others 2021).

In addition to raising the cost of FX swaps, an increase in uncertainty can make the global FX market less liquid and volatile. As financial uncertainty increases, it can become more costly for dealers to hold foreign currencies, raising the cost of facilitating trades in the global FX market. This is partly because the rising risk of large losses from adverse exchange rate movements requires banks to hold more capital as a safety buffer.[17] The expense of holding this additional capital is passed on to customers through wider bid-ask spreads: the gap between the prices at which dealers can buy and sell foreign currencies. Wider spreads make trading more expensive, discouraging participation and making markets less liquid. With fewer trades taking place, prices can swing more sharply in response to even small orders. This can lead to another vicious cycle: higher volatility leads to wider spreads, which reduces trading and amplifies market volatility.

Structural market fragilities can amplify the transmission of global shocks to FX market conditions (Figure 2.3). For example, when market making is concentrated among a small number of dealers, regulatory constraints arising from sharp declines in asset prices are more likely to lead to funding and liquidity stress, with broader market implications. Similarly, when market participants have smaller liquidity buffers or greater leverage, as some types of NBFIs often do, they are more likely to engage in procyclical market behavior, which can amplify the impact of a shock on FX market conditions. In addition, larger underlying FX mismatches across institutions increase the latter's reliance on FX swaps for hedging, resulting in more pronounced portfolio adjustments when cross-currency bases widen.[18]

Stress in FX markets can be transmitted to the broader financial system and the real economy through various channels. Elevated FX funding costs, reflected in a widening of cross-currency bases, can reduce the profitability of financial institutions facing capital

[14]During periods of broad market volatility, dealer banks may face tighter balance sheet constraints because of a rise in demand for intermediation and a decline in asset values, making it harder for them to meet regulatory requirements for leverage and limiting their ability to support FX swap markets.

[15]In addition, informational asymmetries in FX markets, in which some participants know more than others, mean that large customer trades can signal valuable information. Dealers may interpret the flows involved in these trades as reflecting private insights or strategic intent, prompting them to adjust prices or positions, which can trigger broader market reactions, increasing volatility, widening spreads, and reducing liquidity.

[16]When volatility rises, arbitrage mechanisms that normally keep prices aligned across venues and instruments can break down. Tighter balance sheet constraints increase the cost of providing liquidity and deter arbitrage, allowing price gaps to persist, distorting pricing, and amplifying market pressure.

[17]Specifically, the increased risk of sharp exchange rate losses can raise dealer banks' value-at-risk estimates—measures of how much a portfolio could lose over a set time period with a given level of confidence—which are used to calculate regulatory capital requirements.

[18]Eguren-Martin, Busch, and Reinhardt (2024) find that UK banks with greater currency mismatches—that is, those more reliant on FX swaps for US dollar funding and hedging of exchange rate risk—respond to a widening cross-currency basis by cutting back cross-border foreign currency lending more aggressively than banks with matched exposures.

constraints such as leverage ratio requirements. As capital constraints tighten, such institutions may respond by deleveraging, contracting their balance sheets and selling risky assets, including stocks and corporate bonds in local currencies.[19] A wider cross-currency basis also implies a higher cost of hedging FX risk embedded in long positions of US-dollar-denominated assets, prompting institutions to reduce their hedge ratios—the proportion of their foreign currency risk exposure covered by hedging instruments—and take on greater FX risk. Market participants may mitigate this risk through self-insurance strategies, increasing their holdings of safer and more liquid assets. As a result, demand for sovereign bonds, particularly those of short duration, can increase, especially in countries with stronger fiscal fundamentals. This increased demand can exert downward pressure on bond yields.[20]

Market liquidity and exchange rate volatility are also important in the transmission of FX market stress. As noted earlier, higher transaction costs, reflected in wider bid-ask spreads, can discourage market participation and impair the functioning of FX and related asset markets. For financial institutions and firms engaged in cross-border trade and investment, this can translate into reduced access to hedging instruments and trade finance, dampening economic activity. Similarly, excess exchange rate return volatility can increase uncertainty around asset valuations and macroeconomic outcomes, undermining investor confidence and prompting portfolio rebalancing away from riskier assets.[21] In addition, excess volatility can tighten banks' balance sheet constraints, potentially reducing domestic credit provision. Such dynamics would reinforce the feedback loop between FX market stress and broader financial instability.

[19]When risk-weighted capital requirements become more binding, financial institutions may shift toward safer assets, increasing demand for sovereign bonds, which typically carry zero risk weights. In contrast, when leverage constraints tighten, FX market stress is more likely to push local currency sovereign bond yields higher, as institutions face broader funding pressures rather than incentives to rebalance toward low-risk assets.

[20]These dynamics can also spill over into stock and other asset markets through the actions of leveraged investors and financial intermediaries, such as hedge funds, pension funds, and insurers. For example, pension funds with internationally diversified portfolios and local currency defined-benefit liabilities typically hedge FX risk to manage asset-liability mismatches. However, as hedging cost rises, these entities may choose to unwind their foreign positions, transmitting stress from FX markets to other markets, amplifying volatility across asset classes.

[21]Excess exchange rate volatility may also complicate monetary policy transmission, affecting macrofinancial stability.

Beyond macrofinancial uncertainty, operational disruptions can significantly impair FX market functioning and amplify volatility. Outages in trading platforms, messaging systems, or payment and settlement infrastructure can delay trade execution and settlement, increasing market illiquidity and counterparty risk. Although the global FX market's decentralized structure and high substitutability across platforms have implied that disruptions to individual trading platforms, including interdealer platforms, have not been systemic to date, simultaneous outages across multiple platforms, such as those from cyber incidents or power outages, could trigger systemic stress by cutting off access to liquidity and risk management tools (Box 2.3). Similarly, prolonged disruptions to payment systems and settlement infrastructures (for example, CLS; TARGET2; Fedwire; and the Clearing House Automated Payment System) are inherently more disruptive and require robust safeguards and backup arrangements to contain systemic risks.

The Evolving Landscape of the Global Foreign Exchange Market

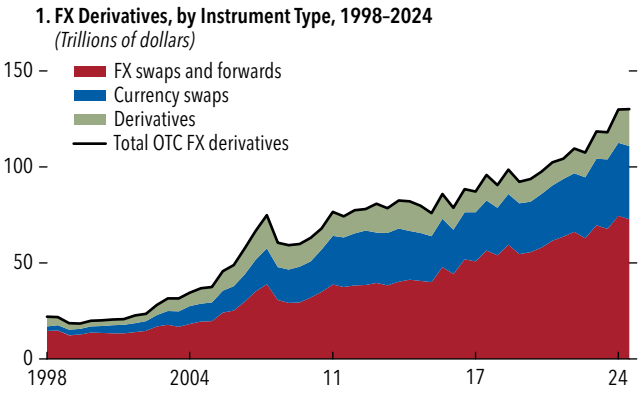
The global FX market has expanded, with average daily trading volumes increasing fivefold since the late 1990s. Growth in FX swap and spot transactions has driven this expansion and accounts for the bulk of trading activity (Figure 2.1, panel 1). FX swap activity has risen notably in recent years, reflecting increased NBFI participation (Figure 2.4, panels 1 and 2). A majority of these swaps are of short duration, typically with tenors up to three months (Figure 2.4, panel 3), highlighting the continuous hedging needs of institutions and the market's role in short-term liquidity management.

The US dollar remains the dominant trading currency in spot and swap markets. About one-fourth of transactions involve the euro against the US dollar, and one-fifth involve the Japanese yen, underscoring the importance of these two currencies among major currency pairs (Figure 2.4, panel 4). However, the euro–US dollar share of total transactions has declined from about one-third in 2015, whereas the share of other currencies relative to the dollar has increased, reflecting a gradual diversification in trading activity.[22]

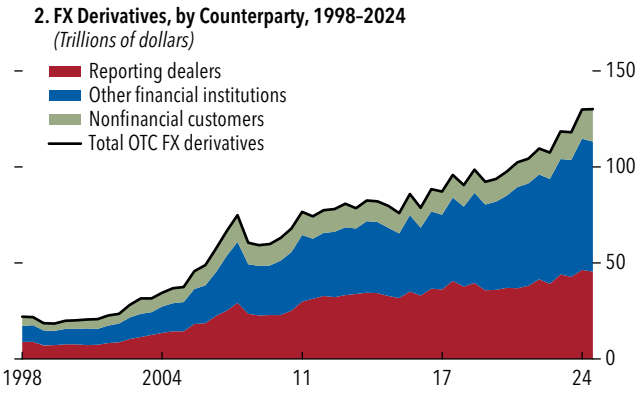
[22]Figure 2.4, panel 4, is based on CLS data and covers FX transactions settled by CLS. As shown in Figure 2.1, panel 2, the share of other currencies, particularly the Chinese yuan, has increased over time. The share of the yuan, however, remains well below China's share in global output and trade.

Figure 2.4. Structure and Trends in the Global Foreign Exchange Market

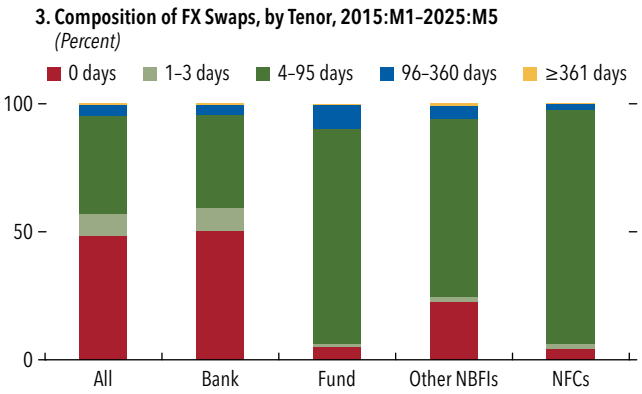
Trading activity in FX swaps and forwards has surged in recent years ...



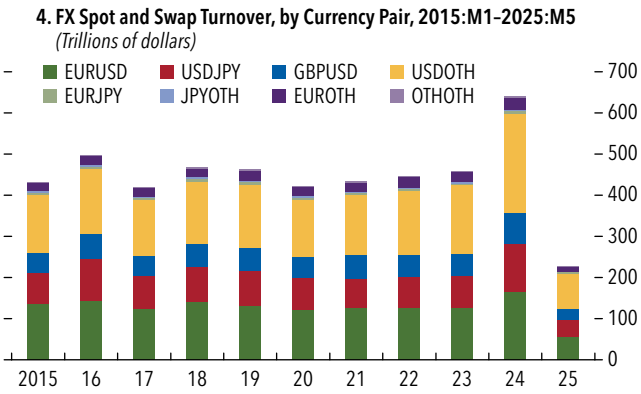
... with the increase driven largely by NBFIs.



A large share of FX swaps have short maturities: three months or less.



The euro and yen dominate FX trading against the US dollar, but the share of other currencies has been rising.



Sources: Bank for International Settlements, OTC Derivatives Statistics; CLS Group; and IMF staff calculations.

Note: Panels 1 and 2 are based on the Bank for International Settlements' OTC Derivatives Statistics and reflect the FX derivatives outstanding by instrument type and counterparty, respectively. Panels 3 and 4 are based on CLSMarketData by CLS Group. Panel 3 indicates the composition of FX swaps by tenor for all swap transactions and transactions disaggregated by market participant, aggregating all swap flow data from January 2015 to May 2025. Panel 4 shows the composition of FX spot and swap transactions aggregated annually by currency pair. EUR = euro; FX = foreign exchange; GBP = British pound; JPY = Japanese yen; M = month; NBFIs = nonbank financial institutions; NFCs = nonfinancial corporation; OTC = over-the-counter; OTH = other currencies; USD = US dollar.

The dollar's relative importance seems to have remained stable through May 2025, with no major shift after the US tariff announcements in early April 2025 (Box 2.1).

A large share of FX transactions takes place between banks (Figure 2.5, panel 1). Among NBFIs, investment funds dominate FX trading, reflecting the funds' growing use of FX instruments for portfolio diversification and risk management (BIS 2025b). Banks remain central to the FX ecosystem, as evident from their high degree of interconnectedness with other market participants (Figure 2.5, panels 2 and 3). Banks in major economies, especially the United States, form the core of the global FX network, whereas their financial and nonfinancial clients typically operate at the periphery.[23]

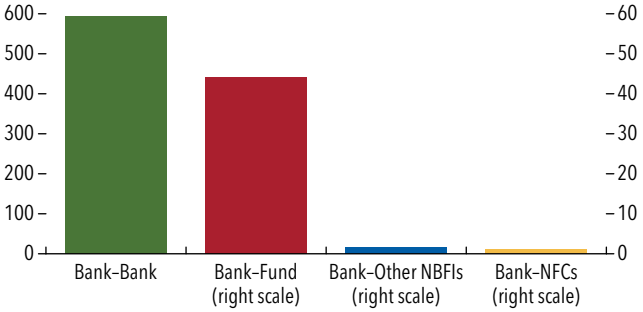
Bank participation in FX trading varies considerably across currency pairs. For example, euro–US dollar transactions are intermediated by US banks as well as by banks in some other major markets, such as France, Germany, and the United Kingdom (Figure 2.5, panel 2). However, yen–US dollar transactions are

[23]Because CLS membership largely comprises major banks, each transaction in the data set is recorded relative to the banking sector. The data thus do not capture the interconnectedness between other institutional sectors, such as that between NBFIs and nonfinancial firms.

Figure 2.5. Bank and Nonbank Financial Institutions' Presence in the Global Foreign Exchange Market

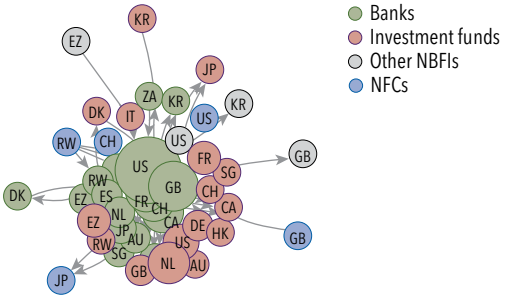
Interbank transactions account for most FX market activity.

1. FX Spot and Swap Turnover, by Counterparty, 2024
(Trillions of dollars)



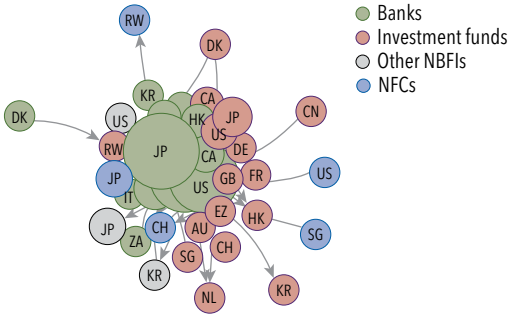
Banks in the United States and in major European economies are dominant in euro–US dollar trades ...

2. Network of Spot Euro–US Dollar Sectoral Trading Activity, 2024
(Share)



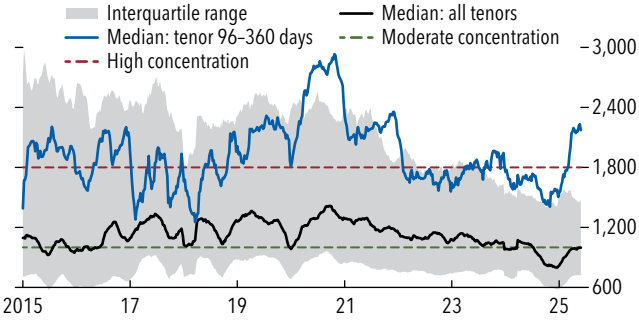
... whereas Japanese and US banks dominate yen–US dollar trades.

3. Network of Spot Yen–US Dollar Sectoral Trading Activity, 2024
(Share)



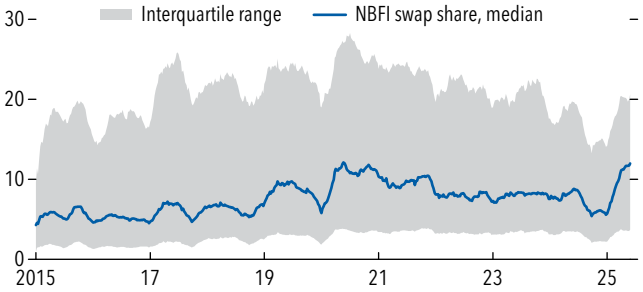
Dealer bank concentration thus varies across currency pairs and instruments.

4. Dealer Concentration in FX Swaps, 2015:M1–2025:M5
(Index)



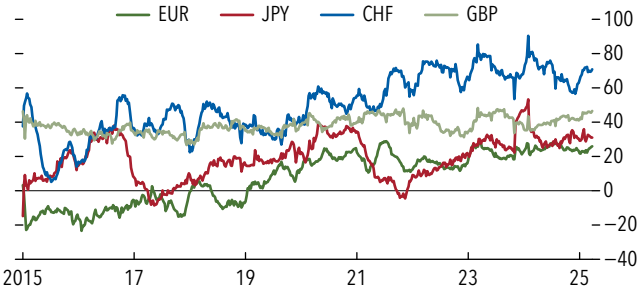
The share of NBFI trading activity also varies by currency pairs ...

5. Share of NBFIs in FX Swaps, by Currency Pair, 2015:M1–2025:M5
(Percent)



... as does NBFI hedging activity.

6. NBFIs' Hedging Pressure, by Currency
(Percent)



Sources: CLS Group; and IMF staff calculations.

Note: Panel 1 shows the total spot and swap flow turnover by counterparty sector for 2024 across all currencies. Panels 2 and 3 show the structure of euro–US dollar and yen–US dollar networks, respectively, depicting average net flow from each country-sector in the pair to the other country-sector in 2024. The size of the node represents the market share of gross flows. The arrows represent the direction of net inflows. Data labels in panels 2 and 3 use International Organization for Standardization (ISO) two-digit country codes. Panel 4 measures bank dealer concentration across currency pairs by computing the Herfindahl-Hirschman Index. The index scale ranges from 0 to 10,000. The horizontal lines refer to the Bank for International Settlements' benchmarks for concentration in FX markets. Panel 5 shows the share of NBFIs by currency pair and indicates the median and interquartile range of the distribution. In panel 6, hedging pressure is computed as the difference between short and long swap outstanding positions of various currencies relative to the US dollar, normalized by the total outstanding FX swap positions. A positive hedging pressure reflects an imbalance in NBFIs' demand for hedging in the FX swap market. The measure is shown as a three-month rolling average (see Online Annex 2.3 for details). CHF = Swiss franc; EUR = euro; EZ = euro area countries excluding France, Germany, Italy, The Netherlands, and Spain; FX = foreign exchange; GBP = British pound; JPY = Japanese yen; M = month; NBFI = nonbank financial institution; NFC = nonfinancial corporation; RW = rest of the world.

predominantly facilitated by banks in Japan and the United States (Figure 2.5, panel 3). There are thus different degrees of dealer bank concentration, defined here as the extent to which banks in specific jurisdictions dominate trading activity in a particular currency pair, with some currency pairs showing higher degrees of concentration, as reflected by the upper range of the interquartile distribution in Figure 2.5, panel 4.[24] The degree of dealer concentration is also high in swap markets with longer tenors, suggesting that even though the global FX market is broadly diversified, certain segments remain reliant on a concentrated group of dealers. This reliance can amplify systemic risk in the event of financial or operational disruptions affecting these key institutions.

The trading activity of NBFIs also varies significantly across currency pairs. Over the past decade, the median share of NBFIs in FX trading activity has averaged about 8 percent (Figure 2.5, panel 5). However, some currency pairs, such as euro–US dollar, have had a significantly higher participation share, exceeding 15 percent in recent years. This variation reflects differences in market structure, liquidity, and the importance of specific currency pairs to institutional investors. Moreover, hedging of currency exposures among NBFIs, measured by their net FX swap positions against the US dollar in various currencies, has generally been on an increasing trend (Figure 2.5, panel 6).[25] Notably, this measure appears to be positively correlated across major currencies, suggesting a synchronized need for dollar hedging ("hedging pressure") that can strain liquidity and amplify volatility, particularly in times of market stress.[26]

[24]Dealer bank concentration is measured using the Herfindahl-Hirschman Index, which reflects the share of trading activity in specific currency pairs in key financial jurisdictions—Canada, France, Germany, Japan, Switzerland, the United Kingdom, and the United States—conducted by banks classified as dealer banks. Banks in all other jurisdictions are treated as nondealer banks (see Online Annex 2.3 for details).

[25]Specifically, hedging pressure is defined as the net short swap position of NBFIs in specific currencies with respect to the US dollar relative to the total outstanding market swap position (Bräuer and Hau 2023). This measure reflects both demand-side factors (for example, rollover needs of NBFIs) and supply-side constraints (for example, dealer balance sheet limitations). Subsequent empirical analysis attempts to disentangle these two channels.

[26]Hedging pressure from NBFIs across countries tends to be strongly correlated with these institutions' net bond investment positions with respect to the United States, suggesting that greater exposure to US fixed-income assets is associated with higher demand for FX hedging (see Online Annex 2.3; BIS 2025b).

Nonresident NBFIs typically increase their holdings of safe haven assets during periods of elevated macrofinancial uncertainty. For example, net purchases of US dollars in both spot and swap markets tend to rise with spikes in the VIX or the US EPU index (Figure 2.6, panels 1 and 2).[27] Similarly, net spot purchases of other safe haven currencies, such as the euro and the Swiss franc, by nonresident NBFIs also react strongly to these shocks (Online Annex Figure 2.3.5).

In the recent episode of uncertainty triggered by US tariff announcements in early April 2025, nonresident NBFIs increased their purchases of safe haven assets. However, overall net spot purchases of US dollars by both non-US banks and non-US NBFIs were relatively subdued compared with those in previous episodes, such as the 2020 COVID-19 shock (see Box 2.1).[28] Demand for US dollar swaps by non-US NBFIs rose sharply, suggesting a shift to hedge previously unhedged exposures. Despite the magnitude of the shock, stress in the FX market remained limited, with no major disruption.

Macrofinancial Uncertainty and FX Trading Dynamics

This section formally examines how an increase in global macrofinancial uncertainty affects FX trading activity, focusing on cross-border transactions involving major currencies against the US dollar. The analysis considers several uncertainty measures, including financial market volatility, monetary policy uncertainty, and broader economic policy uncertainty.[29] These measures capture different dimensions of risk and may influence market behavior and demand for the dollar through distinct but related channels: financial volatility, proxied by the VIX, often triggers immediate liquidity needs and safe haven flows, as investors reallocate their investments into assets with cash-like

[27]In general, both US and non-US NBFIs are net buyers of US dollars. Among banks, US institutions typically supply US dollars to their non-US counterparts in the spot market (Online Annex 2.3). In the FX swap market, behavior varies by tenor: US banks rely on short-tenor swaps for their FX funding, which non-US banks provide. For longer tenors, US banks provide hedges to non-US institutions (Kloks and others 2023; Kloks, Mattille, and Ranaldo 2024).

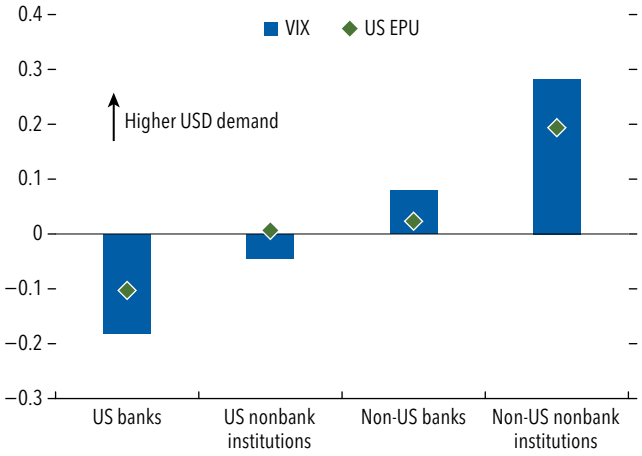
[28]These observations are supported by data on portfolio flows into the United States among nonresident investment funds, which show a slowdown during April and May (Online Annex Figure 2.7.1). Bond fund flows especially declined, reflecting in part weaker demand for US Treasuries (Grothe and others 2025; Jiang and others 2025).

[29]See Online Annex 2.4 for further details on empirical methodology and results for the analysis presented in this section.

Figure 2.6. Net Purchase of US Dollars and Macrofinancial Uncertainty

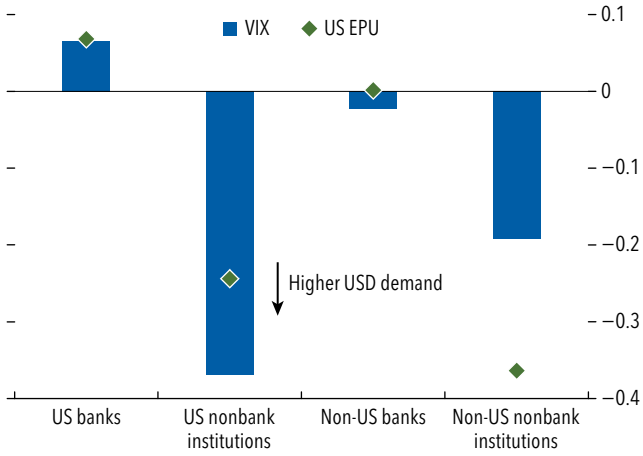
Non-US nonbank financial institutions increase their purchase of dollars as uncertainty rises ...

1. Net US Dollar Spot Flows versus VIX and EPU, 2015:M1–2025:M5
(Weekly correlation in four-week moving averages)



... whereas US banks act as net lenders.

2. Net US Dollar Swap Flows versus VIX and EPU, 2015:M1–2025:M5
(Weekly correlation in four-week moving averages)



Sources: CLS Group; Haver Analytics; and IMF staff calculations.

Note: The figure displays the unconditional correlations between net US dollar spot and swap flows and various uncertainty measures across different country sectors. EPU = economic policy uncertainty index; M = month; USD = US dollar; VIX = Chicago Board Options Exchange Volatility Index.

properties; monetary policy uncertainty (measured by the MOVE index's signal of volatility in the bond market) may affect expectations and funding costs; and broader economic policy uncertainty, captured by the EPU index, can weigh on longer-term investment decisions and influence demand for the dollar.

An increase in uncertainty tends to raise nonresident demand for US dollars. The effects are particularly pronounced after large shocks to the VIX or the MOVE index, defined here as unexpected changes in the values of those indices exceeding two standard deviations (Figure 2.7, panel 1).[30] The estimated effects are economically meaningful: uncertainty shocks of the magnitude observed during episodes like the 2020 COVID-19 turmoil can raise weekly spot trading growth by up to 24 percentage points. Additional analysis for flows into other safe haven currencies—such as the euro, Japanese yen, and the Swiss franc—confirms that these currencies also attract inflows during periods of heightened global uncertainty (Online Annex Figure 2.4.2). These results remain robust when the sample is restricted to the period preceding the 2025 US tariff announcements, a time marked by unusually high levels of economic policy uncertainty (Online Annex Figure 2.4.5).[31]

NBFIs, particularly investment funds, respond more strongly to global uncertainty shocks than do banks or nonfinancial firms. After a spike in the VIX or the MOVE index, weekly growth rates in trading volumes of nonresident NBFIs rise by about 40 percentage points, on average, compared with a 15 percentage point increase in the rates for dealer and nondealer banks (Figure 2.7, panels 2 and 3). This sectoral asymmetry could reflect that NBFIs are more exposed to market-driven risks and operate with tighter liquidity and margin constraints. Unlike banks, NBFIs rely more heavily on market funding and collateralized borrowing, making them more vulnerable to asset price volatility and margin calls (Aramonte and Avalos 2021; FSB 2022).

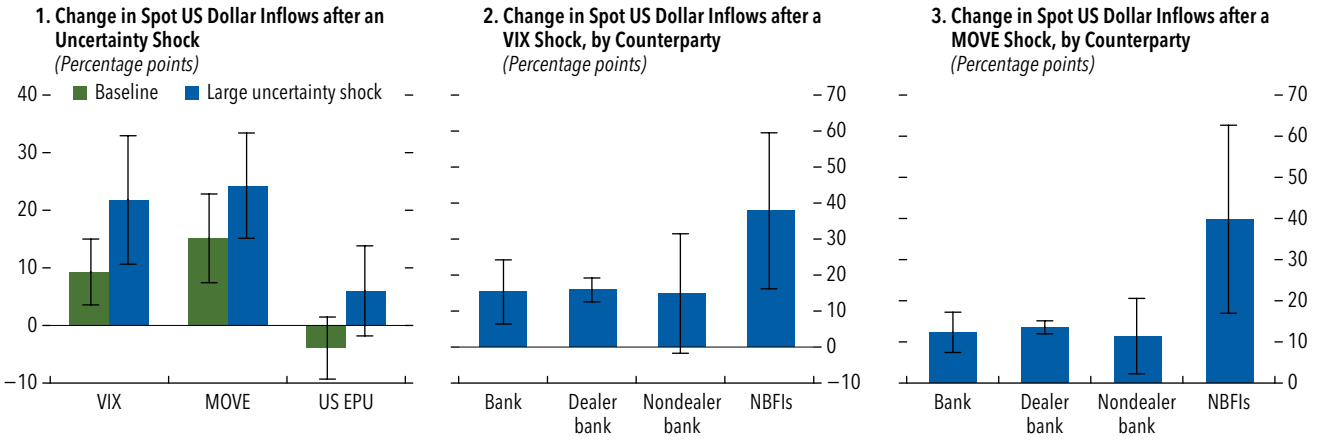
Similar dynamics are evident in the FX swap market, in which NBFIs account for a growing share of

[30]Using an alternative measure of monetary policy uncertainty derived from the EPU index yields similar results (see Online Annex Figure 2.4.1).

[31]Although these findings highlight strong demand for safe haven currencies during major uncertainty shocks, caution is warranted in extrapolating the patterns observed to future episodes. Deepening global fragmentation that triggers major shifts in the use of international currencies may alter traditional flight-to-safety dynamics. Moreover, the nature of a particular shock matters: more localized episodes, such as a rise in US-specific macroeconomic uncertainty without a broader surge in global macrofinancial uncertainty, may reduce nonresident demand for US dollars (see Online Annex 2.4; Grothe and others 2025).

Figure 2.7. Effect of Macrofinancial Uncertainty on Foreign Exchange Spot Activity

After a spike in macrofinancial uncertainty, demand for US dollars among nonresident institutions, especially NBFIs, tends to rise.



Sources: Baker, Bloom, and Davis 2016; Bloomberg Finance L.P.; CLS Group; LSEG Datastream; and IMF staff calculations.

Note: "US dollar inflows" refers to spot transactions by non-US financial and nonfinancial institutions in 15 jurisdictions. The figure displays the impacts of various uncertainty shocks on weekly changes in dollar inflows using a panel model. The model controls for a range of global and domestic macrofinancial factors, including the Federal Reserve Bank of Chicago's National Financial Conditions Index, a commodity price index, the US term spread, domestic term spreads in other countries, and the spot exchange rate. The specification also includes country-sector fixed effects and country-time fixed effects. In panel 1, "Baseline" refers to the effects of a one-standard-deviation increase in uncertainty measures on the outcome variable. "Uncertainty shocks" are defined as dummy variables equal to 1 when the first-order autoregression residual of the underlying indicator exceeds two standard deviations. Whiskers show the 90 percent confidence intervals. EPU = economic policy uncertainty index; MOVE = Merrill Lynch Option Volatility Estimate index; NBFIs = nonbank financial institutions; VIX = Chicago Board Options Exchange Volatility Index.

short-term US dollar funding and hedging. During episodes of elevated uncertainty, NBFIs increase FX swap usage to secure liquidity or hedge currency exposures. The response is especially pronounced for longer-dated transactions (those of more than seven days) (Figure 2.8, panel 1), which are more indicative of hedging, than for short-term trading or arbitrage flows (Du, Tepper, and Verdelhan 2018; Bräuer and Hau 2023).[32] Quantitatively, a VIX shock raises FX swap activity by about 5 percentage points among banks but nearly twice as much among NBFIs, which is consistent with patterns observed in spot market flows (Figure 2.8, panel 2). A similar response follows shocks to the MOVE index, which captures expected volatility in US interest rates. However, the response appears somewhat weaker in this case, presumably because the regression model includes the term-spread differential as a control variable, which may absorb part of the impact of the MOVE index on US dollar swap inflows (Kumar and others 2023).

FX exposures notably drive the hedging behavior of participants, making currency mismatches a key amplifier of global shocks. Institutions holding substantial open positions in foreign currencies, particularly the US dollar, face heightened amounts of valuation and rollover risk during periods of volatility, prompting a surge in hedging activity. The analysis shows that countries whose banks have larger dollar funding gaps tend to exhibit stronger responses to uncertainty shocks (Figure 2.8, panel 3). Net international investment positions in the dollar also help explain cross-country differences in hedging behavior, as US and non-US investors often face opposing hedging needs (Figure 2.8, panel 4).[33] These findings align with studies showing that net hedging activity is proportional to a country's net investment position in the corresponding currency (Gabaix and Maggiori 2015; Devereux and Yu 2020; Liao and Zhang 2025).[34]

[32]Most sub-seven-day trades are used by banks and money market desks to square books, fund inventories, or arbitrage rate differentials. These flows roll over daily and serve intraday liquidity needs rather than strategic hedging purposes. Short-dated swaps are concentrated in the interdealer market for intraday liquidity management or maturity transformation, in which banks use short-dated interbank swaps to fund longer-dated dollar lending (Kloks and others 2023).

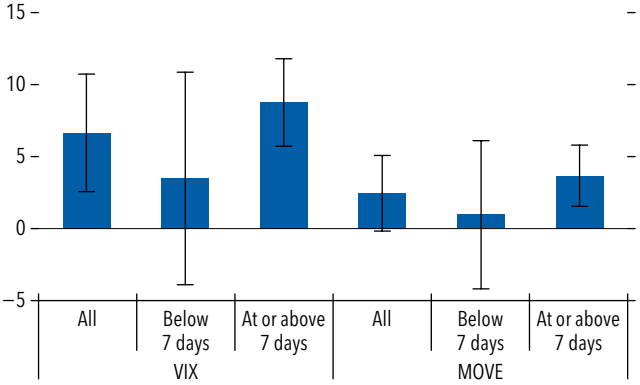
[33]For instance, a country with a large long position in US dollar assets—such as holdings of US Treasuries—would face a greater incentive to hedge FX risk when volatility rises, typically by selling dollars forward.

[34]The banking sector's US dollar FX mismatch is measured as the ratio of dollar-denominated assets minus dollar-denominated liabilities, normalized by dollar-denominated assets. Similarly, the net investment position is defined as the difference between dollar long-term debt held by foreign investors and foreign long-term debt held by US institutions, normalized by the total amount of outstanding long-term debt among US and foreign investors.

Figure 2.8. Effect of Macrofinancial Uncertainty on Foreign Exchange Swap Flows

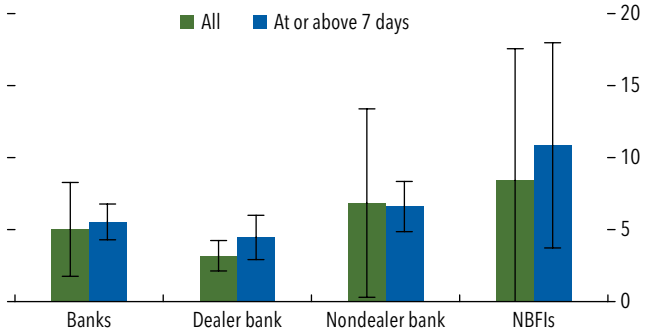
Heightened uncertainty raises FX swap activity in longer maturities, indicating stronger hedging rather than interdealer activity ...

1. Change in US Dollar Swap Inflows after an Uncertainty Shock
(Percentage points)



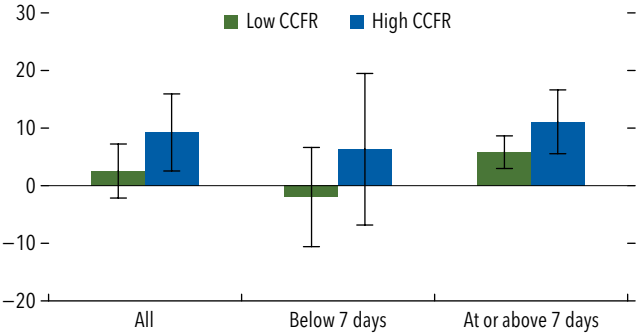
... especially among NBFIs, likely reflecting tighter balance sheet constraints and greater sensitivity to global shocks.

2. Change in US Dollar Swap Inflows after a VIX Shock, by Counterparty
(Percentage points)

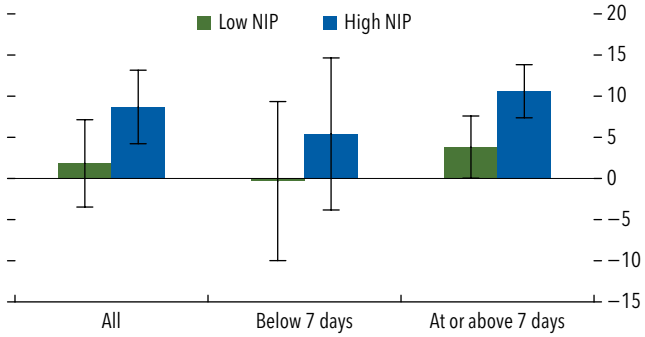


Hedging demand tends to rise with FX mismatches, as institutions with larger currency gaps—measured by the bank funding gap or net foreign investment positions—face greater exposure to exchange rate fluctuations.

3. Change in US Dollar Swap Inflows after a VIX Shock, by CCFR
(Percentage points)



4. Change in US Dollar Swap Inflows after a VIX Shock, by NIP
(Percentage points)



Sources: Baker, Bloom, and Davis 2016; Bloomberg Finance L.P.; CLS Group; LSEG Datastream; and IMF staff calculations.

Note: "US dollar swap flows" refers to swap transactions by non-US financial and nonfinancial institutions. FX swap transaction volumes are smoothed, with the four-week average of weekly flows taken. The figure displays the impacts of different uncertainty shocks on weekly changes in dollar inflows using panel models with fixed effects. The models control for global and domestic macrofinancial factors, including the Federal Reserve Bank of Chicago's National Financial Conditions Index, a commodity price index, the US term spread, domestic term spreads, the three-month overnight index swap covered interest parity deviation, and the spot exchange rate. The specification also includes country-sector fixed effects and country-time fixed effects. An "uncertainty shock" is defined as a dummy variable equal to 1 if the first-order autoregression residual of the underlying indicator exceeds two standard deviations. The banking sector's US dollar FX mismatch is the ratio of its net to its total dollar-denominated assets. The dollar net investment position is the difference between foreign holdings of US long-term debt and US holdings of foreign long-term debt, scaled by total outstanding holdings of long-term debt. High (low) CCFR or NIP refers to economies with vulnerability levels above (below) the quarterly sample median. Whiskers show the 90 percent confidence intervals. CCFR = cross-currency funding gap ratio; FX = foreign exchange; MOVE = Merrill Lynch Option Volatility Estimate index; NBFIs = nonbank financial institutions; NIP = net (foreign) investment position; VIX = Chicago Board Options Exchange Volatility Index.

Uncertainty Shocks and Stress in Foreign Exchange Markets

The effects of global uncertainty shocks on FX trading dynamics can translate into FX market stress. To evaluate these effects, three key measures of FX market conditions are considered here: (1) the cross-currency basis (through CIP deviation), (2) annualized excess spot-return volatility, and (3) quoted bid-ask spreads.[35]

The baseline analysis uses a panel of 11 major pairs of the US dollar with other currencies for which disaggregated data are available from CLS. In addition, an alternative sample that includes a broader set of emerging market currencies is used to assess the impact of uncertainty shocks on FX markets in that group of countries.[36]

[35]See Online Annex 2.5 for methodological details.

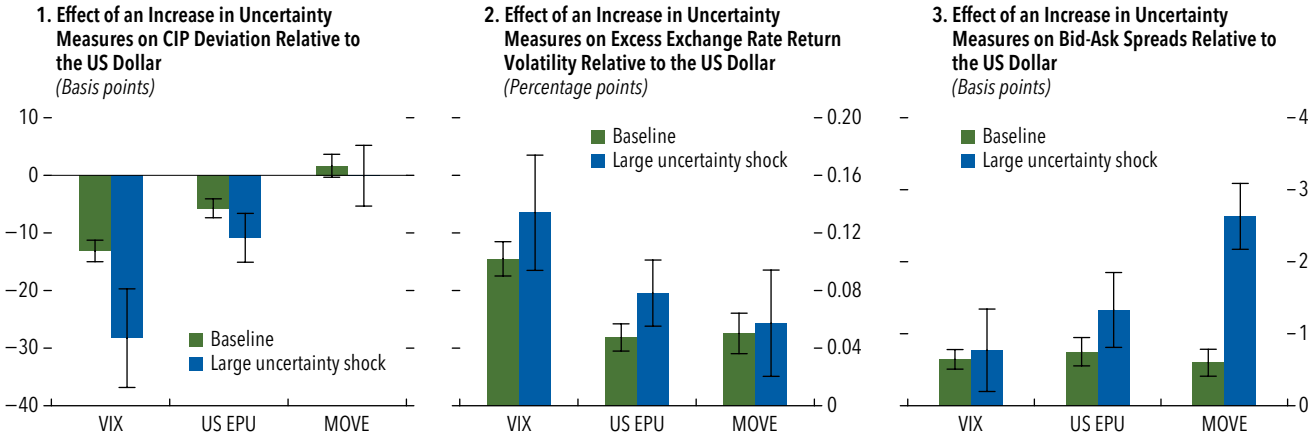
[36]The emerging market sample includes 16 currencies, with coverage varying across regressions due to data availability (see Online Annex 2.5 for details).

Figure 2.9. Effect of Global Macrofinancial Uncertainty Shocks on Foreign Exchange Market Conditions

Uncertainty shocks widen CIP deviations, signaling increased US dollar funding stress ...

... while also increasing excess exchange rate return volatility ...

... and widening bid-ask spreads.



Sources: Baker, Bloom, and Davis 2016; Bloomberg Finance L.P.; CLS Group; LSEG Datastream; and IMF staff calculations.

Note: The figure shows the effects of one-standard-deviation increases in each uncertainty indicator and high uncertainty shocks on the three-month overnight index swap CIP deviation, excess exchange rate return volatility, and bid-ask spreads over a one-week horizon. Large uncertainty (VIX, US EPU, or MOVE) shocks are represented as dummy variables equal to 1 when the first-order autoregression residuals of the underlying indicators exceed two standard deviations. The effects are economically significant: The standard deviation is about 40 basis points for CIP deviations, 0.3 percentage point for excess exchange rate return volatility, and 0.06 percent for bid-ask spreads (normalized by the mid-rate). Whiskers show the 90 percent confidence intervals. CIP = covered interest parity; EPU = economic policy uncertainty index; MOVE = Merrill Lynch Option Volatility Estimate index; VIX = Chicago Board Options Exchange Volatility Index.

Uncertainty shocks are a key driver of cross-currency bases relative to the dollar. A one-standard-deviation increase in global macrofinancial uncertainty indicators, such as the VIX or the EPU index, widens the three-month basis by up to 13 basis points over a week (Figure 2.9, panel 1). The effect of changes in the MOVE index is not statistically significant once the effect of term-spread differentials is controlled for, consistent with the view that US interest rate volatility transmits mainly through the yield curve (Kumar and others 2023). Large uncertainty shocks—those exceeding twice the standard deviation—produce disproportionately larger effects, indicating a nonlinear response.

Elevated uncertainty also impairs FX market liquidity and increases volatility. In response to shocks to the VIX, EPU, and MOVE indices, weekly excess exchange rate return volatility increases by about 5–10 basis points, while bid-ask spreads widen by 1–3 basis points—equivalent to about half a standard deviation, on average. These effects persist for up to three months, peaking about four weeks after the shock (Figure 2.9, panels 2 and 3; Online Annex Figure 2.5.2).

Notably, the effects of shocks are larger for emerging market currencies. When the analysis is extended to include emerging market currencies in the sample, the results show that these tend to experience somewhat stronger and more persistent effects after uncertainty shocks, across all measures of FX market conditions (Online Annex Figure 2.5.3). Cross-currency bases and bid-ask spreads widen, on average, more than twice the amounts estimated for advanced economies, and the estimated effects on excess exchange rate return volatility also increase notably. These results are aligned with those of earlier studies (for example, Du and Schreger 2016, 2022; Dao and Gourinchas 2025; and Dao, Gourinchas, and Itskhoki 2025) that find greater sensitivity of emerging market currencies to global shocks, possibly as a result of structural factors like shallower markets, greater reliance on foreign currency financing, and more limited access to dollar liquidity backstops.[37]

[37]Because data on the CIP deviation of overnight index swaps are not available for many emerging markets, the analysis comparing advanced economies and emerging market economies uses the Treasury CIP deviation, which is the difference between the yield on a US Treasury bond and the synthetic yield obtained by swapping a foreign government bond into dollars through the FX swap market. Because much of the variation in Treasury CIP deviations could reflect credit risk, the regressions include measures of expected default frequency in the banking sector or sovereign credit default swap spreads. See Online Annex 2.3 for details.

Effect of Foreign Exchange Market Fragilities

The impact of uncertainty shocks on FX markets is shaped by underlying market fragilities. In the banking sector, US dollar funding needs amplify the effect of uncertainty on CIP deviations when the cross-currency funding ratio (CCFR) is large, that is, above the sample median, reflecting a significant shortfall of dollar-denominated liabilities relative to dollar-denominated assets that must be covered using FX swaps (Figure 2.10, panel 1). Elevated CCFR levels also amplify the effect on FX market volatility, with excess exchange rate return volatility rising in response to uncertainty shocks when the CCFR is large (Figure 2.10, panel 2). A second amplification channel arises from hedging pressure linked to currency mismatches on the balance sheets of NBFIs. As noted earlier, during periods of heightened macrofinancial uncertainty, NBFIs increase their dollar hedging activity, typically by selling dollars forward in FX swaps. As a result, hedging pressure tightens synthetic dollar funding conditions and amplifies deviations from CIP (Figure 2.10, panel 3).

Excess exchange rate return volatility is sensitive to dealer concentration and the share of NBFI activity (Figure 2.10, panel 4). In concentrated markets, as reflected in a high Herfindahl-Hirschman Index, fewer dealers dominate, potentially reducing competition and market depth. This raises transaction costs and limits the market's capacity to absorb shocks. Similarly, a sizable presence of price-taking NBFIs (for example, real-money investors or macro funds) may increase order flow imbalances during stress, raising market volatility. These institutions typically demand liquidity without providing it, contributing to wider spreads and higher levels of execution risk. Unlike hedging pressure, which affects valuations, dealer concentration and the NBFI share in a currency's trade appear to affect market outcomes more through intermediation and liquidity provision channels.[38]

[38]The distinction lies in the transmission channels: hedging pressure affects valuation—the pricing of forward rates relative to interest differentials—whereas dealer and investor structure affects liquidity and intermediation capacity. CIP reflects a valuation arbitrage condition among spot, forward, and interest rates. When hedging demand outpaces dealers' ability to supply synthetic US dollars, forward prices deviate from arbitrage-consistent levels. This distorts relative pricing without necessarily affecting transactional liquidity. As a result, CIP deviations are more responsive to FX mismatches and hedging imbalances, whereas spreads and volatility reflect frictions in liquidity provision.

Dealer balance sheet constraints represent another key friction shaping the transmission of uncertainty shocks to FX markets. Beyond demand-driven forces, FX market dysfunctions can arise as systematic responses to market frictions that intensify under elevated uncertainty. As outlined in the conceptual framework (Figure 2.3), increased market volatility can constrain dealers' balance sheet capacity, limiting their ability to intermediate FX swaps and contributing to CIP deviations (see, for example, Du, Tepper, and Verdelhan 2018; Dao, Gourinchas, and Itskhoki 2025; and Kubitza, Sigaux, and Vandeweyer 2025).[39] To formally assess this mechanism, the analysis interacts uncertainty shocks with a proxy for dealer balance sheet strength: specifically, the capital ratio of primary dealer banks, following He, Kelly, and Manela (2017). A higher capital ratio, reflecting stronger equity buffers, is associated with greater capacity to supply derivatives and absorb risk. The findings suggest that stronger capital positions help mitigate the effects of uncertainty shocks, improving overall FX market functioning by reducing CIP deviations and excess exchange rate return volatility (Figure 2.11, panels 1 and 2).[40]

Role of Policy Factors

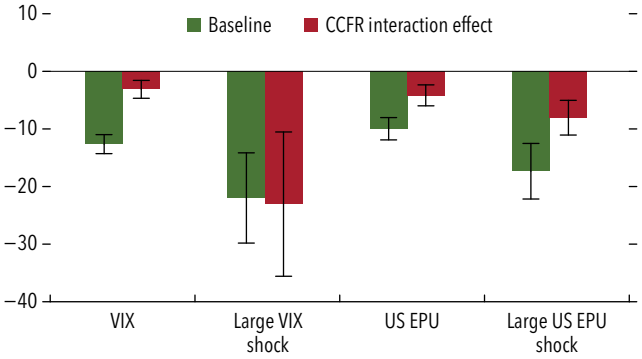
Policy backstops are critical for stabilizing the global FX market during adverse shocks. Among the most effective tools are the Federal Reserve's US dollar liquidity swap lines, which provide selected foreign central banks with direct access to dollar funding. These arrangements ease dollar funding stress, limiting CIP deviations and helping to stabilize FX swap markets. During the 2020 COVID-19 turmoil, the Federal Reserve expanded its swap lines to additional central banks and introduced the Foreign and International Monetary Authorities Repo Facility, offering temporary liquidity against US Treasury collateral. Analysis shows that newly activated swap lines reduced CIP deviations by up to 30 basis points, nearly offsetting the entire impact of the initial VIX shock, and significantly lowered excess exchange rate

[39]Dealer balance sheets have not kept pace with the expansion of the US Treasury supply since the global financial crisis (Online Annex Figure 2.5.1).

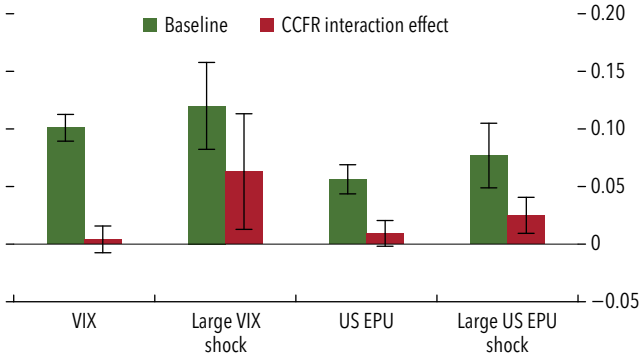
[40]The results support the idea that tighter dealer constraints reduce dealers' ability to intermediate (He, Kelly, and Manela 2017; Duffie 2023).

Figure 2.10. Foreign Exchange Market Fragilities as Amplifiers of Shock Transmission

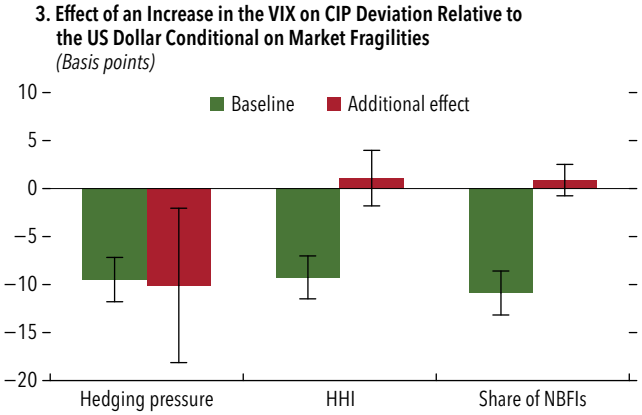
Banks' FX mismatches increase the cost of US dollar funding through swaps ...



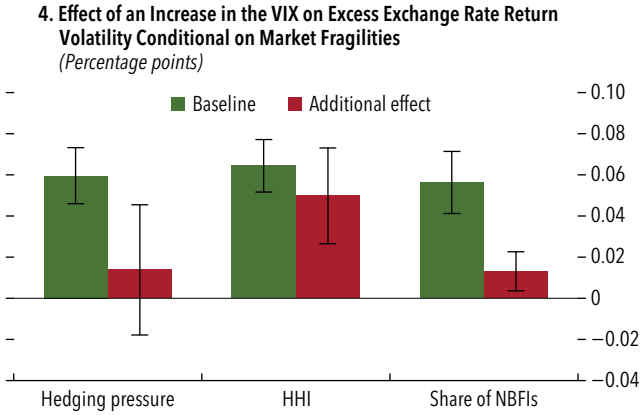
... and amplify the impact of uncertainty shocks on excess exchange rate return volatility.



Increased NBFI hedging activity amplifies the effect of financial uncertainty on CIP deviation ...



... whereas dealer concentration and greater participation of NBFIs in a currency's trading amplify excess exchange rate return volatility.



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

Note: The figure shows the effects of one-standard-deviation increases in each uncertainty indicator and high-uncertainty shocks on three-month overnight index swap covered interest parity deviations and excess exchange rate return volatility, along with the amplification effects due to various FX market vulnerability measures over a one-week horizon. Large uncertainty (VIX or US EPU index) shocks are represented as dummy variables equal to 1 when the first-order autoregression residuals of the underlying indices are two standard deviations above average. The CCFR measures a country's banking sector's US dollar mismatch as the difference between its US dollar assets and US dollar liabilities, divided by US dollar assets, using quarterly Bank for International Settlements data. "Additional effect" refers to the additional impact of uncertainty shocks when vulnerabilities are one standard deviation above their averages. "Hedging pressure" measures the net hedging activity of NBFIs and is calculated as the difference between their aggregate short and long FX swap (forward) positions, scaled by the global average of outstanding US dollar contracts. The HHI is the sum of the squared market shares of all bank dealers. "Share of NBFIs" captures the proportion of non-interdealer swap market activity accounted for by NBFIs. The three vulnerability measures are computed for each currency area. Whiskers show the 90 percent confidence intervals. See Online Annex 2.3 for details on variable construction. CCFR = cross-currency funding ratio; CIP = covered interest parity; EPU = economic policy uncertainty index; FX = foreign exchange; HHI = Herfindahl-Hirschman Index; NBFI = nonbank financial institution; VIX = Chicago Board Options Exchange Volatility Index.

return volatility (Figure 2.12, panels 1 and 2). These outcomes underscore the importance of swap lines in mitigating market dysfunction.[41]

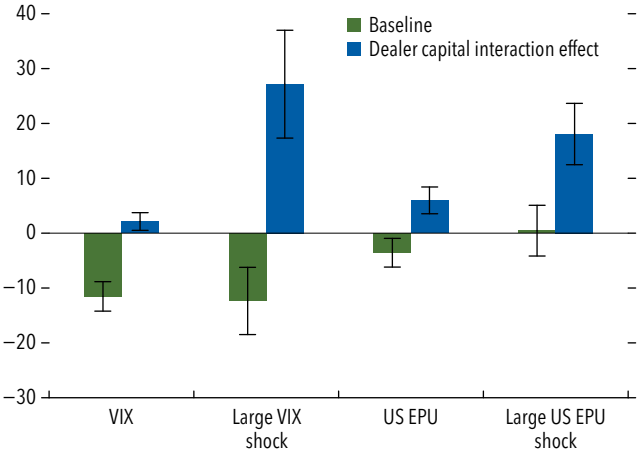
International reserves are a stabilizing force during stress episodes. Central banks can use reserves to provide domestic dollar liquidity when private funding dries up, whereas larger reserve buffers may also enhance a sovereign's perceived creditworthiness and help mitigate flight-to-quality pressures, thereby mitigating FX market stress. The analysis here shows that economies with stronger reserve buffers—about one standard deviation above the average—experience notably smaller CIP deviations and lower excess exchange rate return volatility following macrofinancial uncertainty shocks (Online Annex Figure 2.5.4, panels 1 and 2).

[41]The stabilizing effect of these new swap lines is consistent with Barajas, Deghi, Fendoglu, and Xu (2020); Barajas, Deghi, Raddatz, and others (2020); Aizenman and others (2021); and Bahaj and Reis (2022).

Figure 2.11. Dealers' Constraints and Foreign Exchange Market Conditions

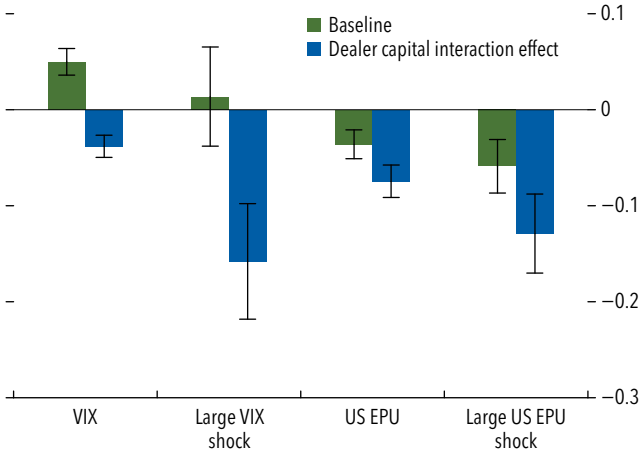
A higher capital ratio boosts dealers' capacity to supply FX liquidity, limiting CIP deviation ...

1. Effect of an Increase in Uncertainty on CIP Deviation Conditional on Dealers' Capital Ratios
(Basis points)



... whereas a lower ratio limits dealers' willingness to intermediate, worsening FX market conditions.

2. Effect of an Increase in Uncertainty on Excess Exchange Rate Return Volatility Conditional on Dealers' Capital Ratios
(Percentage points)



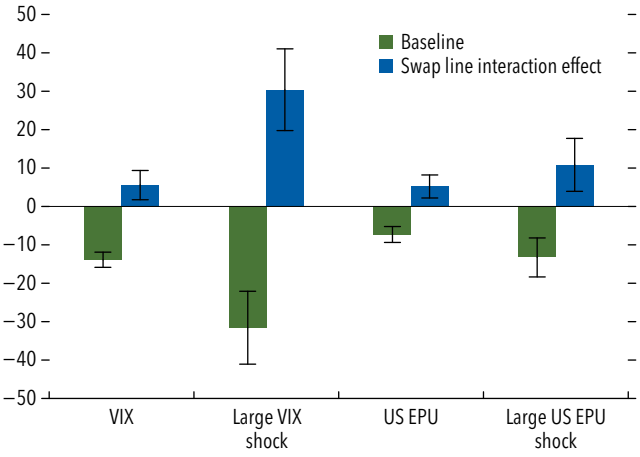
Sources: Bloomberg Finance L.P.; LSEG Datastream; and IMF staff calculations.

Note: The figure shows the effects of one-standard-deviation increases in the VIX and the US EPU index and their associated uncertainty shocks on FX market conditions, along with the mitigating effects of a proxy of dealer balance sheet strength. Large uncertainty (VIX or US EPU) shocks are represented as dummy variables equal to 1 when the first-order autoregression residuals of the underlying indices are two standard deviations above the average. Dealer balance sheet strength is proxied by the capital ratio of primary dealer banks from He, Kelly, and Manela (2017). Whiskers show the 90 percent confidence intervals. CIP = covered interest parity; EPU = economic policy uncertainty index; FX = foreign exchange; VIX = Chicago Board Options Exchange Volatility Index.

Figure 2.12. Policy Mitigating Factors

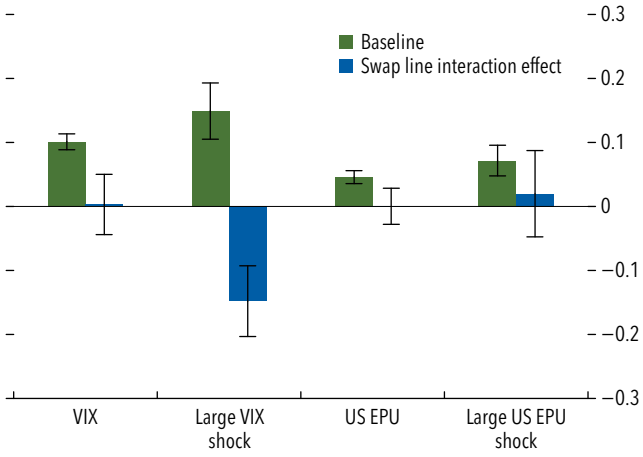
FX swap lines help reduce CIP deviations ...

1. Mitigating Effect of FX Swap Lines on CIP Deviations after External Shocks
(Basis points)



... and lower excess exchange rate return volatility.

2. Mitigating Effect of FX Swap Lines on Excess Exchange Rate Return Volatility after External Shocks
(Percentage points)



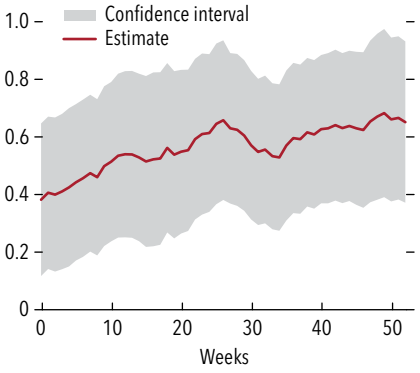
Sources: Bloomberg Finance L.P.; LSEG Datastream; and IMF staff calculations.

Note: The figure shows the effects of a one-standard-deviation increase in the VIX and the US EPU index and their associated uncertainty shocks on FX market conditions, along with the mitigating effects of policy backstops like new central bank swap lines. Large uncertainty (VIX or US EPU) shocks are represented as dummy variables equal to 1 when the first-order autoregression residuals of the underlying indices are two standard deviations above the average. Currencies in the sample with new swap lines are the Danish krone, the Norwegian krone, the Singapore dollar, and the Swedish krona. Whiskers show the 90 percent confidence intervals. CIP = covered interest parity; EPU = economic policy uncertainty index; FX = foreign exchange; VIX = Chicago Board Options Exchange Volatility Index.

Figure 2.13. Financial Spillovers of Foreign Exchange Market Stress

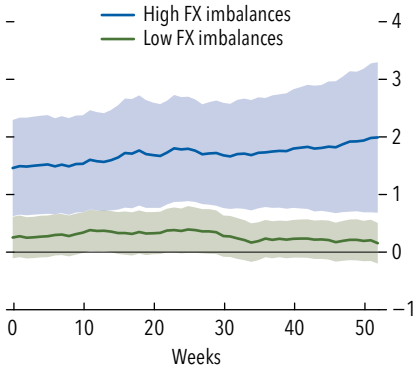
FX funding stress can tighten financial conditions ...

1. Effect of Cross-Currency Bases on Financial Conditions
(Standard deviations)



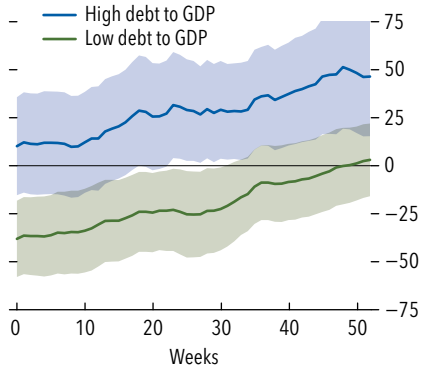
... particularly when currency mismatches are large.

2. Effect of Cross-Currency Bases on Financial Conditions with FX Mismatches
(Standard deviations)



Fiscal vulnerabilities can amplify the spillover of FX funding stress onto sovereign bond yields.

3. Public Debt and the Effect of Cross-Currency Bases on Five-Year Sovereign Bond Yields
(Basis points)



Sources: Bloomberg Finance L.P.; CLS Group; LSEG Datastream; and IMF staff calculations.

Note: Panel 1 shows estimates from regressions of financial conditions on the cross-currency bases of local currencies against the US dollar. Panel 2 shows estimates from regressions of financial conditions on the cross-currency bases and on the cross-currency bases interacted with a dummy variable equal to 1 when FX mismatches in a country are above the sample median for the period. Panel 3 shows estimates from regressions of five-year local currency sovereign bond yields on the cross-currency bases and on the cross-currency bases interacted with a dummy variable that takes the value 1 when the debt-to-GDP ratio of a country is above the sample median for the period. In all panel regressions, a granular instrumental variables approach is used in which the cross-currency bases are instrumented with variables that capture idiosyncratic shocks to demand for dollar funding in the FX swap market for three different tenors (less than 7 days, between 7 and 35 days, and more than 35 days). The cross-currency basis and the idiosyncratic demand shocks are standardized for each currency and tenor. The shaded areas represent 90 percent confidence intervals, obtained using Driscoll-Kraay standard errors, with the number of lags equal to $\sqrt[4]{T}$, in which T denotes the number of time periods in the sample. The specifications include time and currency effects. The currencies in the sample are the euro, the Japanese yen, the British pound, the Swiss franc, the Canadian dollar, the Australian dollar, the New Zealand dollar, the Swedish krona, and the Norwegian krone, trading against the US dollar. FX = foreign exchange. See Online Annex 2.6 for further details.

Spillovers of Foreign Exchange Market Stress to Other Asset Classes

Stress in the global FX market, given its size and deep linkages with other financial markets, can trigger cross-market spillover effects. To identify these spillover effects, the analysis employs panel regressions and a granular instrumental variables approach. The results show that a widening of cross-currency bases triggers a flight-to-quality, which compresses local currency sovereign bond yields and reduces stock prices (Online Annex Figure 2.6.1). Specifically, a one-standard-deviation widening (about 25 basis points) reduces longer-term sovereign bond yields by about 25 basis points, with effects lasting up to three months.[42] Shorter-term yields fall even more sharply, reflecting increased demand for less interest-rate-sensitive assets.

[42]This is an economically meaningful effect, considering, for example, that the five-year US Treasury yield fell by about 50 basis points in the week following the collapse of Silicon Valley Bank in March 2023.

FX market stress tightens overall financial conditions. Shocks that widen cross-currency bases drive down risky asset prices, tightening aggregate financial conditions. A one-standard-deviation widening tightens financial conditions by 0.4 to 0.7 standard deviations over the following year. This is a sizable effect, about half the tightening observed during the dash-for-cash episode induced by COVID-19 in March 2020, and highlights the potential systemic implications of FX market dislocations for credit spreads, equity prices, and funding costs (Figure 2.13, panel 1).

The transmission of FX market shocks to broader financial conditions is amplified by vulnerabilities, such as currency mismatches on the balance sheets of financial institutions or elevated public debt (Figure 2.13, panel 2). In economies with a low level of FX mismatches, the effect of a cross-currency basis widening is negligible because the spillover effects of an increased cost of funding or hedging using FX swaps are likely to be smaller. In contrast, countries with a high level of mismatches experience a tightening of financial conditions by as much as two standard deviations following a one-standard-deviation shock

to cross-currency bases. Fiscal vulnerabilities also play a role: the effect of cross-currency basis widening on five-year sovereign bond yields is greater for economies with high public debt relative to GDP (Figure 2.13, panel 3), consistent with flight to quality favoring fiscally sound economies.[43]

These findings underscore the systemic importance of FX markets, in which stress can transmit into tighter financial conditions, exacerbating downside tail risks to real GDP growth and threatening macrofinancial stability (Adrian, Boyarchenko, and Giannone 2019; October 2024 *Global Financial Stability Report*).

Conclusion and Policy Recommendations

The global FX market has expanded significantly over time. This growth has been accompanied by notable structural changes, including a rising presence of NBFIs and increased reliance on FX swaps for liquidity management and currency risk hedging. These developments present opportunities and challenges for market resilience and policy frameworks. This chapter's analysis shows that the global FX market reacts strongly to macrofinancial shocks despite its deep liquidity. Heightened risk aversion tends to increase demand for safe assets, straining FX market and funding liquidity conditions, particularly in emerging markets. Structural vulnerabilities, such as high dealer concentration, the growing role of NBFIs, and intensified FX hedging and funding pressures, can amplify these effects. Moreover, operational disruptions in FX market infrastructure can restrict trading and impair liquidity, which exacerbates market stress. Given the central role of FX markets in the financial system, such stress can spill over into debt and equity markets, tightening overall financial conditions and posing risks to macrofinancial stability.

The findings also highlight that FX settlement risk remains a material concern, particularly for economies that cannot access robust risk mitigation infrastructure. The adoption of simultaneous settlement systems, such as PvP platforms, significantly reduces excess FX returns and volatility and can thereby reduce settlement uncertainty and currency risk premiums.

A shifting global macrofinancial landscape underscores the need to strengthen FX market resilience. To address vulnerabilities and mitigate associated risks, policy actions could focus on three key areas.

Strengthening Surveillance to Monitor Systemic Risk Arising from FX Market Stress

Although stress testing and systemic risk monitoring have advanced, the role of FX markets as a conduit for risk transmission and cross-border spillovers remains underappreciated. A more structured surveillance approach is needed to better capture FX market vulnerabilities and their potential to disrupt macrofinancial stability. Enhancing FX liquidity stress tests is essential to assess the sectoral resilience to funding shocks and sudden tightening in spot and swap market conditions. Systemwide stress tests should incorporate scenarios involving heightened volatility, as well as wider bid-ask spreads and cross-currency bases, while factoring in FX market vulnerabilities, to assess how FX market disruptions could transmit across the financial system. Monitoring and mitigating rollover and liquidity risks from short-tenor FX swap positions, which are widely used for funding and hedging, is also essential, as these can amplify stress during market disruptions.

Scenario analysis is crucial to evaluate the impact of operational disruptions on FX market functioning and broader financial stability. The scenarios employed in such analysis should include severe and persistent technical failures in primary trading venues and critical payment systems, cyberattacks, physical disasters, and defaults by major FX dealers, and consider the availability of contingency measures. Cyberattacks, in particular, pose growing risks, with the potential to impair liquidity, delay settlements, and trigger systemic stress across markets (April 2024 *Global Financial Stability Report*).

Closing data gaps is essential to strengthen the monitoring of FX market risks. The decentralized nature of FX trading makes comprehensive and timely data collection a persistent challenge. Key gaps in data availability include limited visibility into bilateral exposures, settlement practices, intraday trading, and counterparty concentrations, particularly for transactions carried on outside centralized infrastructures like PvP systems. Much of this information is held privately by NBFIs or embedded in bilateral dealer relationships not subject to reporting requirements. Addressing these gaps through enhanced regulatory reporting and improved data sharing is essential to strengthen surveillance and support resilient FX markets.

[43]Similar results for sovereign bond yields are obtained when fiscal vulnerability is proxied by sovereign credit default swap spreads (Online Annex 2.6).

Ensuring Adequate Capital and Liquidity Buffers at Financial Institutions, Supported by a Robust Crisis Management Framework

Regulatory and supervisory agencies should ensure that financial institutions with a dominant and systemic role in FX markets maintain adequate hedges and capital and liquidity buffers. Strengthening access to intraday central bank liquidity and credit facilities, including for NBFIs, alongside stronger regulatory and supervisory oversight to limit moral hazard (April 2023 *Global Financial Stability Report*), can help prevent payment gridlocks during market stress.[44] Moreover, supervisors and banks should effectively monitor and manage liquidity risks in significant currencies.

Economies relying heavily on external financing should maintain sufficient international reserve buffers to safeguard against external shocks (IMF 2016). Strengthening and expanding the network of central bank swap lines can enhance global FX liquidity backstops and help reduce contagion risks. Notably, the IMF's lending toolkit plays a vital role within the broader global financial safety net, offering tailored instruments to support countries facing FX liquidity pressures during adverse shocks.

Managing systemic risk arising from stress in FX markets may also require a policy action mix in line with the IMF's Integrated Policy Framework. This is particularly important when external shocks lead to undesirable macroeconomic fluctuations, particularly in the presence of significant FX mismatches on private sector balance sheets or shallow FX markets, as reflected in excess exchange rate return volatility, or wider bid-ask spreads and CIP premiums. The response may include FX intervention and macroprudential and capital flow management measures calibrated to country-specific conditions (IMF 2023).

Adequate Management of Operational and Settlement Risk

Strengthening the operational resilience of financial market infrastructures is critical to safeguarding FX market stability. In line with the Principles of Financial Market Infrastructures (BIS-CPSS-IOSCO 2012), financial market infrastructures should identify plausible sources of operational risk and implement robust systems, policies, and procedures to ensure high reliability. This implementation should include comprehensive business continuity planning, cyber resilience frameworks, and regular testing of contingency arrangements. Given the substantial netting efficiency provided by settlement and clearing systems, a prolonged failure could have serious effects, such as preventing participants from accessing additional liquidity they may require to fulfill payment obligations and capital needed to cover potential counterparty losses.[45] Financial institutions, likewise, should adopt comprehensive operational risk management practices that address vulnerabilities in technology, processes, and third-party dependencies (April 2024 *Global Financial Stability Report*). Given the interconnected nature of FX markets, disruptions in one jurisdiction can affect counterparties globally, underscoring the need for coordinated responses among central banks and agencies with oversight responsibility for financial market infrastructures.

Reducing FX settlement risks requires wider adoption of PvP arrangements. In the interim, dealer banks can strengthen risk controls through alternative arrangements, including "pre-settlement netting," which reduces settlement risk by bilaterally offsetting gross obligations, and "on-us" settlement, in which both legs of FX trades are settled within the same institution, thereby mitigating counterparty exposure (BIS 2025a). Strong anti-money laundering/combating the financing of terrorism measures should also be implemented to reduce uncertainty in settlement. Policy initiatives that leverage digital technologies, if properly designed, offer promising avenues for helping to address settlement risk and increase the safety and efficiency of cross-border payments. These include linking faster payment systems or developing cross-border central bank digital currency, as explored in recent Bank for International Settlements initiatives (IMF 2024a).[46]

[44]Effective oversight of NBFIs is essential to limit moral hazard and reduce central banks' exposure to collateral and credit risks. Liquidity support facilities should be temporary, collateralized with appropriate haircuts, and priced at a penalty rate, to safeguard financial stability. These measures should align with the Financial Stability Board's recommendations to address vulnerabilities in NBFIs, including liquidity mismatches and leverage (FSB 2025).

[45]For example, CLS's netting process typically reduces funding requirements by approximately 96 percent (CLS Group 2025).

[46]The cross-border use of FX-denominated central bank digital currency, if such currency is not properly designed and regulated, could displace domestic currencies, weaken monetary policy control, and heighten vulnerability to shocks (IMF 2023; October 2024 *Global Financial Stability Report*, Chapter 3).

Finally, FX markets could lower transaction costs and volatility by migrating toward well-designed financial platforms, which have the potential to reduce counterparty and settlement risks, as well as costs associated with information asymmetry and dealer constraints in over-the-counter markets (Adrian and Mancini-Griffoli 2023; IMF 2024b).[47]

[47]"Financial platforms" refers to infrastructures that facilitate the interoperability of financial assets.

Box 2.1. Foreign Exchange Market Dynamics around the April US Tariff Announcement

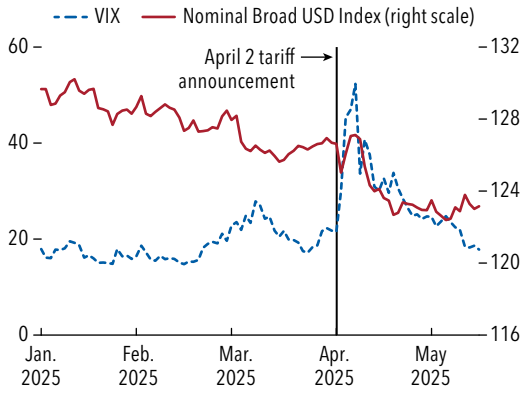
On April 2, 2025, the United States announced increased tariff rates on imports, marking a major policy shift with potential implications for global trade and investment. The announcement triggered a sharp reaction in financial markets: measures of financial uncertainty like the Chicago Board Options Exchange Volatility Index spiked, and the broad US dollar index depreciated by about 2 percent on impact (Figure 2.1.1). Although market volatility eased after the suspension of some tariffs on April 9, the dollar continued to weaken. Overall, despite the large magnitude of the shock, foreign exchange (FX) market conditions remained broadly orderly, with no major disruptions observed. Using data from the CLS FX settlement system, this box examines how FX market dynamics evolved around the announcement, focusing on changes in spot and swap dollar trading volumes across countries and sectors.

Spot dollar purchases by nonresident investors rose notably ahead of April 2, increasing by about $265 billion on a net basis between January 1 and April 1. Following the tariff announcement, purchases continued to rise through mid-April but have since declined (Figure 2.1.2, panel 1). As of the end of May, cumulative net spot purchases remained broadly stable.

Cross-country differences are evident in trading patterns. For example, Canada was a net buyer of spot dollars from November 2024 through mid-April 2025 but shifted to net selling thereafter. Similarly, spot dollar sales on a net basis by major euro area countries increased after April 2. Across sectors, most of non-US institutions' activity has been driven by nonbank financial institutions around the tariff episode, which contrasts with what took place in previous macrofinancial shocks, such as the COVID-19 market turmoil in March 2020, when banks dominated FX trading (Figure 2.1.2, panels 2 and 3).[1]

The FX swap activity of non-US nonbank investors against the US dollar increased notably after the April 2 tariff announcement (Figure 2.1.2, panel 4).[2] Compared with what took place after the COVID-19 shock, hedging demand from these investors—which involves selling US dollar forward contracts—has been stronger and more persistent.[3] Although the overall cumulative change in swap positions has been only slightly larger than that of the COVID-19 episode, combined with the muted net spot dollar purchases, this may have contributed to US dollar depreciation pressure during April and May.[4]

Figure 2.1.1. Broad US Dollar Index and VIX, January 2, 2025, to May 15, 2025
(Index)



Sources: Federal Reserve Bank of St. Louis, Federal Reserve Economic Data; and IMF staff calculations.

Note: USD = US dollar; VIX = Chicago Board Options Exchange Volatility Index.

[1]Net purchases of other safe haven currencies, such as the euro and Japanese yen, rose notably after April 2, exceeding levels observed during the COVID-19 turmoil (Online Annex Figure 2.7.2). Moreover, as Canada became net sellers of US dollars during this period, the country appeared to shift toward the euro, and major euro area countries moved toward the yen.

[2]Cumulative swap flows in panel 4 of Figure 2.1.2 should not be interpreted as net mark-to-market positions. This is because they do not account for maturity and refinancing activities. In addition, each flow is recorded using the forward rate fixed at the time of the contract, without incorporating after-the-fact valuation changes that are due to the shifts in market exchange rates.

[3]Swap dollar flows are positive for non-US banks, indicating that they sell dollar hedges, that is, they buy dollar forward contracts. A similar pattern holds for US banks, which are net hedge sellers, whereas US nonbank institutions are net buyers of FX hedges.

[4]Note that a shift in trading activity in other sectors, such as the official sector, or by other institutions not captured by the CLS settlement data may also have contributed to US dollar depreciation pressures following April 2 (see, for example, Jiang and others 2025).

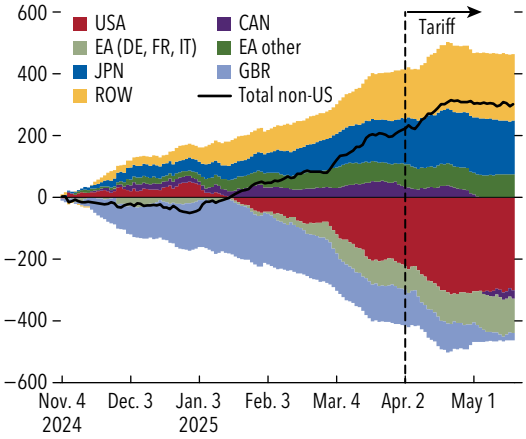
Box 2.1 *(continued)*

Figure 2.1.2. Net Spot US Dollar Flows before and after the US Tariff Announcement on April 2, 2025

(Billions of dollars)

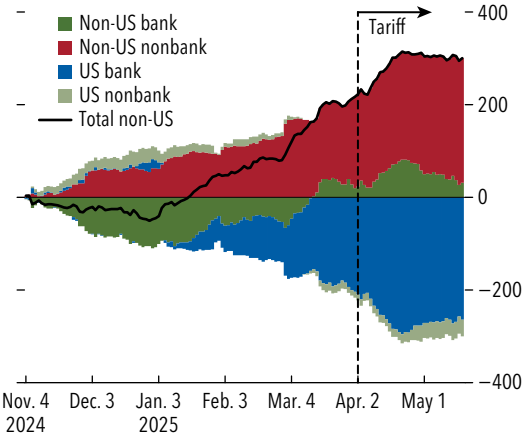
Net purchases of US dollars increased in the first quarter of 2025 but have stabilized since then.

1. Cumulative Net US Dollar Spot Flows, by Purchaser Nationality, 2024:M11–2025:M5



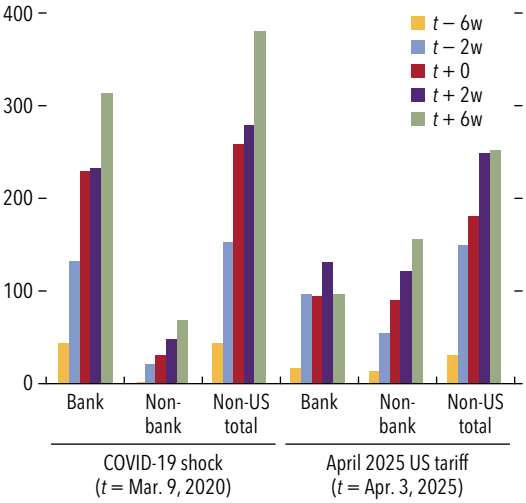
Non-US nonbank institutions have been active buyers of US dollars in the spot market.

2. Cumulative Net US Dollar Spot Flows, by Sector, 2024:M11–2025:M5



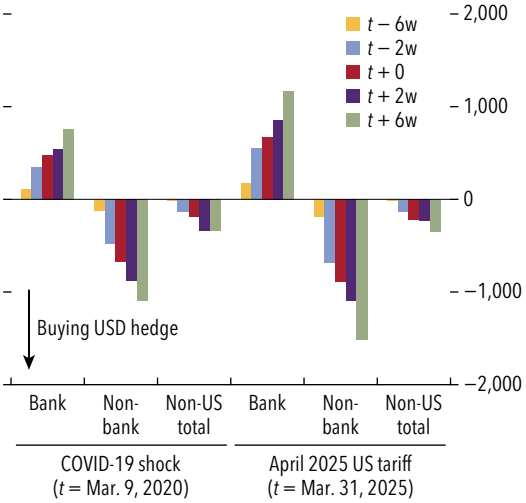
Spot US dollar purchases by non-US investors decreased more after the April US tariff announcement than they did during the COVID-19 episode ...

3. Cumulative Net US Dollar Spot Flows of Non-US Institutions



... although hedging demand has been higher.

4. Cumulative Net US Dollar Swap Flows of Non-US Institutions



Sources: CLS Group; and IMF staff calculations.

Note: In panel 1, residency is based on the institutions participating in CLS Settlement System. Panels 3 and 4 present net US dollar spot and swap flows around two major shocks—COVID-19 and the April US tariff announcement—denoted as time t, with $t - h$ and $t + h$ representing h weeks before and after the event, respectively ($h = 2$ and 6). For COVID-19, t is set as March 9, the date of a sharp stock market decline amid broader financial turmoil triggered by pandemic fears. In panel 3, for the US tariff announcement shock, t is defined as April 3, reflecting the timing of the US tariff announcement after market close in several major economies. In panel 4, t is set as March 31 to align with the weekly frequency of FX swap flow data; a positive bar indicates that the institutional sector is a net buyer of US dollars in the forward leg of swap contracts and a net seller of US dollars in the near leg of swap contracts; US dollar swap flows with tenors of less than 35 days are excluded from panel 4. Country names are represented by International Organization for Standardization (ISO) three-digit country codes except EA (DE, FR, IT) = euro area (Germany, France, and Italy); EA other = euro area except Germany, France, and Italy; ROW = rest of the world.

Box 2.2. The Relevance of Settlement Risk in Foreign Exchange Markets

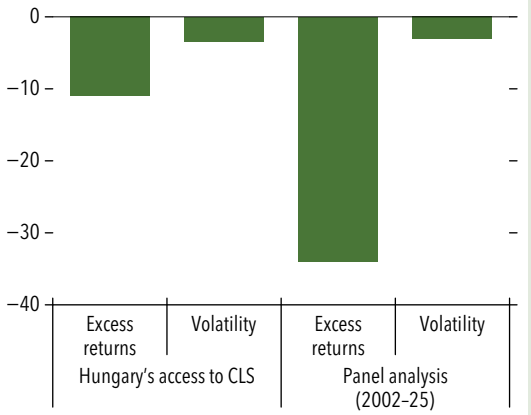
Foreign exchange (FX) settlement risk, often referred to as Herstatt risk, arises when one party in a currency trade delivers the currency it sold but fails to receive the currency it bought. Such risk is significant because such failures can trigger liquidity pressures, credit losses, and even systemic disruptions, especially during periods of market stress. Whereas payment infrastructure and risk mitigation tools have improved over the years, settlement risk remains a concern, particularly in emerging market and developing economies. These jurisdictions often lack access to robust simultaneous settlement mechanisms like payment-versus-payment (PvP) systems, rely more on correspondent banking relationships that introduce additional layers of counterparty exposure and operational complexity, and operate within payment and legal frameworks that may not align with global FX settlement arrangements. This box reviews key historical episodes, outlines the evolution of mitigation strategies, and assesses the relevance of settlement risk for countries without access to global PvP platforms like the CLS system.[1]

Key Episodes and Risk Mitigation Frameworks

The term "Herstatt risk" originates from the failure of Bankhaus Herstatt on June 26, 1974, when German regulators closed the bank after it had received Deutsche mark payments from US counterparties but before it delivered the corresponding US dollars later that day. The default triggered widespread disruption in the multilateral net settlement system and prompted the establishment of the Basel Committee on Banking Supervision later that year. Settlement risk has persisted well beyond this episode. In 2008, Kreditanstalt für Wiederaufbau, a German state-owned investment and development bank, transferred €300 million (equivalent to $426 million at the time) to Lehman Brothers on the morning of Lehman's bankruptcy filing but never received the corresponding payment, resulting in a unilateral loss. More recently, in March 2020, Barclays suffered a $129 million FX loss when its counterparty, UAE Exchange, failed to deliver the currency owed amid COVID-19-related market stress. These incidents underscore enduring vulnerabilities in FX settlement, particularly during periods of heightened market volatility or institutional fragility.

In response to these vulnerabilities, the global financial community has progressively developed strategies to mitigate FX settlement risk. A pivotal advancement was the establishment in 2002 of CLS, a multicurrency PvP system designed to ensure simultaneous settlement of both legs of an FX transaction. CLS significantly reduces counterparty risk by linking settlements across time zones and currencies and covers a substantial share of global FX turnover (see Online Annex 2.2 for further details). In parallel, international standard-setting bodies, such as the Basel Committee on Banking Supervision, the Committee on Payments and Market Infrastructures–International Organization of Securities Commissions, and the Global Foreign

Figure 2.2.1. Effect of CLS Entry on Excess Foreign Exchange Returns and Volatility
(Basis points)



Sources: Bloomberg Finance L.P.; Haver Analytics; LSEG Datastream; and IMF staff calculations.

Note: The figure shows the difference-in-difference impact of Hungary's entry into the CLS system on excess foreign exchange rate returns and the associated volatility, using daily data for a one-month window before and after the event. The analysis includes relevant control variables, including country and time fixed effects. Standard errors are clustered at the country level. The estimated effects are statistically significant at the 10 percent level or lower.

[1]FX settlement risk can be mitigated through two key approaches: presettlement netting, which reduces the amount to be exchanged by offsetting obligations between counterparties, and simultaneous settlement mechanisms, such as PvP or on-us settlement. PvP ensures that each currency leg settles only if the other does, eliminating settlement risk. In on-us settlement, both legs are processed within the same institution. However, protection against loss is assured only if settlement occurs simultaneously or within preauthorized credit lines; this is known as "on-us with loss protection."

Box 2.2 *(continued)*

Exchange Committee, have issued guidelines to strengthen legal certainty, promote settlement finality, and encourage broader adoption of PvP mechanisms. Notably, the FX Global Code, published in 2017 under the auspices of the Bank for International Settlements, sets out principles for good market conduct, including robust risk management and settlement practices to enhance transparency and integrity in FX markets. Many jurisdictions have also implemented real-time gross settlement systems and improved their legal frameworks to support netting arrangements and cross-border enforceability. Despite these advancements, about 25 percent of the deliverable turnover of currencies is without risk mitigation mechanisms (Glowka and Nilsson 2022).

PvP Systems and Currency Risk Premiums

In typical FX transactions, mismatches in global time zones and payment system operating hours expose participants to settlement risk, including the possibility of counterparty default. PvP systems like CLS eliminate such risk. By reducing settlement uncertainty and counterparty exposure, PvP mechanisms could lower the settlement risk premiums investors may require for bearing settlement risk and reduce the volatility of such premiums. To examine these effects empirically, two complementary approaches are employed here: a natural experiment based on Hungary's accession to CLS in 2015 and a broader panel analysis covering 26 currencies over 2000–25, including 16 currencies settled through CLS and 4 currencies with other PvP arrangements (those of Brazil, India, Malaysia, and Thailand).

1. *Hungary's Accession to CLS*

Hungary's currency, the forint, joined the CLS system on November 16, 2015. To assess the impact of this change on the forint's excess FX rate returns and volatility, a difference-in-difference analysis is conducted. The Czech koruna and Polish zloty, similar regional currencies that did not join CLS at the time, are used as benchmarks for comparison.[2]

The analysis shows that CLS entry led to a significant decline in the average daily excess exchange rate returns and volatility of the forint—the former by about 11 basis points (bps) and the latter by 3 bps—when the one-month periods before and after CLS participation are compared (Figure 2.2.1). Notably, the average excess returns over the month before CLS accession were about 28 bps, suggesting that CLS participation eliminated this excess return, bringing the currency closer to the value expected for it in the forward market. These results suggest a meaningful reduction in market uncertainty and support the hypothesis that PvP systems help mitigate credit risk in FX markets, thereby lowering settlement risk premiums.

2. *Panel Analysis*

A number of currencies are settled through PvP systems, such as CLS, the B3 Foreign Exchange Clearinghouse in Brazil, the Clearing Corporation of India Limited's Forex Settlement, and the Hong Kong Special Administrative Region–based Clearing House Automated Transfer System. To estimate the impact of PvP adoption, a panel regression analysis is conducted over January 2000 to May 2025. The results support earlier findings, showing that CLS participation is associated with a significant decline of 34 bps in excess FX returns and 3 bps in volatility, on average (Figure 2.2.1). This reinforces the view that PvP systems can contribute to global FX market stability by lowering settlement risk and the associated risk premiums.

[2]The koruna and zloty are selected as control group currencies based on Czechia's and Poland's comparable macroeconomic characteristics to those in Hungary, with the validity of this selection supported by exchange rate correlation analysis and a parallel trends test conducted using one year of pre-CLS data. See Online Annex 2.8 for details on the empirical methodology.

Box 2.3. Implications of Operational Disruptions in Foreign Exchange Markets

The resilience of foreign exchange (FX) markets is critical to global financial stability, given their central role in facilitating cross-border trade, investment, and exchange rate determination. Although FX markets are typically deep and liquid, they also depend on a concentrated set of trading venues and dealer banks for execution and price formation.[1] This reliance creates potential vulnerabilities: operational disruptions, such as technological failures, natural disasters, and cyber incidents, affecting these core infrastructures and intermediaries can impair market functioning and liquidity, with spillovers to other financial markets, as discussed in the conceptual framework in this chapter's text. This box analyzes how operational disruptions can affect FX market conditions by estimating the effects of outages at two primary trading venues, Electronic Broking Services (EBS) and London Stock Exchange Group's FX Matching, as a case study.

The core of the global FX network overlaps with the interdealer market (Figure 2.5, panels 2 and 3), in which transactions between dealer banks are facilitated by primary market venues, most notably EBS and FX Matching. These platforms play a central role in price formation and liquidity provision. In 2023, EBS experienced an outage; in 2015, trading on the FX Matching platform was disrupted. Both outages occurred when the London and New York trading sessions in the FX market overlapped, a period of high market liquidity (King, Osler, and Rime 2012). There are no detailed accounts of the exact nature of the disruptions, but publicly available information indicates that both outages lasted for some time and likely had a meaningful impact on trading in the interdealer market.

To examine the effect of these outages on FX market conditions, key market liquidity indicators, such as spot and forward bid-ask spreads, are analyzed across two dimensions—currencies that are primarily traded on the affected platform versus those that are not, and over time for all currencies—to assess the aggregate effects. Because the outages at EBS and FX Matching directly affected the interdealer segment of the FX market, they provide a natural setting for isolating the effects of operational disruptions, reducing the risk of confounding from broader financial market impairments (see Online Annex 2.9 for methodological details).

The analysis focusing on the currencies directly affected by the outages suggests a deterioration in market liquidity across multiple dimensions. During the outages,[2] the cost of FX transactions, as measured by bid-ask spreads, increased in the spot and swap markets (Figure 2.3.1, panel 1).[3] An examination of the volumes traded in the spot market on the days of the outages reveals a decline of $2.8 billion, on average, across the affected currencies.[4] Further analysis suggests that a $1 billion decrease in trading volume is associated with a 0.3 basis point widening of bid-ask spreads in the spot market, which could be considered an estimate of the causal effect of volumes on bid-ask spreads.[5] Larger drops in trading volumes because of more severe incidents, such as prolonged outages or simultaneous disruptions across multiple trading venues, could lead to more pronounced widenings of bid-ask spreads.

The market for the affected currencies also becomes less liquid, as measured by the price impact of trading volume (Figure 2.3.1, panel 2; Ranaldo and Santucci de Magistris 2022). Economically, however, the effect is moderate: the trading volume required to move daily FX returns by one standard deviation (about 3.4 percent) declines from $19.2 billion to $18.6 billion. The deterioration of market liquidity is also reflected in an increase of about 0.2 standard deviations (about 11 percent) in

[1]Over the past two decades, the number and types of FX trading venues (for example, multidealer platforms, single-dealer platforms, electronic communication networks, and retail platforms) have increased notably. However, core liquidity and price discovery in the interdealer segment, which underpins the broader FX market, remains concentrated in a few venues, notably Electronic Broking Services and London Stock Exchange Group's FX Matching.

[2]The effects of the outages on bid-ask spreads are quantified over their assumed durations, deduced from publicly available information (Mackenzie Smith 2015; Lambert 2023).

[3]The increase in bid-ask spreads for currencies directly affected by the outages suggests that disruptions to the interdealer market can raise inventory holding costs for dealer banks, thereby contributing to wider bid-ask spreads (Amihud and Mendelson 1980).

[4]All dollar volumes in this box are adjusted for inflation using the US Bureau of Labor Statistics Consumer Price Index and expressed in December 2024 US dollars.

[5]The relation between bid-ask spreads and trading volume is estimated using the outages as an instrumental variable for trading volume. The estimates are comparable with those in Bessembinder (1994), which translate to an increase of 0.2–1.1 basis points for a decrease of $1 billion, in December 2024 US dollars, in forecastable futures trading volume for the German mark, Japanese yen, British pound, and Swiss franc between January 1979 and December 1992.

Box 2.3 *(continued)*

the dispersion of transaction prices across counterparties, suggesting that some must accept less favorable terms of trade.

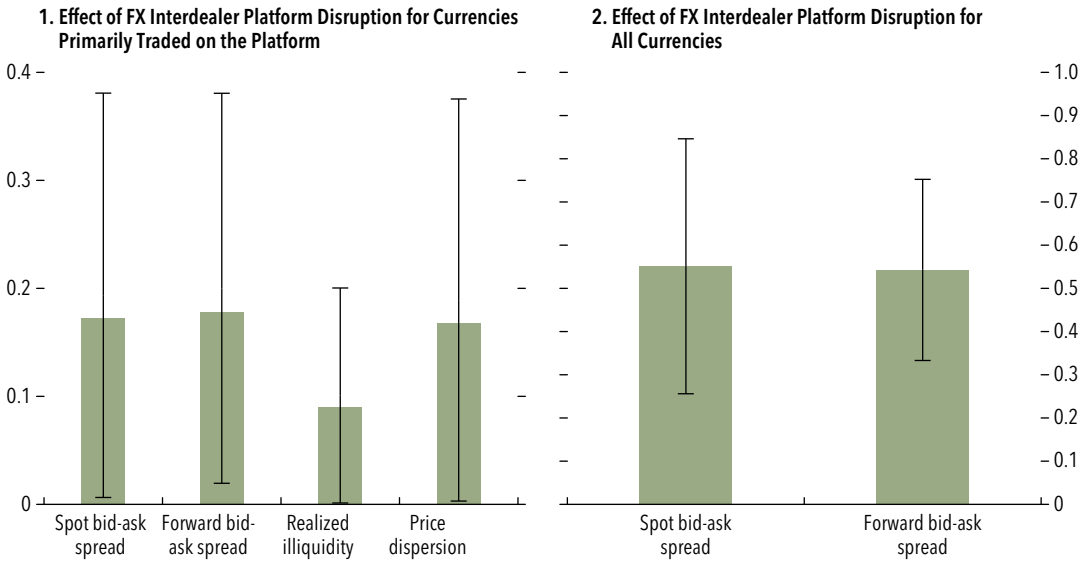
Further analysis of the aggregate effects of the outages indicates that transaction costs in the spot and swap markets rose significantly across all currencies, including those mainly traded on venues that remained operational (Figure 2.3.1, panel 2). This suggests the presence of liquidity spillovers across market venues, which is possibly due to the migration of trading from the affected platforms to other venues, leading to congestion and strained liquidity conditions. Nonetheless, the increase in transaction costs is economically moderate, with bid-ask spreads across all major currency pairs against the US dollar widening, on average, from 3 to 4 basis points in the spot market and from 4 to 5 basis points in the swap market during the outages.

Together, the results suggest that even relatively short-lived outages of trading platforms can materially affect FX market liquidity. This underscores the importance of resilient infrastructures and intermediaries in safeguarding against more severe operational disruptions that could pose risks to financial stability.

Figure 2.3.1. Effect of Interdealer Platform Disruption on Market Liquidity
(Standard deviations)

Outages on interdealer platforms reduce liquidity for affected currencies ...

... and raise transaction costs for those traded on other platforms.



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

Note: The bars in the figure represent estimated coefficients from panel regressions of the outcome variables on an indicator variable for platform outage. In panel 1, the indicator variable is equal to 1 during a platform outage only for the currencies traded primarily on the platform and 0 otherwise. In panel 2, the indicator variable is equal to 1 during a platform outage for all currencies. "Realized illiquidity," defined as in Ranaldo and Santucci de Magistris (2022), refers to the ratio of the realized absolute variation of intraday returns to the volume of transactions in billions of US dollars and measures the price impact of trading volume. Price dispersion is the coefficient of variation of transaction prices for each pair of currencies traded across different counterparty sectors. Bid-ask spreads are sampled at 30-minute intervals, whereas the other measures are constructed at a daily frequency. The sample period covers the day of each outage as well as 90 days before and after. All the measures are standardized separately in each of the two 181-day windows and for each currency traded on the platform. The currencies in the sample are the euro, the Japanese yen, the British pound, the Swiss franc, the Canadian dollar, the Australian dollar, the New Zealand dollar, the Swedish krona, and the Norwegian krone, trading against the US dollar. The specifications in panel 1 include time and currency-year effects, and those in panel 2 include currency-year effects. The specifications for the bid-ask spreads also include currency–time of day–year effects. The error bars represent 90 percent confidence intervals, obtained using Driscoll-Kraay standard errors, with the number of lags equal to $\sqrt[4]{T}$, in which T denotes the number of time periods in the sample. FX = foreign exchange.

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CHAPTER 3

GLOBAL SHOCKS, LOCAL MARKETS: THE CHANGING LANDSCAPE OF EMERGING MARKET SOVEREIGN DEBT

Chapter 3 at a Glance

- Amid rising global sovereign debt levels and heightened vulnerabilities to global shocks, this chapter examines the changes in emerging market and developing economies' (EMDEs') domestic debt markets.
- The structure of government debt has increasingly diverged in emerging markets with stronger economic fundamentals from others that continue to face significant financing and debt challenges.
- Many emerging markets with strong fundamentals have been able to issue domestically in local currency and, given the subdued interest from international buyers, have found new resident buyers.
- This shift toward local currency issuance has supported resilience, as EMDEs with higher shares of local currency debt and more diverse investor bases have exhibited more stable bond yields and market liquidity during periods of global stress.
- In contrast, EMDEs with weaker policy credibility and shallower pools of domestic financial savings remain reliant on foreign currency borrowing, short-term local currency debt, or less stable funding sources.
- The growing sovereign-bank nexus in some EMDEs warrants attention, as it may mask underlying weakness in debt absorption capacity and amplify financial stability risks.

Policies to Address Financial Vulnerabilities

- Enhancing macroeconomic fundamentals—such as raising domestic financial savings and strengthening fiscal and monetary credibility—remains essential to increase debt-carrying capacity and attract stable sources of long-term funding.
- Proven positive steps can also be taken to deepen EMDEs' local currency bond markets and enhance their functioning, with benefits for financial stability. These include enhancing the predictability and transparency of debt issuances, developing efficient repo and money markets, strengthening primary dealer frameworks, and diversifying the investor base.

Introduction

This chapter examines the evolution of emerging market and developing economies' (EMDEs)[1] domestic debt markets against a backdrop of rising debt levels and heightened vulnerabilities to global shocks. Over the past decade, total government debt among EMDEs has more than doubled to nearly $30 trillion (close to $12 trillion excluding China), and nonresident portfolio inflows have slowed. Although many EMDEs and their local bond markets have demonstrated resilience to a variety of global shocks (see Chapter 2 of the October 2025 *World Economic Outlook*), the contrast with those that have faced significant distress and macroeconomic instability highlights the structural and market challenges related to domestic bond market development.

EMDEs have experienced significant outflows from their domestic local currency bond markets (LCBMs)[2]

The authors of this chapter are Sally Chen, Andrew Ferrante, Bryan Gurhy, Zixuan Huang, Kay Chung, Esti Kemp, Xiang-Li Lim, Shijia Luo, Sonal Patel, Arindam Roy (co-lead), Patrick Schneider (co-lead), Xuege Zhang, Zhongxia Zhang, and Jing Zhao, under the oversight of Charles Cohen, Thor Jonasson, and Jason Wu.

[1]In this chapter, "emerging market and developing economies" (EMDEs) is used as a general term covering a full economy sample of 56 economies, which are classified into 12 major emerging markets, 7 other emerging markets, and 37 frontier markets (see Online Annex 3.2 for the full list).

[2]The term "local currency bond market" (LCBM) used throughout this chapter refers to marketable securities issued by the government in local currency in the domestic market. Countries most commonly issue in local currency in their domestic markets and in hard currency (most often US dollars or euros) in international markets. While exceptions to this pattern exist, data limitations preclude more detailed analyses of this issue at present.

and financial stress during global shocks like the 2013 "taper tantrum." As a result, EMDEs have sought to increase the role of resident buyers in their financing strategies. In addition, weak returns in LCBMs over the past decade—driven largely by continuing dollar strength—have made them a less appealing asset class for global investors benchmarked to US dollar assets. Considering these developments, EMDEs have had two main options for funding increased debt issuance: find more resident buyers for local currency debt or continue to rely on foreign-currency-denominated sovereign bond issuance or external loans. Compared to many advanced economies, financial markets in EMDEs tend to be less developed, and their domestic debt markets are more exposed to market stress and spillovers from global shocks.

A select group of major emerging markets has largely been able to rely on local currency issuance that has been increasingly absorbed by domestic investors amid higher domestic financial savings. This has helped reduce the risks stemming from both "original sin" (currency mismatch) and "original sin redux" (nonresident outflows). Other EMDEs have expanded borrowings largely through relatively shorter maturity financing from domestic banks and the central bank and often continue to rely on expensive foreign currency debt. Last, several EMDEs have had to resort to domestic debt restructuring because of unsustainable public debt burdens.[3]

Although all government debt is considered, this chapter focuses on LCBMs and investigates how the changes in composition of debt issuance, investor absorption, and market structure have influenced resilience to external shocks (see the "Recent Trends in EMDE Sovereign Debt Markets" section). It has been well established that LCBMs play a critical role in enhancing macrofinancial stability and deepening domestic financial systems. By reducing currency mismatch and rollover risks, they insulate public finances from external shocks and support countercyclical responses. To help overcome limitations from wide variations in data coverage, this chapter focuses on a newly compiled data set of government debt issued in domestic markets in 56 EMDEs, broken down by investor type, which constitutes over 90 percent of local currency government debt outstanding in EMDEs. EMDEs are classified into *emerging* and *frontier* markets, with emerging markets further classified into *major* and *other emerging markets* on the basis of market size and fragmentation.[4]

This chapter estimates the effects of global shocks on LCBMs and how these effects are associated with the degree of participation by nonresident versus domestic investors, as well as the split between banks and nonbank financial institutions (NBFIs) within domestic investors. Empirical results confirm that the presence of more nonresident investors is indeed associated with greater sensitivity of domestic markets to global shocks, while the presence of more domestic investors—notably banks—is associated with lower sensitivities (see the "EMDE Bond Market Sensitivity to Global Shocks" section).

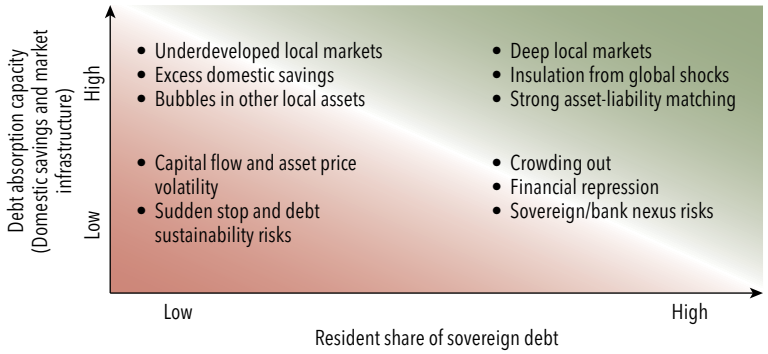
Although these results suggest that more resident buyers of local currency debt tend to improve resilience to global shocks, this does not mean that more domestic buyers are always better. This chapter also explores the drawbacks that may be associated with an overreliance on domestic issuance and demand (see the "Vulnerabilities: Limited Absorption Capacity and the Sovereign-Bank Nexus" section). To this end, this chapter highlights the risk of overborrowing and the adverse feedback loops that could ensue if domestic banks were to absorb excessive amounts of sovereign debt (that is, the sovereign-bank nexus), which could lead to large financial stability downsides in cases of debt distress or restructuring. Resilience in EMDEs, therefore, depends on macroeconomic factors such as monetary and fiscal credibility (see Chapter 2 of the October 2025 *World Economic Outlook*), as well as sufficiently deep and liquid sovereign debt markets that feature a diverse domestic buyer base with high absorption capacity.

Rapid expansion of LCBMs without adequate absorption capacity and strong monetary and fiscal anchors can lead to overreliance on captive investors like banks and central banks, raising financial stability risks and resulting in the crowding out of private

[3]Emerging and frontier markets who restructured their sovereign domestic debt since 2010 include economies such as Argentina, Ghana, Jamaica, and Sri Lanka.

[4]See Online Annex 3.2 for economy classification of local currency bond markets. "Major EMs" (12) are those that have local currency marketable bonds above 25 percent of GDP, with a minimum of 50 percent of bonds exceeding $1 billion. "Other EMs" (7) are non–frontier markets that have local currency marketable bonds of more than 10 percent of GDP and at least 15 percent of bonds above $1 billion. Economies classified as frontier markets (37) are a sample of economies that are either part of the JPMorgan Next Generation Markets Index, are lower-income countries with outstanding Eurobonds, or that have local currency marketable bonds-to-GDP >10 percent; and 15 percent of outstanding bonds with size >$250 million equivalent.

Figure 3.1. Financial Stability Framework for Local Sovereign Debt Markets in Emerging Market and Developing Economies



Source: Authors.

credit. In extreme cases, unlike sovereign external debt restructuring, domestic debt restructuring can impose disproportionate losses on domestic banks and financial institutions, threatening systemic stability and transmitting sovereign stress across the economy (IMF 2021).

Against this backdrop, LCBM development has two aims: (1) to reduce currency mismatch and sudden stop risks by anchoring financing in local currency and (2) to limit losses and spillovers to domestic investors should a domestic debt restructuring be required. To conclude, this chapter provides policy advice on developing a resilient LCBM, drawing on findings from the IMF and the World Bank's LCBM diagnostic framework and on broader technical assistance for LCBM development (see the "Deepening Local Currency Bond Markets to Enhance Financial Stability" section). While improving macroeconomic fundamentals—such as raising domestic financial savings and ensuring a stable macrofinancial environment—remains essential for LCBM development, a strong policy framework and robust financial market systems are critical for channeling financial savings into a well-functioning local market. Foundational market infrastructure (including money markets, primary markets, and secondary markets) must be developed, legal certainty provided, and sustained efforts to deepen the investor base through sound debt management practices and market communication undertaken. In the absence of these elements, efforts to deepen sovereign debt markets often stall, raising financial stability risks from poor price discovery, shallow liquidity, and excessive reliance on banks and public institutions to absorb government debt.

Framework for Assessing EMDE Sovereign Debt Markets

The framework in Figure 3.1 highlights the interaction of domestic absorption capacity and the role of resident investors, as well as the consequences of this interaction for financial stability. Absorption capacity requires both strong macroeconomic fundamentals to generate sufficient domestic financial savings and sound financial market systems to channel these savings into the LCBM. The framework assumes two core financial stability objectives by sovereign issuers: (1) expand local currency issuance to domestic investors to reduce both currency mismatch and the risk of capital outflows and (2) minimize the risks to domestic financial institutions by building an investor base with a larger and more diverse share of resident buyers willing and able to hold more local currency government bonds.

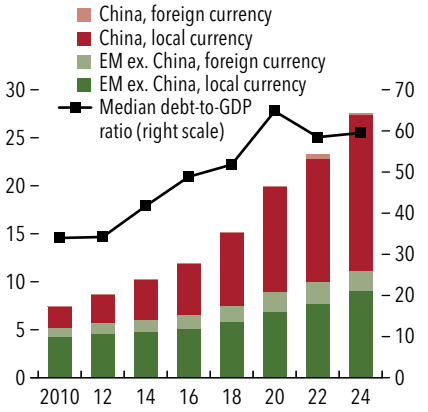
Broadly speaking, this interaction leads to four possible outcomes. When high debt absorption capacity is successfully used to increase the share of domestic buyers, EMDEs are more insulated from global shocks because assets and liabilities in the economy are matched in local currencies. Even in this case, however, there is the trade-off that bond markets and resident investors might be more exposed to local shocks.[5] When absorption capacity is low but domestic buyers are nonetheless forced to buy sovereign debt, financial repression and sovereign-bank nexus risks may ensue. The more unusual case of an economy with ample

[5]For example, this can include inflation shocks that lead to valuation losses in bonds held by resident investors despite well-functioning markets. This chapter does not analyze this domestic trade-off.

Figure 3.2. Recent Trends in Emerging and Frontier Debt Markets

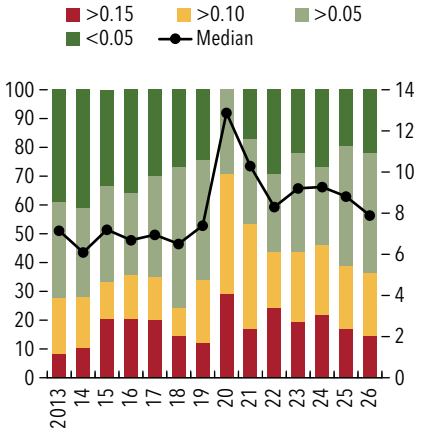
Government debt has increased sharply over the past 15 years, with the median debt-to-GDP ratio reaching close to 60 percent.

1. Government Debt
(Trillions of dollars, left scale; percent of GDP, right scale)



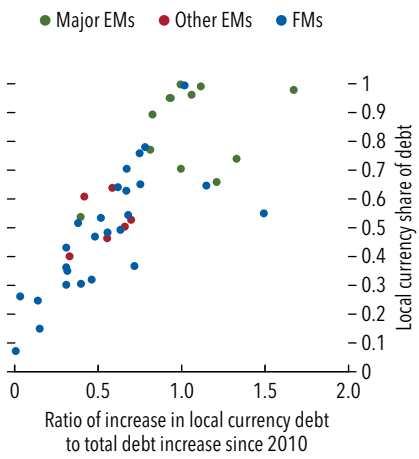
Gross financing needs have remained above prepandemic levels for many economies.

2. Gross Financing Needs
(Share of economies, left scale; median percent of GDP, right scale)



Major EMs primarily issue in local currency, while many other EMs and FMs still rely more on foreign currency issuance.

3. Foreign Currency versus Local Currency Debt, 2024
(Percent share and ratio)



Sources: IMF, World Economic Outlook database; IMF staff calculations; and sovereign investor base estimates by Arslanalp and Tsuda (2014).

Note: Panel 1 includes the maximum sample of 56 countries (see Online Annex 3.2). Panel 2 includes a subset of 45 countries based on data availability. Panel 3 includes only countries where the general government debt as a percentage of GDP increased between 2010 and 2024. "Major EMs" are Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, the Philippines, Poland, South Africa, and Thailand. Frontier markets are classified according to the methodology in the October 2025 *Global Financial Stability Report*, Chapter 3, footnote 5. "Other EMs" are the balance of the sample. EM = emerging market; ex. = excluding; FM = frontier market.

potential absorption capacity (that is, high domestic financial savings) but without a well-developed debt market to absorb these savings could lead to asset bubbles in other local markets such as real estate or public equities. In the worst case, EMDEs with both low shares of resident buyers and low absorption capacity are forced to rely on foreign borrowing and are more vulnerable to sudden stops of capital flows and debt sustainability risks. With many EMDEs starting in this low/low corner, the challenge has been to move to the high/high quadrant without getting stuck in the bad equilibrium of overreliance on a high share of domestic bank investors while still lacking adequate absorption capacity.

Recent Trends in EMDE Sovereign Debt Markets

Financing Needs Are Growing as Public Debt Rises

Government debt in EMDEs has been rising rapidly since 2010, reaching close to $30 trillion (nearly $12 trillion excluding China), with the median debt-to-GDP ratio reaching close to 60 percent of GDP (Figure 3.2, panel 1). Gross financing needs are forecast to ease slightly but remain above the levels seen immediately before the pandemic in many economies, leaving them more vulnerable to future shocks (Figure 3.2, panel 2).

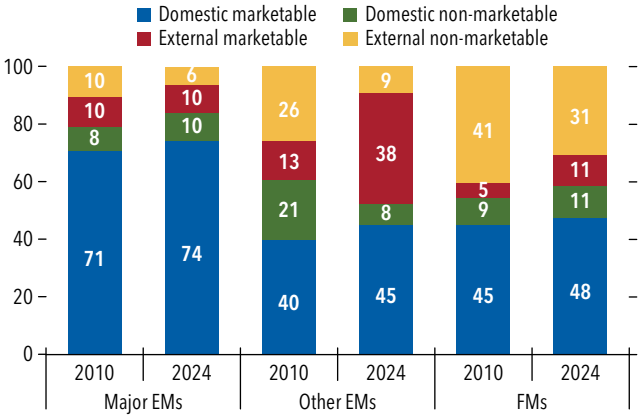
Foreign currency borrowing has become less prominent in some EMDEs, but progress has been uneven, and the currency composition of government borrowing still varies considerably across economies. Major emerging markets, a minority of our broad sample, have more than two-thirds of total government debt in local currency and have avoided large net foreign currency issuance since 2010. In contrast, other emerging and frontier markets still rely significantly on foreign currency debt amid less developed LCBMs (Figure 3.2, panel 3). Expansion of LCBMs in EMDEs has taken place amid widely varying macroeconomic and institutional conditions, shaping the depth and resilience of LCBMs to different degrees (see the "Deepening

Figure 3.3. Composition of Marketable Domestic Public Debt in Selected Emerging Market and Developing Economies

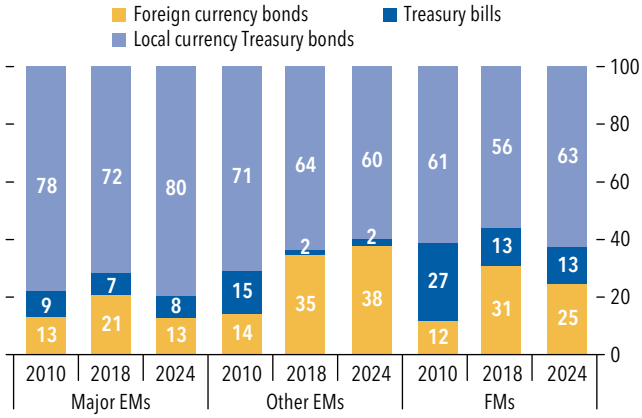
Major EMs issue mostly on local currency markets, while other EMs and FMs rely more on international bonds and external loans, respectively.

Regarding marketable debt, major EMs are able to issue a greater amount of longer-term local currency bonds, while other EMs and FMs issue more short-term securities and foreign currency bonds.

1. Composition of Central Government Debt 2010 versus 2024
(Percent)



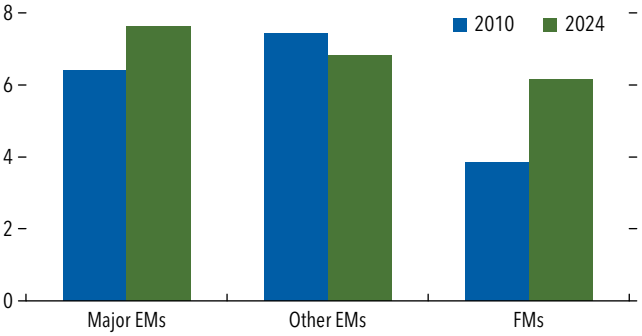
2. Composition of Marketable Debt, by Instrument Type, 2010–25
(Percent of total)



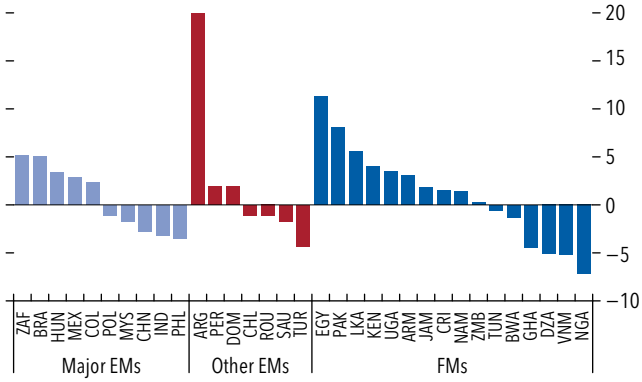
Most EMs and FMs extended their local currency bond maturities, but maturity declined for Other EMs, reflecting cost and absorption constraints.

Carrying cost of domestic debt portfolio in real terms exceeds projected real growth in several countries.

3. Average Time to Maturity for Domestic Debt in Emerging Market and Developing Economies, 2010 versus 2024
(Number of years)



4. Net Interest Cost of Domestic Debt Portfolio in 2024 versus Projected Inflation and Real Growth Rate, 2025–29
(Percentage points)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; national authorities; national sources; and IMF staff calculations.

Note: Panel 1 shows the annual weighted average share of total marketable debt issuance for economy groupings since 2010 split between the domestic and foreign jurisdiction of debt instruments. Panel 2 shows the simple average composition of marketable debt for a group of 36 EMDEs. Panels 3 and 4 refer to domestic debt only. Local currency bond market classification is based on two thresholds: (1) domestic debt-to-GDP ratio and (2) the share of bonds exceeding a minimum outstanding size. "Major EMs" are defined by domestic debt-to-GDP ratios above 25 percent with at least 50 percent of bonds exceeding $1 billion outstanding. "Other EMs" meet a 10 percent domestic debt-to-GDP threshold and have at least 20 percent of bonds above $1 billion. "FMs" are those within the broader frontier sample that meet a 10 percent domestic debt-to-GDP threshold with at least 15 percent of bonds above $250 million. See Online Annex 3.2 for details of this classification. EM = emerging market; FM = frontier market. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Local Currency Bond Markets to Enhance Financial Stability" section). Although not within the scope of this chapter, corporate debt in more developed large emerging markets has also migrated toward local currencies (Box 3.1).[6]

Major emerging markets issue primarily in local currency in their domestic debt markets.[7] However, other emerging and frontier markets also rely significantly on foreign currency denominated international bonds and external loans, respectively (Figure 3.3, panel 1).

[6]A well-functioning LCBM is foundational for development of domestic corporate bond market by, for example, providing a reliable local currency yield curve benchmark (IFC 2025).

[7]At the end of 2024, a few emerging markets had a modest share of foreign-currency-denominated bonds in their domestic bonds outstanding, notably Argentina and Türkiye, alongside some recent restructuring cases such as Ghana and Sri Lanka.

In terms of maturity, many major emerging markets have been able to rely on long-term local currency bonds to meet financing needs (Figure 3.3, panel 2), thereby mitigating rollover risks, and have extended their maturity profiles over the past 20 years as a result of improved macroeconomic stability and a larger institutional investor base. For major emerging markets, the average time to maturity of debt reached seven years in 2024 (Figure 3.3, panel 3), and the average cost on the domestic debt portfolio declined marginally. Nevertheless, some major emerging markets have had to compensate investors for additional risk through the use of inflation-linked or floating-rate instruments, whereas others also use marketable sukuk to meet investor preferences.[8] Many frontier markets have also significantly extended maturities since 2010, although some have seen the average interest cost on domestic debt portfolios rise significantly.

Extending debt maturities in countries with less stable macroeconomic environments and fiscal anchors can lead to rising term premiums. This highlights the trade-offs faced by debt managers in balancing funding costs and refinancing risks for local currency borrowings.[9] In several economies, the real interest rate on outstanding domestic bonds exceeds projected real GDP growth over the next five years, suggesting that the net real carrying cost of domestic debt may impose fiscal burdens in the years ahead (Figure 3.3, panel 4).

Weak Returns Have Weighed on Nonresident Investor Risk Appetite

Portfolio flows to LCBMs have broadly decelerated over the past 10 years despite a modest uptick in recent months. Inflows to local currency debt averaged over 1 percent of GDP in aggregate (excluding China) from 2010 to 2014 but under 0.5 percent of GDP from 2015 to 2024,[10] with inflow cycles becoming smaller and shorter (Figure 3.4, panel 1). Staff analysis finds that a strong dollar and higher US Treasury yields have played significant roles in curbing flows to LCBMs,[11] yet other related recent work suggests that the role of the global financial cycle in total portfolio debt flows is overstated.[12] Nonresident holdings have stagnated in many countries as a share of GDP, although they remain significant and continue to play an important role in some local markets (Figure 3.4, panel 2).

For global investors, total returns on the emerging market local currency bond index have been persistently weak over the past decade, primarily undermined by poor currency returns amid a strong dollar cycle (Figure 3.4, panel 3). Risk-adjusted returns have lagged comparable asset classes such as US high-yield corporate bonds, likely denting risk appetite for the asset class (Figure 3.4, panel 4). Returns on emerging market hard currency bonds have performed somewhat better. Net international sovereign bond issuance has continued at a robust pace, with total outstanding debt reaching over $1.4 trillion in 2025 despite outflows of around 20 percent of assets under management from dedicated emerging market hard currency funds since 2022, suggesting an increased role for crossover investors.[13]

Over the past decade, the structure of the investment base for domestic local currency debt has changed materially. For many emerging markets, the nonresident share of local currency debt peaked nearly a decade ago (Figure 3.5, panel 1), although the decline accelerated after the pandemic. The decline generally reflects a significant increase in net issuance alongside tepid inflows, rather than large outflows, outside select cases (Figure 3.5, panel 2).

[8]Asian emerging markets tend to rely on a high share of fixed-rate domestic bonds. In Latin America and Central and Eastern Europe, issuance has also included a significant amount of floating, or inflation-linked, bonds. Emerging markets like Indonesia, Malaysia, Saudi Arabia, and Türkiye issued a significant amount of sukuk in the domestic market, with their outstanding stock ranging between 13 and 47 percent of their marketable domestic debt at the end of 2024. Frontier markets like Pakistan also have sizable outstanding sukuk (11 percent). Analysis in this chapter relating to domestic marketable bonds covers sukuk.

[9]Unlike foreign concessional loans and international bonds, which are typically longer term, ranging between 10 and 30 years but contingent upon access restrictions, domestic bond maturities in emerging markets could range between 1 and 30 years. Shifting from external to domestic debt in the initial stages could therefore result in a reduction in the average maturity of the overall debt portfolio.

[10]Measured on a rolling four quarter sum.

[11]IMF staff regressed nonresident bond flows, as a percentage of the previous month's nonresident stock, against the change in the Federal Reserve's advanced economy dollar index, the VIX index, and emerging market–US policy rate differentials, with controls on commodity prices, emerging market and US inflation surprise, and emerging market and US industrial production.

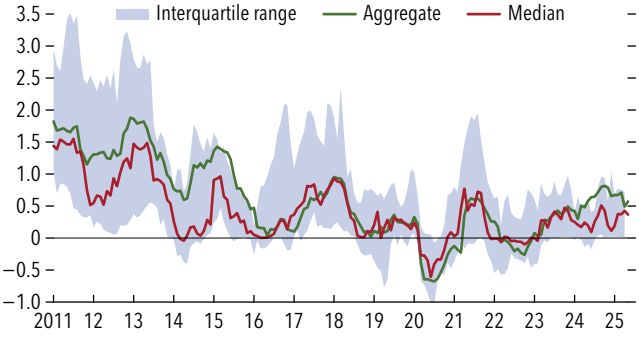
[12]Cerutti and Claessens (2024) assert that only up to about 25 percent of the variation in portfolio flows can be explained by the global financial cycle.

[13]This includes only funds reported by EPFR.

Figure 3.4. Portfolio Flows, Nonresident Holdings, and Investor Returns for Selected Emerging Market and Developing Economies

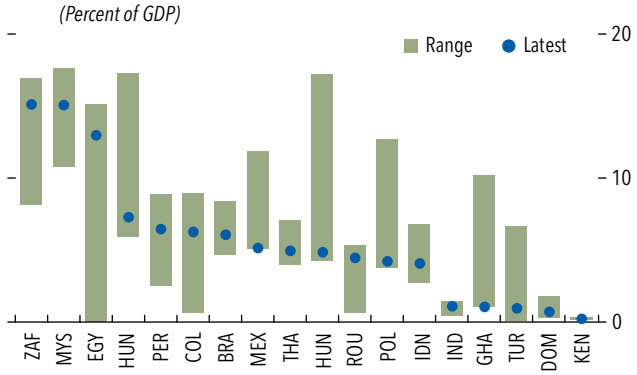
Portfolio flows to emerging markets have continued, albeit at a slower pace.

1. Nonresident Flows to Local Currency Bond Markets, Excluding China
(Percent of GDP on rolling 12-month sum)



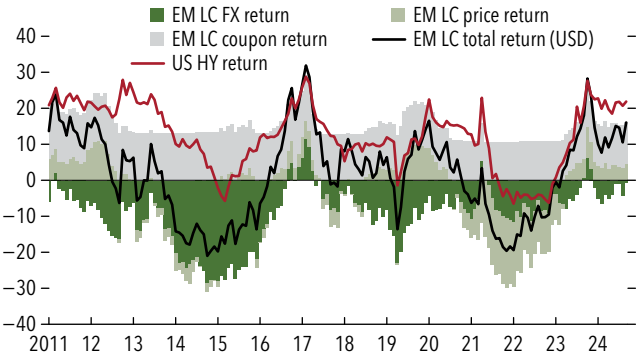
Nonresident holdings of local currency debt are below their peaks but remain significant in some cases.

2. Nonresident Holdings of Local Currency Government Bonds, 2012–Present
(Percent of GDP)



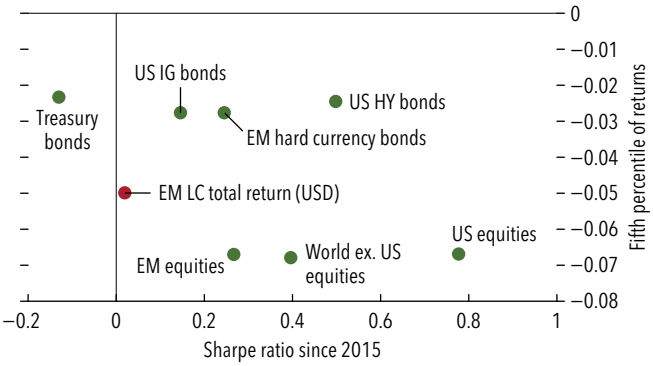
Total returns on emerging market local currency debt have been weak, undercut by currency performance.

3. Decomposition of Total Returns for Emerging Market Local Currency Debt
(Percent, two-year rolling returns, total return in US dollar terms)



Downside risks and risk-adjusted returns for emerging market local currency debt have lagged other asset classes.

4. Risk-Adjusted Returns and Downside Risk
(Fifth percentile of monthly returns since 2015; Sharpe ratio since 2015)



Sources: Bloomberg Finance L.P.; EPFR; J.P. Morgan; IMF World Economic Outlook database; IMF staff estimates; and national sources.

Note: Panels 1 and 2 include the same unbalanced panel of 17 countries, labeled in panel 2. Egypt includes only US Treasury bills; GDP is interpolated. Data labels in the figure use International Organization for Standardization (ISO) country codes. Panel 3 displays returns from the J.P. Morgan EM Government Bond Index–Global Diversified: a local currency government bond index with a maximum country weight of 10 percent. Panel 4 considers monthly returns since 2015; other asset class returns are derived from benchmark indices. In panel 4, Treasury bills are used as the risk-free rate. EM = emerging market; ex. = excluding; FX = foreign exchange; HY = high yield; IG = investment-grade; LC = local currency; USD = US dollar.

Among frontier markets, nonresident participation in domestic local currency debt markets has been more varied and at times prone to large fluctuations, although it can also be a significant part of some markets. Domestic bank ownership has generally been steady over time, indicating that bank absorption has largely kept pace with increased issuance in recent years (see the "Sovereign-Bank Nexus Has Risen in Recent Years" section), while NBFIs have increased their presence in a number of markets (Figure 3.5, panel 3).

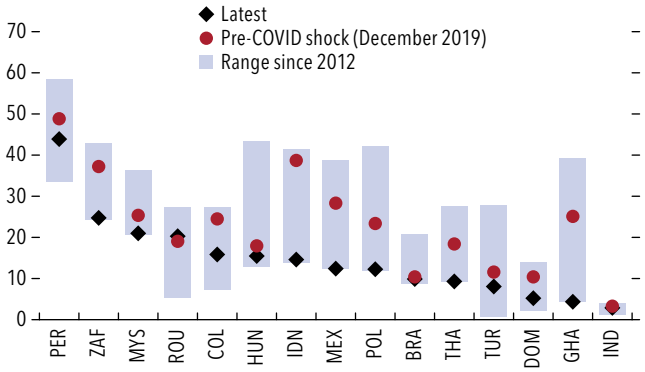
Investor Base for Some Local Currency Bond Markets Has Shifted from Nonresident to Resident

The uncertainty and risks around nonresident inflows highlight the value of a strong domestic investor

Figure 3.5. Investor Base in Selected Emerging Market Local Currency Government Bond Markets

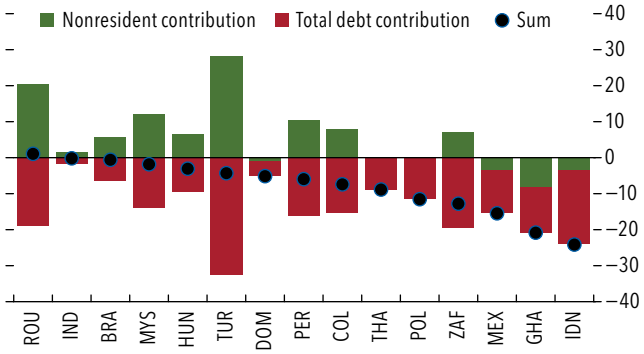
Nonresident share of LCBMs has declined and is near multiyear lows in many countries …

1. Range for Nonresident Share of LCBM since 2012
(Percent share)



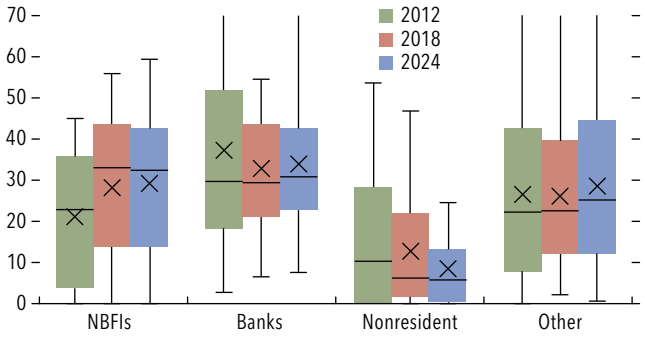
… with nonresident holdings largely failing to keep pace with higher domestic net issuance.

2. Decomposition of Change in Nonresident Share of LCBMs Since December 2019
(Percentage points, contribution of nonresident stock and total debt stock to change in nonresident share of debt)



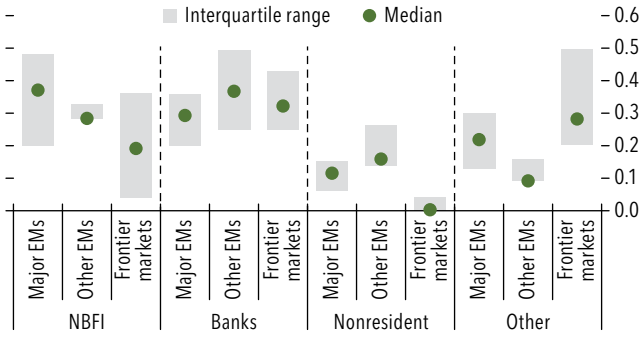
NBFIs have become a larger presence across most markets, while banks continue to be a sizable share of the investor base.

3. LCBM Investor Composition
(Percent share)



Investor composition varies considerably across countries, with larger NBFI ownership among major EMs, more banks among other EMs, and more "other" ownership among frontier markets.

4. Detailed Investor Composition, by LCBM and Country Type, 2024
(Percent share, interquartile range, median)



Sources: ASISA; central banks; EUROPACE AG/Haver Analytics; IMF Monetary and Financial Statistics; and ministries of finance.

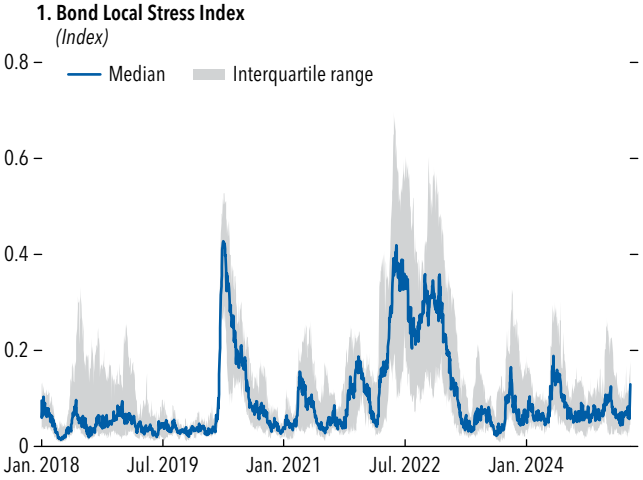
Note: Panels 3 and 4 use a baseline sample of 29 countries, of which the sample in panels 1 and 2 are included. In panels 1 and 2, India includes only central government securities. In panel 1, data on nonresident holdings for Hungary are not adjusted for repo transactions. In panel 3, × represents the average, and the horizontal line represents the median. Data labels in the figure use International Organization for Standardization (ISO) country codes. EM = emerging market; LCBM = local currency bond market; NBFI = nonbank financial institution.

base. However, investor composition varies considerably across EMDEs. Many emerging markets with more developed financial markets have been able to rely on a diverse set of resident NBFIs and banks. Emerging and frontier markets with less developed local markets have less consistent funding models. Debt absorption often involves different types of investors, with central banks, public institutions, and other private buyers playing more significant roles. Banks have a large presence in most LCBMs, although less so in Latin America, with a median ownership share of close to 30 percent across countries (Figure 3.5, panel 4). Among countries with a significant NBFI investor base,[14] the sector is primarily composed of long-term buyers such as pension funds and insurance companies (see the "Vulnerabilities: Limited Absorption Capacity and the Sovereign-Bank Nexus" section). In a limited number of countries (Brazil, Mexico, and South Africa), mutual and investment funds hold more than 10 percent of government bonds.

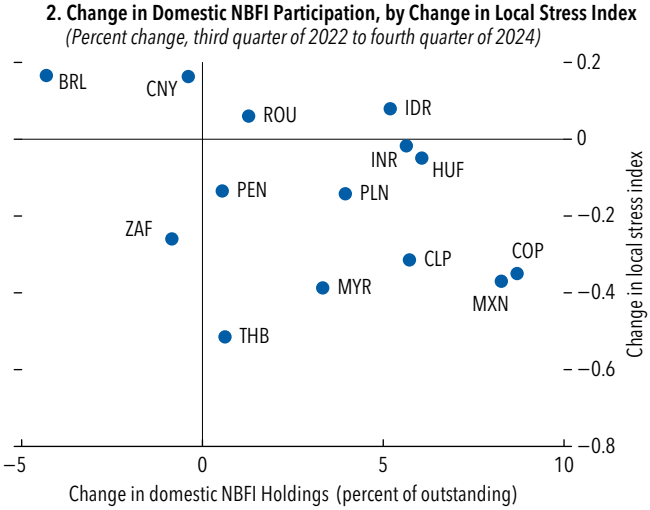
[14]Availability and consistency of granular classification of investor categories, especially among nonbank investors, varies greatly and presents analytical limitations.

Figure 3.6. Local Stress Index and the Investor Base for Local Currency Bond Markets in Emerging Markets

Emerging market LCBMs experienced some stress in early 2022 as many emerging market central banks raised rates rapidly ...



... with most emerging markets seeing an increase in domestic NBFIs' participation in the postpandemic era.



Sources: Bloomberg Finance L.P.; EUROPACE AG/Haver Analytics; and IMF staff calculations.

Note: Local stress index methodology is from the IMF's October 2020 *Global Financial Stability Report*. Variables for emerging markets are bid-ask spreads, estimated liquidation cost (Bloomberg's liquidity assessment model), term premia (the ACM model), and three-month realized volatility and asset swap spread. Data labels in the figure use International Organization for Standardization (ISO) country codes. LCBM = local currency bond market; NBFI = nonbank financial institution.

EMDE Bond Market Sensitivity to Global Shocks

Local Market Stress Has Receded in Recent Years

LCBMs in emerging markets experienced periods of heightened stress during the COVID-19 pandemic in 2020 and later in 2022 when many central banks rapidly hiked interest rates, as measured by the IMF Local Stress Index (Figure 3.6, panel 1). Greater participation by domestic NBFIs in LCBMs (as detailed in the previous section) appears to have coincided with the normalization of market functioning during the 2022 episode (Figure 3.6, panel 2). In contrast, in 2020, domestic banks absorbed the bulk of issuance, while central bank purchases were also associated with a reduction in market stress (see the October 2020 *Global Financial Stability Report*).[15] The empirical models in the next section provide more granular analysis of the stabilizing role of domestic banks and NBFIs during global shocks.

[15]Eckhold and others (2024) note that the increased presence of central banks in LCBMs after the COVID-19 shock was in line with their financial stability mandates, effectively addressing issues related to market dysfunction. However, in some EMDEs, the size of the interventions may have significantly increased risks to central banks' balance sheets, raising issues of policy solvency, operational independence, fiscal dominance, and moral hazard.

More Resident Investors Is Associated with Smaller Effect of Global Shocks on Local Bond Markets

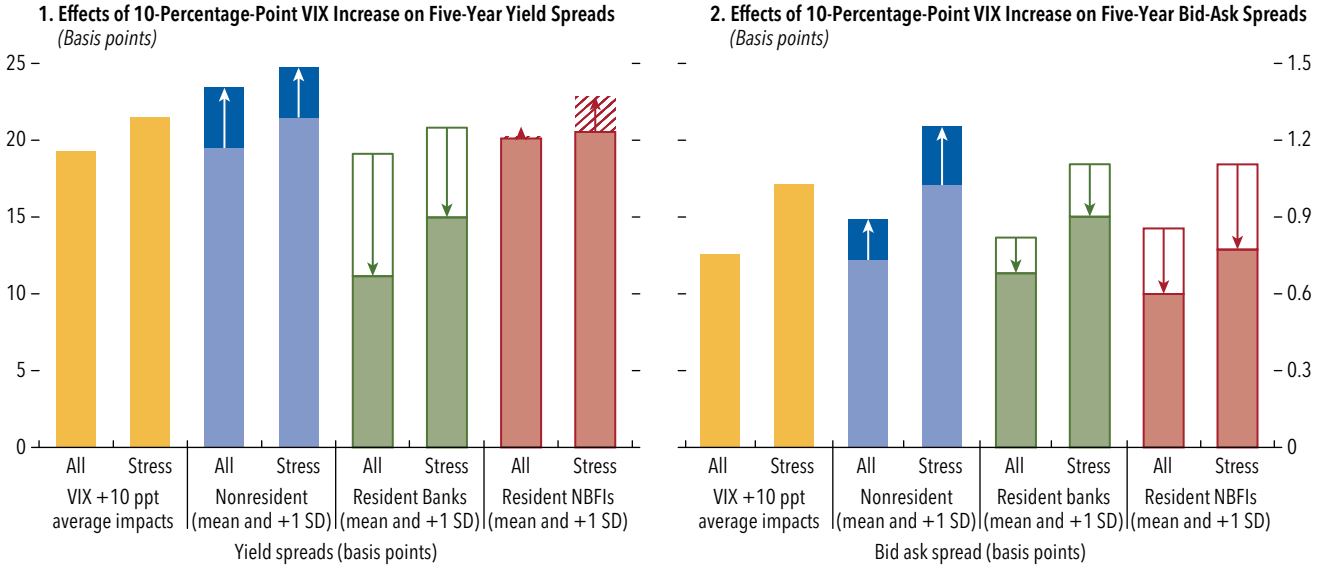
Regressions confirm that increased resident bank holdings are associated with a decline in the transmission of global shocks to LCBMs.[16] Global shocks are generally accompanied by an increase in local market strains, as measured by rising bond yields or widening bid-ask spreads (see Figure 3.7, panels 1 and 2, yellow bars). However, the presence of nonresident investors is associated with an amplification of such pressure (blue bars), and increased resident bank participation is associated with a dampening of these pressures (green bars), particularly when investor participation is above the sample average. Moreover, the attenuation effects persist and are larger in some instances during periods of financial market stress; the latter suggests that

[16]Cross-country panel regressions are used to quantify the effects of investor participation on LCBMs. The dependent variables are changes in five-year yield spreads and bid-ask spreads for 14 emerging markets, while the key independent variable is the change in the Chicago Board Options Exchange Volatility (VIX) Index, a proxy for global shocks, and its interaction with shares held by nonresident and resident investors (further segmented into banks and NBFIs), controlling for economy level macroeconomic fundamentals (see Online Annex 3.1 for data and model discussions).

Figure 3.7. Effect of Global Risk Factors on Local Currency Bond Markets in Emerging Markets and the Role of Investor Composition

Above-average nonresident (domestic bank) shares increase (reduce) the impacts of VIX on yield spreads.

Above-average nonresident (domestic) shares increase (reduce) the impact of VIX on market liquidity.



Source: IMF staff calculations.

Note: Bars indicate the estimated impact of a 10-percentage-point increase in the VIX, along with the effects of a one-standard-deviation increase in investor participation for nonresidents, resident banks, and resident NBFIs. Solid bars signal an amplification effect; hollow bars indicate attenuation. Shaded bars indicate statistical insignificance. See Online Annex 3.1 for more information. "Stress" refers to a subsample in which the VIX is above its 75th historical percentile. The sample is Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Poland, Romania, South Africa, Thailand, and Türkiye. 1 SD = one standard deviation; NBFIs = nonbank financial institutions; ppt = percentage point; VIX = Chicago Board Options Exchange Volatility Index.

LCBMs' response to global shocks could be disproportionately higher in stress scenarios.

More specifically, the model results show that increased nonresident ownership is accompanied by an amplification of the effects of a VIX shock on local currency bond yield spreads to the same-maturity US Treasury yield and bond bid-ask spreads.[17] A 10-percentage-point increase in the VIX is associated with a 19 basis point increase of the five-year local currency yield spread and a 0.7 basis point increase in the bid-ask spread, when nonresident ownership of local currency bonds is at the cross-country average level of 22 percent (Figure 3.7, panels 1 and 2, light blue bars under "All"). Should this ownership increase by one standard deviation (to 34 percent), the sensitivity of yield and bid-ask spreads to the increase in VIX rises, respectively, to 23 basis points and 0.9 basis point (Figure 3.7, panels 1 and 2, dark blue bars under "All"). Online Annex 3.1 contains more details on the model, results, and robustness checks.

By contrast, increased resident bank bond holdings are associated with a mitigation of the impacts of a VIX shock. A one-standard-deviation increase in ownership by resident banks from the average of 29 percent to 44 percent is associated with a dampening of the sensitivity of yield and bid-ask spreads, respectively, from 19 to 11 basis points and from 0.8 to 0.7 basis points (Figure 3.7, panels 1 and 2, left green bars under "All").

For sovereign bond investors, such effects are meaningful. For example, given the average monthly change in emerging market yield spreads of approximately 1.4 basis points, a 4 basis point increase in yield spreads—based on a 34 percent nonresident ownership and a 10-percentage-point increase in VIX—represents nearly three times the typical monthly movement. On market liquidity, given the average monthly change in bid-ask spreads of about 0.02 basis points, an impact of 0.1 to 0.2 basis points is about 5 to 10 times the average movement. These results are qualitatively

[17]These results are qualitatively consistent with the literature (for example, Ebeke and Lu 2015; Ho 2022; BIS 2024; October 2024 *Fiscal Monitor*, Chapter 1), which documents the procyclical nature of nonresident flows and the stabilizing role of banks.

similar when other proxies of global shocks, such as the Merrill Lynch Option Volatility Estimate (MOVE) Index, are used.[18]

The role of resident NBFIs is more nuanced. Increased NBFI bond holdings do not statistically alter the impact of a VIX shock on yield spreads in this sample (Figure 3.7, panel 1, left red bars), but they are associated with an attenuation of the shock's impact on bid-ask spreads (Figure 3.7, panel 2, left red bars). This lack of statistical significance in the yield spread regression may be driven by the heterogeneity of NBFIs across countries, given the diversity of their investment mandates, investment horizons, and funding stability. To disaggregate this effect, impacts were examined by region. In some economies in emerging Asia, where pension funds and insurers account for a dominant share of NBFI local currency bond holdings, increased NBFI participation is accompanied by an attenuation of the impacts of a VIX shock (Online Annex Table 3.1.4).[19] This is consistent with pension funds and insurers having more stable funding and typically being regarded as "safe hands" with long-term investment decisions. By contrast, in Latin America (notably Brazil and Mexico), where mutual funds play a larger role, a larger presence of NBFIs does not appear to have the same effect. That said, greater market participation of NBFIs does appear to help deepen market liquidity more broadly, as seen in a narrowing of bid-ask spreads.

The effect of global shocks on LCBMs appears nonlinear and tends to be larger in volatile times and for more indebted economies. Focusing on periods when the VIX is above its 75th historical percentile (Figure 3.7, panels 1 and 2, bars labeled "Stress"), a 10-percentage-point increase in the VIX raises local currency yield and bid-ask spreads much more (right yellow bars). The amplification and attenuation effects of higher nonresident and resident holdings, respectively, are also larger, particularly for market liquidity.

[18]It could be that pure time series variables (for example, monthly changes in VIX or MOVE) are picking up variations in other global conditions or shocks not considered in the panel regressions. Online Annex 3.1 shows the results of a specification whereby yearly fixed effects are added to the regression in both level and interaction terms, in addition to monthly VIX changes. The coefficients on the VIX regressors decline in magnitude in this specification, suggesting that there may indeed be other global forces that need to be considered.

[19]The regional approach was taken due to the lack of more granular data on the types of NBFIs that hold local currency bonds at an economy level.

This nonlinearity is also seen with regard to the size of government debt, whereby higher volatility would be expected in more highly indebted countries. For those high government debt economies (that is, with debt-to-GDP ratios above the sample median of 47 percent), domestic bank holdings are associated with smaller pass-throughs of global shocks, while the presence of nonresidents is accompanied by larger impacts. This highlights the importance of domestic investors in LCBMs to help weather periods of stress. That said, greater nonresident participation is also associated with narrower average yield spreads in these high-debt economies, suggesting a supportive role in reducing financing costs (see Online Annex 3.1 for more details).

Notably, the effects of global shocks and investor participation on domestic bond markets persist. Effects typically peak within one quarter before gradually receding. A larger nonresident investor share is associated with an amplification in both the magnitude and the duration of the spread response (Figure 3.8, panels 1 and 4), likely underscoring the procyclical nature of nonresident flows during risk-off episodes. By contrast, greater participation from domestic banks is accompanied by a dampening in the initial impact and an acceleration in the normalization of spreads, suggesting domestic banks' role in stabilizing and their market-making function (Figure 3.8, panels 2 and 5). For domestic resident NBFIs, although increased participation does not statistically alter the response of yield spreads to the VIX shock (Figure 3.8, panel 3), it does support market liquidity by dampening the response of bid-ask spreads in significant and durable ways, underscoring the sector's role in deepening market liquidity (Figure 3.8, panel 6).

Vulnerabilities: Limited Absorption Capacity and the Sovereign-Bank Nexus

Resident Investors' Absorption Capacity May Become More Challenged

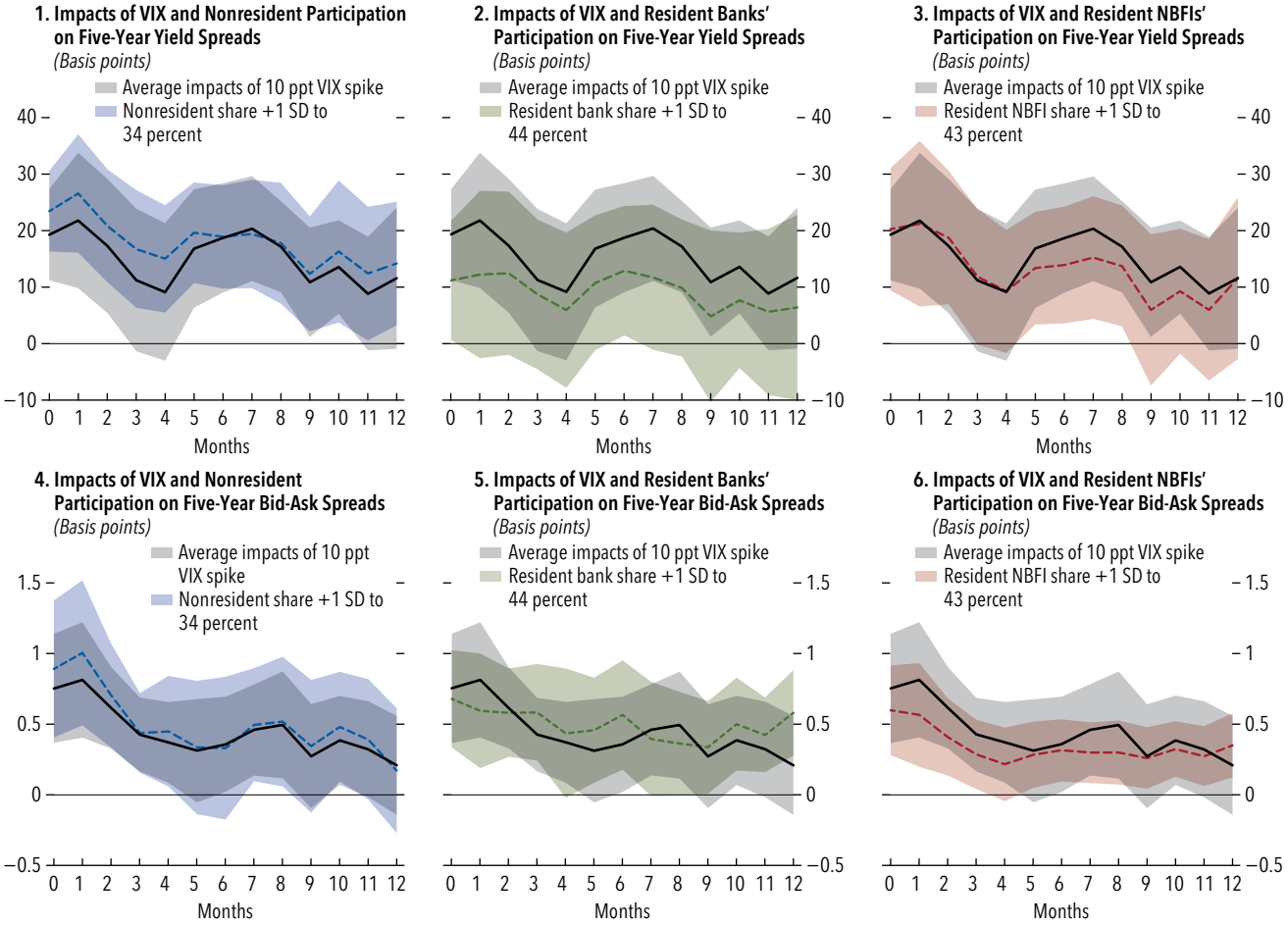
Although the regressions show that high resident participation is associated with smaller impacts of global shocks, the capacity of resident investors to continue absorbing supply might be waning. Net local currency government bond issuance continues to grow at a pace faster than prepandemic rates in several emerging markets (Figure 3.9, panel 1). Concerns that resident investors may not fully absorb rapid issuance could be a reason for the widening of local currency

Figure 3.8. Investor Composition and the Long-Term Effect of a VIX Increase on Local Currency Bond Markets in Emerging Markets

Greater nonresident participation significantly amplifies the effects of global shocks on local currency bond markets.

Greater domestic bank participation significantly mitigates the effects of global shocks on local currency bond markets.

Greater domestic NBFI participation significantly mitigates the effects of global shocks on local currency bond market liquidity.



Sources: IMF staff calculations.

Note: The figure shows the long-term impact of a 10-percentage-point increase in VIX on five-year yield spreads to US Treasuries and five-year bid-ask spreads. The black lines show the effects when nonresidents, resident banks, and resident NBFIs holdings are at their averages of 22, 29, and 31 percent, respectively. The blue, green, and red, dashed lines show the effects when holding share increases by 1 standard deviation to 34 percent for foreign institutions, 44 percent for domestic banks, and 43 percent for domestic NBFIs. The shaded areas represent 90 percent confidence intervals. The emerging markets covered in the sample are Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Poland, Romania, South Africa, Thailand, and Türkiye. 1 SD = 1 standard deviation; NBFIs = nonbank financial institutions; ppt = percentage point; VIX = Chicago Board Options Exchange Volatility Index.

bond yields relative to interest rate swap rates in recent months for some emerging markets—large issuance tends to be a significant driver of wider swap spreads (Figure 3.9, panel 2).

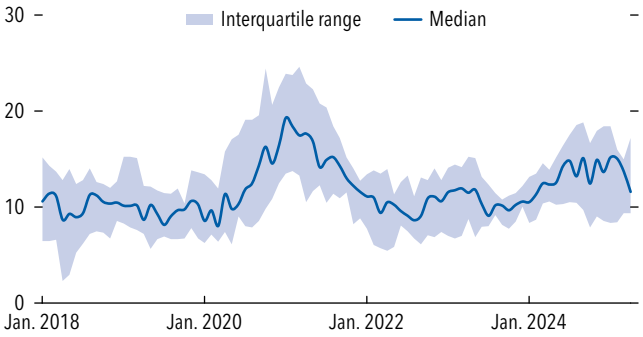
Financial assets of NBFIs in EMDEs increased by about 11 percent of GDP since 2013, as measured by an equal-weighted average across a selection of 20 economies (Figure 3.9, panel 3). However, NBFI presence in the frontier markets in this sample remains low. This suggests frontier markets will continue to rely on banks to be the main buyers of sovereign debt. On average, NBFIs in emerging and frontier markets hold roughly 22 and 40 percent of their assets in sovereign debt, respectively.[20] While there is substantial heterogeneity across jurisdictions, emerging and frontier market pension funds allocate

[20]Average NBFI sovereign debt holdings cover only jurisdictions with data available in the IMF Monetary and Financial Statistics data set.

Figure 3.9. Financial Sector Assets and Absorption Challenges in Selected Emerging Markets

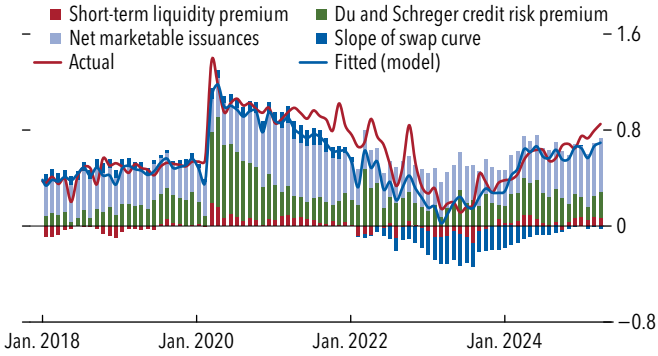
Local currency issuance has expanded faster than prepandemic ...

1. Local Currency Debt Issuance
(Year-over-year percent change)



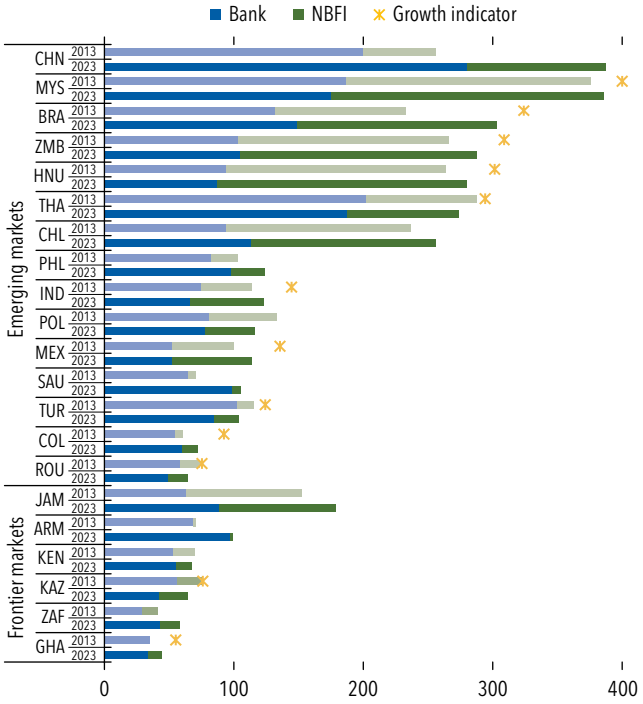
... contributing to wider spreads against swap rates.

2. Model Decomposition of Five-Year Swap Spreads
(Percent)



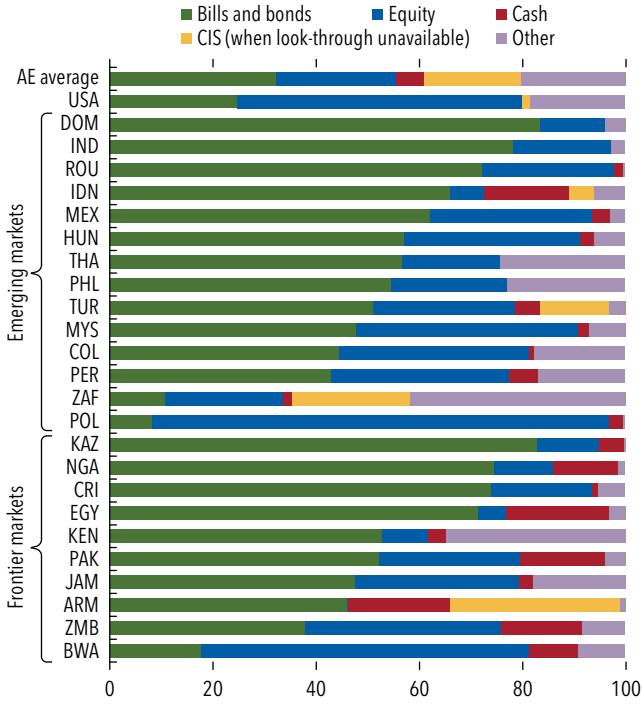
Nonbank financial institution assets are limited in most frontier markets, although they have generally expanded in most countries over the past decade.

3. Emerging and Frontier Market Financial Sector Asset Growth
(Percent of GDP)



Emerging and frontier market pension fixed-income allocations are higher than those of advanced economies.

4. Pension Fund Asset Allocation across Countries, 2024 or Latest Available
(Percent of pension fund assets)



Sources: Bloomberg Finance L.P.; Fitch Ratings; OECD 2024; IMF Monetary and Financial Statistics and World Economic Outlook database; and IMF staff calculations.

Note: Panel 1 shows growth in marketable local currency debt. In panel 2, estimates are derived from ordinary least squares regression on individual economies, with attribution to only relevant variables for individual countries. The slope of the swap curve captures issuers' incentives to adjust maturities; when the curve is steep, issuers may swap longer-term obligations for shorter-term payments by receiving fixed longer-term rates, and paying short or floating rates, thus widening the bond-swap spread. Sample emerging market economies for panels 1 and 2 are confined to Brazil, Chile, Colombia, Hungary, Indonesia, Malaysia, Mexico, Poland, Romania, and South Africa because of data availability. Panels 3 and 4 focus on the same [29]-country sample as Figure 3.5, subject to data availability. In panel 3, countries without 2013 data are represented using 2014–15 figures instead. In panel 3, × indicates that NBFI assets grew at a faster pace than that of banks between 2013 and 2023. In panel 4, "AE average" is the average pension fund asset allocation across all advanced economies. Asset allocation includes direct and indirect holdings via CIS. Where look-through is available, CIS are decomposed into underlying asset classes; otherwise, the data fall within "CIS (when look-through unavailable)." "Other" refers to real estate, loans, derivatives, and other alternative investments. Data come from both defined-benefit and defined-contribution pension plans. The figure uses OECD data for members, while data for nonmember countries are compiled from national authorities or the largest pension funds directly. Data labels in the figure use International Organization for Standardization (ISO) country codes. AE = advanced economy; CIS = collective investment schemes; NBFI = nonbank financial institution; OECD = Organisation for Economic Co-operation and Development.

roughly half their assets to fixed-income securities[21] (Figure 3.9, panel 4), materially higher than the average advanced economy fixed-income allocation of 30 percent. In many cases, high fixed-income allocations reflect that investable alternatives are limited and that allocations face regulatory constraints. For frontier markets in particular, small NBFI sectors and high shares of assets held in sovereign debt indicate that some countries could already be in the state of high domestic debt and low absorption capacity.

Sovereign-Bank Nexus Has Risen in Recent Years

Although large resident banks' presence in LCBMs helps mitigate the impact of global shocks, excessive government bond holdings by banks can exacerbate the sovereign-bank nexus. The nexus involves three channels through which stress in one sector can propagate to the others (Chapter 2, April 2022 *Global Financial Stability Report*). The first channel is through direct exposure, specifically the impact of banks' realized losses on large government debt holdings during a fiscal crisis. The second relates to the safety net channel, whereby contingent liabilities from implicit government guarantees of the banking system occur. The third involves the macroeconomic channel, whereby weakening economic fundamentals simultaneously undermines sovereign creditworthiness and erode banks' asset quality through rising defaults and slower credit growth.

Banking and sovereign debt crises have frequently occurred at the same time or in quick succession (Chapter 2, April 2022 *Global Financial Stability Report*). Sovereign-bank linkages can trigger self-fulfilling crises: As fears of a sovereign default rise, banks with significant exposure to the sovereign are seen as riskier. Furthermore, the failure of a domestic bank heavily invested in domestic sovereign debt may result in wider spillovers to corporate lending and other sectors of the economy.

In the context of financial repression, moral suasion has been recognized as a key reason for domestic banks to hold government securities (Deghi and others 2022).[22] These pressures are particularly pronounced for state-owned banks, which generally significantly increase their holdings of sovereign debt during periods of fiscal stress or sovereign distress. Furthermore, among state-owned banks, those with weaker capitalization levels typically increase their sovereign exposures the most, which could erode their vulnerable capital base and lead to the mispricing of sovereign debt and crowding out of private sector credit (see the "Both Strengths and Weaknesses of LCBMs Are Relevant in Emerging and Frontier Markets" section).

Since 2014, the rapid growth in local currency debt issuance has coincided with a growing sovereign-bank nexus, as reflected in the increase in banks' government debt holdings as a share of their total assets (Figure 3.10, panel 1). This may have been driven by a combination of liquidity management needs, attractive yields—especially in high interest rate environments—and, in some cases, moral suasion from authorities. Economies with higher debt burdens tend to have a greater concentration of government bonds on their banks' balance sheets (Figure 3.10, panel 2). The nexus is particularly pronounced in emerging and frontier markets with smaller and less developed capital markets, where domestic banks often serve as the primary vehicle for absorbing sovereign debt (Chapter 2, April 2022 *Global Financial Stability Report*).[23]

As a result of the sovereign-bank nexus, default risks of sovereigns and banks tend to move closely together, and there is potential for a two-way causality. From the perspective of international credit rating agencies, banks' credit ratings are generally constrained by the sovereign's "country ceiling,"[24] with exceptions granted only in rare cases. The cap reflects rating agencies' transfer and convertibility criteria, which assess the risk that a government might impose capital or exchange controls that restrict payments to nonresident creditors for debt service. Consequently, a sovereign downgrade often triggers ratings downgrades for these "bound firms" that are subject to the cap (Chapter 2, April 2022 *Global Financial Stability Report*).

The close interconnectedness between sovereign risk and banking sector risk is evident from the co-movements of implied default risk. Observations from monthly data since 2010 indicate that during

[21]"Fixed-income securities" include both local and foreign currency instruments, encompassing domestic and foreign government and corporate issuers.

[22]Financial repression may manifest through various channels, including the directed placement of government securities with state-owned banks, public enterprises, or government-controlled institutional investors or the administrative setting of government security yields at below-market levels (IMF 2021).

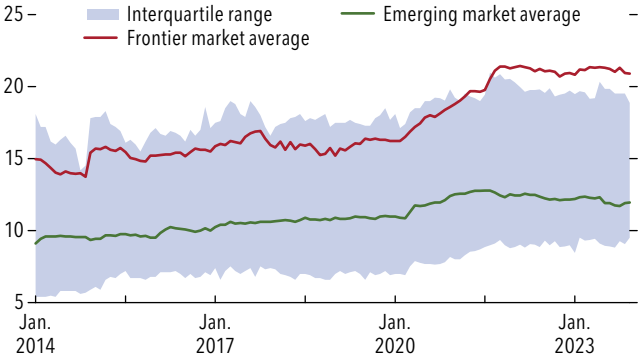
[23]However, there is significant heterogeneity across economies. Rising holdings of local currency debt by domestic banks has occurred in jurisdictions with both deteriorating and improving capital adequacy ratios, suggesting that government debt accumulation by banks could be driven by considerations other than capital.

[24]Country ceilings are not credit ratings but serve as a reference that can limit the foreign currency ratings assigned to entities within a sovereign's jurisdiction.

Figure 3.10. Recent Trends in Sovereign-Bank Nexus Risks in Selected Emerging Market and Developing Economies

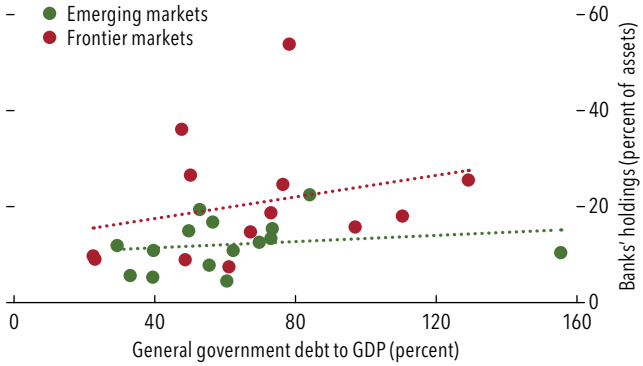
The strength of the nexus has increased since the onset of the COVID-19 pandemic.

1. Evolution of Banks' Holdings of Domestic Government Debt
(Percent of total assets)



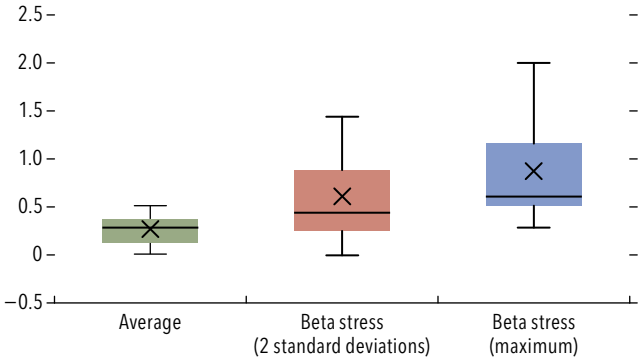
Economies with a larger debt burden tend to see their banking sectors hold more sovereign debt.

2. Banks' Sovereign Debt Holdings, by Sovereign Debt to GDP for 2023
(Percent)



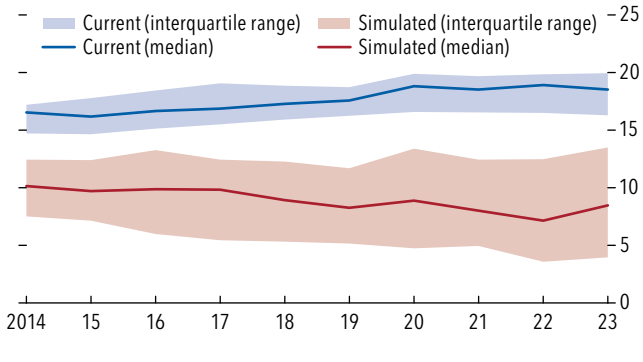
A shock to sovereign implied default risk could affect banks' expected default frequency, especially during stressed periods.

3. Sensitivity of Emerging Market Banks' Expected Default Frequency to Sovereign Implied Risk
(Beta, January 2010 to June 2025)



Banks in emerging market and developing economies could face capital shortfalls in the event of a hypothetical domestic debt-restructuring scenario.

4. Reported and Simulated Capital Ratio in Emerging Market and Developing Economies
(Percent of risk-weighted assets)



Sources: Bloomberg Finance L.P.; Moody's; IMF Financial Soundness Indicators and Public Sector–Bank Nexus databases; and IMF staff calculations.

Note: For panels 1, 2, and 4, the emerging markets are Argentina, Brazil, Chile, Colombia, Dominican Republic, Hungary, Indonesia, Malaysia, Mexico, the Philippines, Peru, Poland, South Africa, Thailand, and Türkiye, while frontier markets are Algeria, Botswana, Costa Rica, Ghana, Jordan, Kazakhstan, Kenya, Namibia, Nigeria, Pakistan, Sri Lanka, Uganda, and Zambia. In panel 2, data are from the end of 2023 or latest available. In panel 3, sensitivity is on two-year rolling monthly observation for emerging markets only, because of data availability constraints. Stressed data points represent observations that exceed 2 standard deviations, while the maximum bars indicate the highest beta values recorded during the period. Sovereign implied default risk is from major emerging markets' five-year credit default swaps. In panel 4, the scenario analysis assumes a 40 percent haircut on government bond holdings.

stress periods, a one-standard-deviation increase in emerging market sovereigns' implied default probability rate is associated with around half of a standard deviation rise in banks' expected default frequency. This effect also appears to intensify during periods of extreme stress, reaching near a one-for-one relationship, on average, for emerging markets (Figure 3.10, panel 3).

Using aggregated bank data from 15 emerging markets and 13 frontier markets, a hypothetical domestic debt restructuring event[25] that haircuts local currency bond prices by 40 percent results in more than half of banking sectors seeing regulatory capital ratios fall

[25]The data sets used for the hypothetical effect of domestic debt restructuring consist of the ratio of the domestic banking sector's holdings to domestic government securities, risk-weighted assets, and regulatory capital from the IMF's Financial Soundness Indicators and Public Sector–Bank Nexus databases.

below the critical 10 percent threshold[26] (Figure 3.10, panel 4). A reverse simulation shows that most banking systems with more than 20 percent of assets in domestic government bonds are unlikely to withstand haircuts of 30 percent or more without breaching the 10 percent regulatory threshold.[27] While the analysis likely underestimates the extent of a sovereign distress event (credit risk) by not considering other amplification channels, the accounting effect alone highlights the vulnerability of the banking systems in this sample of economies.[28] Such fragilities could also be exposed during a noncredit risk event, such as an upward shift in local yield curves (market risk) or forced sales during dash-for-cash episodes (liquidity risk).

Deepening Local Currency Bond Markets to Enhance Financial Stability

Developing LCBMs requires not only sound macroeconomic fundamentals and adequate domestic financial savings but also a strong policy framework and robust financial market structure to channel these financial savings into a well-functioning local market.

The IMF–World Bank Local Currency Bond Market Framework (2021) provides a structured, data-driven approach to identify market development gaps, assess absorption capacity constraints, and guide sequencing of reforms to develop LCBMs. This framework evaluates the stage of development of four core building blocks—money markets, primary market issuance, secondary markets, and investor base—alongside two supporting blocks related to financial market infrastructure (FMI) and legal-regulatory systems, against the backdrop of macroeconomic and institutional enabling conditions.

This section applies the LCBM framework to assess market structure in 37 EMDEs with sizable LCBMs, drawing on available data and recent technical assistance experience. Economies are grouped as "major emerging markets," "other emerging markets," and "frontier markets" on the basis of the relative size of their LCBM and availability of benchmark bonds.[29] While findings provide actionable insight, data gaps limit comparability across dimensions, and results may not generalize to EMDEs where macrofinancial or market structures differ materially.

Both Strengths and Weaknesses of LCBMs Are Relevant in Emerging and Frontier Markets

Macroeconomic and institutional conditions vary widely across EMDEs, shaping the depth and resilience of LCBMs. Major emerging markets with more developed LCBMs tend to exhibit stronger economic fundamentals, including deeper domestic institutional investor bases and lower financial dollarization. These features help anchor investor confidence, lower sovereign risk premia, and support the formation of a yield curve (Figure 3.11, panel 1). In contrast, frontier markets often display weaker and more volatile macroeconomic conditions, limiting their capacity to price risk and sustain demand for long-term local currency bonds. Financial systems in these markets remain bank dominated, with concentrated investor holdings and limited intermediation. These structural weaknesses, when combined with heavy reliance on local currency debt issuance, can heighten the risk of financial repression, lead to crowding out of private sector credit, and increase financial stability risks (Chapter 2, April 2022 *Global Financial Stability Report*).

Flexible exchange rate regimes and inflation-targeting frameworks have supported bond market development in many major emerging markets by anchoring expectations and reducing volatility (Figure 3.11, panel 2).[30] In contrast, frontier markets often face higher inflation volatility, reflecting weaker policy anchors and the absence of credible inflation targeting frameworks alongside greater exchange rate pass-through. The exchange rate can affect bond yields in two ways. In some economies, central banks adjust policy rates to stabilize the exchange rate, and this directly moves short-term yields. In others, expectations of depreciation affect yields indirectly by lifting short-term rates through the inflation channel and pushing up long-term yields

[26]Minimum capital ratios vary between countries, and the 10 percent of risk-weighted assets threshold assumed may exceed the minimum ratio required in some jurisdictions. However, a decline below this threshold is likely to trigger corrective supervisory action (Barrail, Dehmej, and Wezel, forthcoming).

[27]Unlike the fixed losses-given-default assumption of 40 percent used in the simulation presented in Figure 3.10, panel 4, a reverse simulation calculates the maximum losses that banks can sustain on their local currency government bond holdings while still maintaining regulatory ratios above the 10 percent threshold, based on their initial capital ratio.

[28]Countries that undertook domestic debt restructuring in recent years were also characterized by a limited capacity of their domestic banking systems to transmit shocks to the wider economy (IMF 2021).

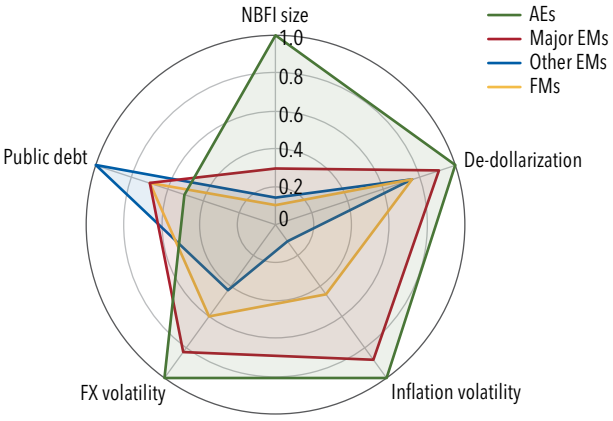
[29]The list of economy groupings is indicated in Online Annex 3.2.

[30]As seen in many EMDEs, inflation-targeting frameworks do not automatically guarantee a reliable yield curve. The operating framework should include well-defined goals, robust decision making, a coherent strategy, operational procedures, and effective communication.

Figure 3.11. Building Blocks of Local Currency Bond Market Resilience in Emerging Market and Developing Economies

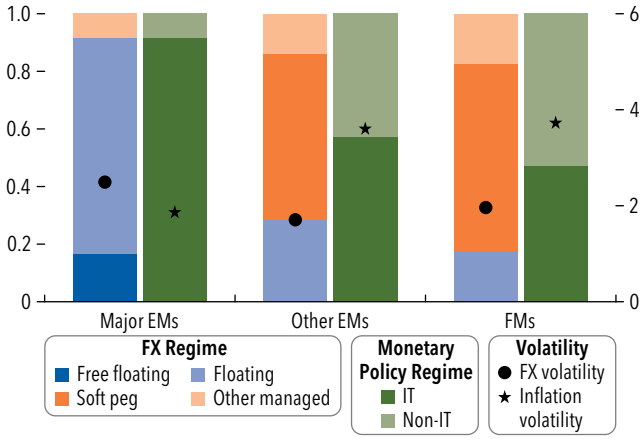
Major emerging markets typically display better macroeconomic fundamentals.

1. Macroeconomic Preconditions, by Economy Group
(Normalized index: 0 = weakest; 1 = strongest)



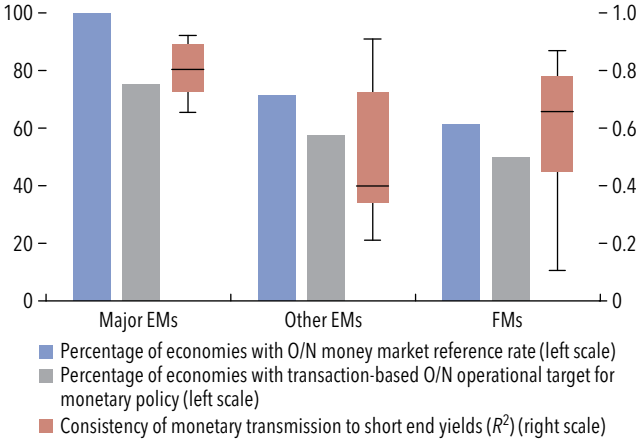
Credible inflation targeting and FX regimes experience lower macroeconomic volatility conducive for LCBMs.

2. Monetary Policy Regimes in EMDEs, End of 2024
(Share of economies, left scale; median FX/inflation volatility (five-year rolling window of standard deviation)



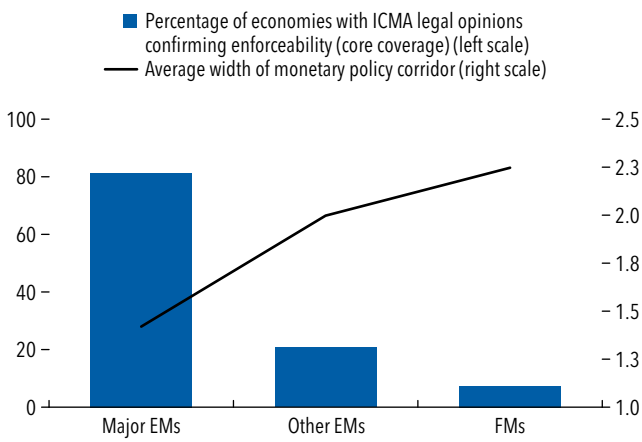
Interest rate-based monetary policy framework anchors the short end of the yield curve through better monetary policy transmission.

3. Monetary Policy Frameworks in EMDEs
(Share of economies, left scale; coefficient of determination, right scale)



Many EMDEs operate with wide interest rate corridors and weak repo contract enforceability, constraining money market depth.

4. Policy Corridor Widths and Repo Contract Enforceability in EMDEs
(Percent)



(Figure continues next page)

through higher currency risk and term premia. In practice, emerging markets are more often shaped by the direct policy rate channel, reflecting the stronger credibility of inflation-targeting frameworks, while frontier markets are more exposed to the risk premia channel. Both fixed and flexible exchange rate regimes can support bond market development if credible, but flexible regimes reduce the possibility of abrupt currency depreciation. The latter also generate demand for hedging instruments, which can help deepen LCBMs.

Foundational money market features remain uneven across EMDEs. Major emerging markets typically operate under interest-rate-based frameworks—often linked to formal inflation-targeting regimes in which the policy rate and transaction-based overnight reference rate anchor the short end of the yield curve (Figure 3.11, panel 3).[31] Many frontier markets rely on indicative or administratively set overnight rates, with weak links to underlying trades. Even where

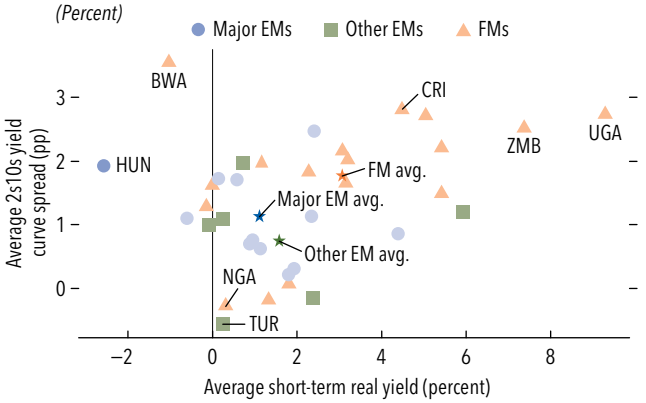
[31]Achieving reliable reference rates for market participants would require the rates to be based on transparent computation methodology and provisions for periods when markets are volatile or under stress (EBRD 2016). For detailed guidance on the transition to an interest-based monetary policy framework, refer to IMF (2022).

Figure 3.11. Building Blocks of Local Currency Bond Market Resilience in Emerging Market and Developing Economies *(continued)*

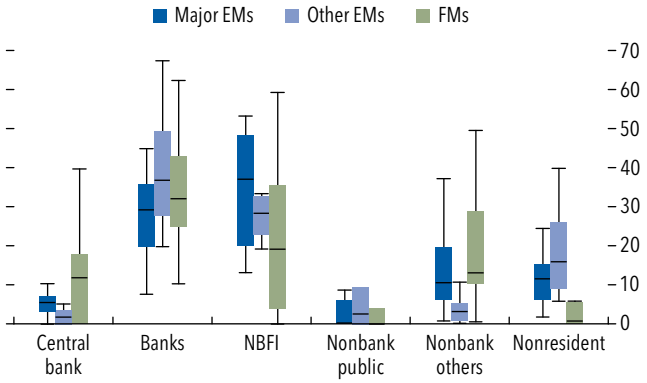
Real bond yields in some FMs, indicate a high-risk premium signaling underlying stability risks in less-developed LCBMs.

Fiscal dominance is more pronounced in FMs, while sovereign-bank nexus and nonresident exposures are higher in other emerging markets than in peers.

5. Short-Term Real Yields on Government Bonds and Yield Curve Slope in EMDEs
(Percent)



6. Investor Base Composition of LCBMs in EMDEs, by Economy Group, 2024
(Percent)



Sources: Bloomberg Finance L.P.; Fitch Ratings; IMF Annual Report on Exchange Arrangements and Exchange Restrictions, International Financial Statistics, and Monetary Operations and Instruments Database; ICMA, national sources; and IMF World Economic Outlook database.

Note: Panel 1 covers 46 countries: 13 AEs and 33 EMDEs (12 major EMs, 5 other EMs, and 16 FMs). De-dollarization is 100 minus the share of FX deposits in total deposits (set at 100 percent for AEs); the prior year was used if the latest was unavailable; source: Fitch). The NBFI size is proxied by 2023 NBFI assets (percentage of GDP). FX and inflation volatilities are five-year rolling standard deviations to the end of 2024. Public debt is general government gross debt (percentage of GDP to the end of 2024). Indicators are normalized from 0 (weakest) to 1 (strongest), and group averages represent each classification. Panel 2 is based on 36 EMDEs (12 major EMs, 7 other EMs, and 17 FMs). Data is based on IMF staff calculations using national sources for monetary policy regimes; IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER); IMF World Economic Outlook database; Bloomberg; and Haver. FX and inflation volatility are five-year rolling averages of standard deviations, calculated through end-2024. Panel 3 shows the share of jurisdictions with ICMA GMRA legal opinions confirming enforceability for core counterparties. Coverage may exclude some entities. R^2 values are from country-level regressions of annual changes in short-end government bond yields (one-year maturities, or the two-year where one-year is unavailable) on annual changes in policy rates, 2016–25. Annual observations are constructed from monthly data averaged to yearly values. R^2 indicates the share of variation in yields explained by policy rate changes, that is, the consistency of monetary transmission. The sample covers 34 countries: 12 major EMs, 7 other EMs, and 15 FMs. In panel 5, the dots show medians of annual averages over 2015–25. Real yields use the one-year maturity (or the two-year maturities if the one-year maturity is unavailable). The *y*-axis shows the spread between 10-year and 2-year government bond yields. Outliers are defined as countries above the 95th percentile or below the fifth percentile on either metric across the full sample (major EMs, other EMs, FMs). Group averages are shown as stars. Data labels use International Organization for Standardization (ISO) country codes. Panel 6 covers 29 EMDEs (12 major EMs, 4 other EMs, 13 FMs). AEs = advanced economies; avg. = average; EMs = emerging markets; EMDEs = emerging market and developing economy; FMs = frontier markets; FX = foreign exchange; GMRA = Global Master Repurchase Agreement; ICMA = International Capital Markets Association; IT = inflation targeting; LCBM = local currency bond market; NBFI = nonbank financial institutional investors, excluding public nonbank investors and other unclassified investors; non-IT = non–inflation targeting; pp = percentage point.

transaction-based rates exist, they are rarely used as operational targets, limiting price formation and weakening monetary policy transmission.

A deep and liquid repo market fosters interbank and secondary bond market trading, anchors the short-term rate, and enhances financial stability by reducing counterparty risk. Repo markets in EMDEs lag advanced economies in scale and market depth.[32] A key constraint for the interbank repo market is collateral availability driven by a high degree of held-to-maturity portfolios. At the same time, high haircuts, and operational limits on collateral circulation, reduce incentives to trade repos.[33] While many emerging markets have adopted standardized legal documentation supported by legal opinions, such as the Global Master Repurchase Agreement, legal uncertainties around collateral enforcement and netting remain in several jurisdictions. Restrictions on short selling apply and fragmented settlement infrastructure further limit the potential of interbank repo markets (Figure 3.11, panel 4). Gaps are larger in frontier

[32]Some major emerging markets have developed a deep repo market. In Brazil, the central bank's dominant role in liquidity management drives repo activity. Interbank repo activity in Mexico is a key driver of bond market liquidity.

[33]Another constraint is a divergence in collateral policy between central bank repos and interbank repos. The haircut determined should consider the maturity, quality, scarcity value, and price volatility of the underlying collateral; the term of the repo; and the creditworthiness of the customer.

markets, where liquidity management is primarily quantity based, secured interbank markets are nascent, and repo transactions are mostly confined to central bank operations.

Most EMDEs are price takers in the primary market, paying positive real yields. Major emerging markets generally sustain upward-sloping yield curves with moderate positive real yields, consistent with macroeconomic fundamentals, functioning price signals, and broader investor participation (Figure 3.11, panel 5). In contrast, many frontier and smaller emerging markets record persistently high real yields and steep yield curves, often reflecting elevated term premia from inflation uncertainty, debt sustainability concerns, or liquidity and supply constraints. A few economies display flat or negative real yields, which may reflect financial repression, shallow investor participation, or credible disinflation episodes that compress term premia. The relationship between the slope of yield curve and bank exposure to public sector debt is more negative in frontier markets.[34] Similarly, the negative real rate of returns during 2002–22 of pension funds, which invest heavily in government bonds, have been more pronounced in frontier markets relative to emerging markets.[35] Taken together, these persistent patterns over the past decade point to broader structural differences across EMDEs, shaped by market depth, the credibility of macroeconomic frameworks, and the scale of marketable debt in circulation.

Sovereign-bank links and exposure to nonresident holders are more pronounced in other emerging markets than in major peers, highlighting relatively higher vulnerability to funding shocks, rollover risks, and the amplification of sovereign stress through the banking system. In contrast, major emerging markets have larger NBFI participation, reflecting deeper financial systems and institutional investor bases. Pension reforms adopted in some Latin American economies, which include variants of a funded, privately managed, and defined-contribution personal accounts retirement system, have had a positive effect on the development of LCBM markets (Roldos 2004).[36] Bond holdings by banks are shaped by liquidity coverage requirements[37] and preferential sovereign risk weights, but in some economies also through reserve or statutory liquidity requirements, which may result in financial repression. Central banks in frontier markets hold a significant share of government securities, reflecting shallow investor bases and potentially indicating elements of fiscal dominance, in addition to high sovereign-bank nexus (Figure 3.11, panel 6). Where prudential limits on foreign exchange (FX) positions, caps on outward investment, and few alternative assets prevail, bank portfolios display strong "home bias" and concentration in LCBMs.

The availability of benchmark bonds is critical to the formation of deep and liquid markets. Annual borrowing plans anchored on credible medium-term fiscal frameworks support predictable issuance and reduce risks of fiscal dominance. Major emerging markets maintain yield curve formation through predictable issuance, frequent reopening, and regular liability management operations, resulting in benchmark issues typically above $1 billion, that support market liquidity and index inclusion (Figure 3.12, panel 1). Many emerging markets have strengthened government cash flow forecasting and established cash buffers to support buyback operations, while switch operations are usually cash neutral. Most other emerging markets issue in similar large sizes but with less consistency across tenors. In contrast, many frontier markets issue smaller, irregular amounts, with mixed levels of transparency and weak auction discipline.[38]

Primary dealer (PD) frameworks in frontier markets tend to prioritize auction participation over secondary market-making activities (Figure 3.12, panel 2). High auction coverage, often above advanced economy norms, supports near-term funding but can strengthen the sovereign-bank nexus, as banks end up backstopping funding risks. In frontier markets, PD frameworks rarely include binding obligations for

[34]Based on a sample of 25 economies, with 14 emerging markets and 11 frontier markets. Bank exposure to the public sector includes claims on the central government, local governments, and state-owned enterprises, using data from Barrail, Dehmej, and Wezel (forthcoming). The correlation between bank exposure and the slope of the yield curve is –0.34 for frontier markets and –0.09 for emerging markets, indicating that frontier markets with larger bank holdings of public debt tend to exhibit flatter or inverted yield curves.

[35]Based on a sample of 10 frontier markets and 16 emerging markets, the average real rate of return during 2002–22 was found to be negative for 50 percent and 6 percent of these groups, respectively (OECD 2024).

[36]Many frontier markets and some emerging markets rely on a pay-as-you-go system. Therefore, pension assets remain shallow. Pension assets of 21 emerging markets averaged at 17 percent of GDP in 2024, mainly contributed by Latin American emerging markets with an average of 27 percent, while for 11 frontier markets, pension assets stood at 14 percent (OECD 2024).

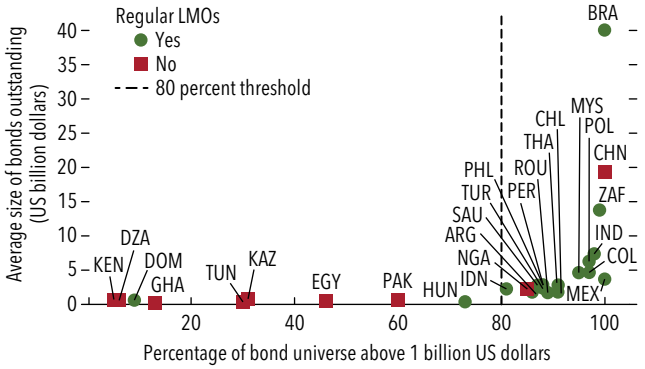
[37]Given widespread bond illiquidity in many EMDEs, government bonds are treated as high-quality liquid assets because they are eligible as collateral for central bank liquidity facilities.

[38]"Domestic Debt Securities Heat Map: 2023," World Bank, August 12, 2024, https://www.worldbank.org/en/data/interactive/2024/08/12/domestic-debt-securities-heatmap.

Figure 3.12. Local Currency Bond Market Development in Emerging Market and Developing Economies

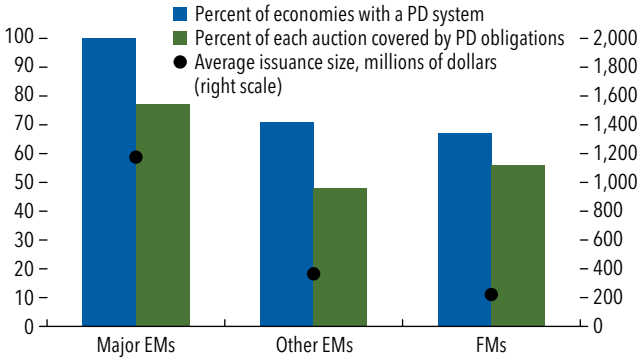
Regular use of liability management operations supports building sizable benchmark bonds.

1. Issuance of Benchmark Bonds and Regular Liability Management Operations



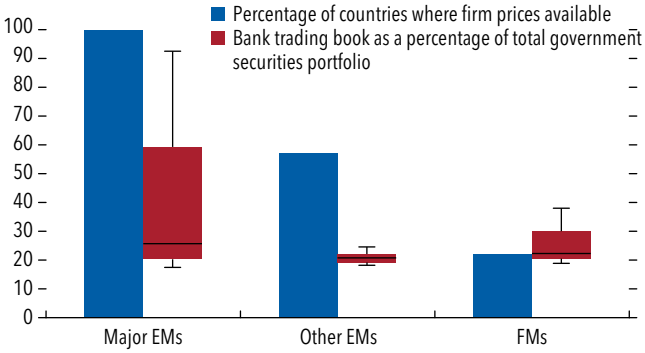
PD systems support auction demand but often expose structural weaknesses and deepen the sovereign-bank nexus.

2. PD System Support in Primary Markets
(Percent, left scale; millions of dollars, right scale)



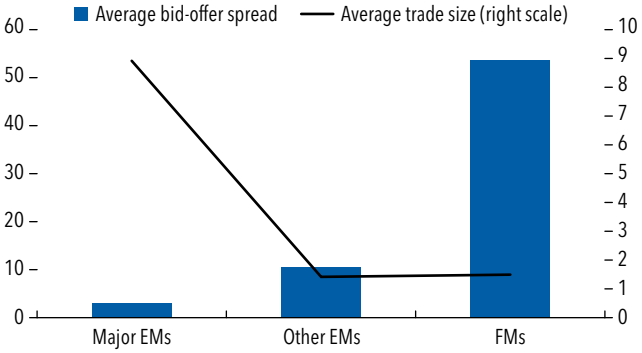
Quoting obligations for PDs and trading book activity remain limited, impeding bond market liquidity.

3. PD System Support in Secondary Markets
(Percent)



Bid-ask spreads and trade sizes reflect weaker liquidity in less developed LCBMs.

4. Secondary Market Liquidity and Average Trade Size
(Basis points, left scale; billions of US dollars, right scale)



Sources: Bank of America; Bloomberg Finance L.P.; Deutsche Bank; JPMorgan; national sources; S&P Capital IQ; and IMF staff calculations.

Note: Panel 1 reports the average size of "benchmark bonds" based on the total outstanding bond universe and the number of outstanding bonds. The share of the bond universe above US $1 billion equivalent is calculated from Bloomberg data, using exchange rates as of August 31, 2025. Excluded from the figure are countries with 0 percent of local currency government bonds outstanding above US $1 billion equivalent: Armenia, Botswana, Costa Rica, Jamaica, Jordan, Namibia, Sri Lanka, Uganda, Vietnam, and Zambia. Panel 2 reflects staff assessments of PD frameworks in 37 EMDEs. Actual PD primary market coverage can be below 100 percent, but PDs are often required to underwrite the full auction if demand is insufficient. The figure reports stated coverage obligations, not the 100 percent fallback underwriting. Panel 3 shows the number of countries with firm secondary price obligations, based on 37 EMDEs, including those without PD systems. The analysis of trading books is based on banking system averages for 2020–24 covering 24 EMDEs, measured as the share of total government securities portfolios, assuming most trading book assets are sovereign securities. Panel 4 presents estimated bid-offer spreads and trade sizes for benchmark bonds in 26 EMDEs, based on typical market conditions. Data labels in the figure use International Organization for Standardization (ISO) country codes. Data are as of August 31, 2025. EMDEs = emerging market and developing economies; LMO = liability management operation; PD = primary dealer.

firm "two-way" quotes in the secondary market and often lack supporting infrastructure for PDs. This leaves few dealers with active trading books[39] and creates shallow secondary market liquidity (Figure 3.12, panel 3). Even in major emerging markets, trading books are significantly smaller than in many developed markets, impeding market liquidity. PDs in most emerging markets include large global banks, which help broaden market access, introduce high-frequency trading strategies, contribute to market liquidity, and potentially narrow bid-ask spreads. However, these PDs can also act as conduits of increased sensitivity during periods of market stress and sudden shifts in global risk sentiment.

[39]Shallow market depth, limited hedging instruments, and a predominance of buy-and-hold investors reduce trading incentives, while regulatory costs and weak institutional support further constrain dealer activity.

High bid-offer spreads and weak pre- and post-trade price transparency in frontier markets underscore persistent secondary market inefficiencies. Wide spreads reflect small trade sizes, lack of benchmark securities, and concentrated buy-and-hold strategies, all of which limit secondary market turnover (Figure 3.12, panel 4). Developing electronic interdealer platforms, ensuring pre- and post-trade transparency, and publishing a reliable yield curve have spurred trading activity in major emerging markets.[40] Some emerging markets (for example, India, Malaysia, and South Africa) exhibit bid-offer spreads comparable with advanced economies, but market liquidity is often concentrated in a few select benchmark bonds.

Supporting market architecture (for example, hedging instruments, investor communication, and FMI) shapes investor participation and market resilience. Hedging markets supported by well-functioning money markets enable both domestic and nonresident investors to manage their exposure to interest rate and exchange rate risk, lifting their participation and liquidity. Emerging markets with deeper hedging markets have been able to weather shocks to liquidity conditions better than others during observed stress events (BIS 2024). Although hedging markets, mostly FX derivatives, continued to grow in emerging markets, they have not always kept pace with issuance.[41] Formal investor relations programs, timely transparency, and financial literacy programs have been effective in harnessing household and corporate investments, including through mutual fund products covering government bonds.

While many EMDEs have relatively open capital accounts, the absence of well-functioning LCBM and FX markets can deter direct nonresident investment.[42] Establishing links with international central securities depositories provides secure, standardized, cross-border access to domestic securities, reducing operational and legal barriers to entry.[43]

Efficient FMI[44] enables safe, low-cost settlement and supports investor confidence during stress. While most emerging markets have sound FMI in place,[45] FMI in frontier markets remains uneven, and operational gaps can amplify liquidity pressures and raise risk premia by disrupting settlement and deterring investor participation, particularly during periods of market stress. Central clearing of repos, essential in reducing counterparty risks, is present only in a few major emerging markets, enhancing market liquidity by reducing risk-based trading costs and mitigating investor uncertainty during market stress.[46]

Policy Recommendations

Strengthening LCBMs is a crucial step toward reducing sovereign debt vulnerabilities and enhancing financial resilience, alongside macroeconomic and fiscal stability. Where macrofinancial conditions are weak, rapid LCBM expansion that outpaces investor demand can increase term premia, destabilize debt dynamics, and increase financial stability risks. Economies should therefore prioritize macroeconomic stability and strong fiscal anchors that safeguard public debt sustainability. Mobilizing adequate financial savings and channeling them into LCBMs is key to strengthening absorption capacity and supporting LCBM development.

Reform priorities should focus on strengthening market absorption capacity by developing the domestic institutional investor base. Deepening LCBMs must be seen within broader financial sector development. National pension system design, including shifts from

[40]Electronic interdealer platforms for government bonds were developed with public sector support in markets like Brazil, India, and South Africa. Malaysia, Mexico, and Thailand implemented dissemination portals to enhance pre- and post-trade transparency in over-the-counter markets to increase transparency.

[41]FX derivatives are generally more prevalent in emerging markets, but Brazil, Chile, Mexico, and South Africa are among those with fairly balanced hedging markets.

[42]Nonetheless, foreign investors may gain synthetic exposure via derivatives or proxies, for example, interest rate swaps (see also Chapter 1), total return swaps, and credit-linked notes, which still influence yields and exchange rates. These instruments are attractive for nonresident investors who are either reluctant or not allowed by their mandates to open an account in a local clearing and settlement infrastructure. Offshore over-the-counter cross-currency swaps or nondeliverable forwards can also provide nonresident investors access to local bond markets.

[43]For example, the introduction of international central securities depositories to Russia in 2013 allowed foreign investors to switch from proxy instruments to direct holding of government bonds. Issuance of credit-linked notes disappeared within two months, and liquidity of government bonds surpassed that of cross-currency swaps (Lu and Yakovlev 2017).

[44]FMIs provide services for LCBMs that facilitate the clearing, settlement, and recording of financial transactions, including the transfer of securities and funds.

[45]As of January 2025, large emerging markets have self-attested to implementing the Committee on Payments and Market Infrastructures and International Organization of Securities Commissions (CPMI-IOSCO) Principles for FMIs, although self-assessment does not imply full compliance or guarantee sound operation in practice (Bank for International Settlements, Committee on Payments and Market Infrastructures, and International Organization of Securities Commissions, Update to the Level 1 online tracker, information as of January 2025).

[46]Brazil, China, and India have implemented a central clearing counterparty for clearing of repos.

Table 3.1. Policies to Improve Resilience and Develop Deeper Local Currency Bond Markets

Country Type	Primary Market Focus	Investor Strategy	Money and Secondary Market
Major emerging markets	Consolidate benchmark issuance to reduce fragmentation	Deepen institutional investor base by promoting long-term savings institutions	Expand use of interbank repos and encourage larger trading books for primary dealers and banks Establish central clearing counterparties where appropriate
Other emerging markets	Accelerate benchmark bond issuance and initiate regular liability management operations	Develop domestic institutional investor base to deepen local currency issuance	Improve the primary dealer framework Encourage the use of repo contracts based on internationally recognized master agreements
Frontier markets	Build benchmark bonds, establish issuance rules and auction discipline, and facilitate greater coordination with monetary operation Strengthen government cash management	Reduce overreliance on banks and nurture nascent institutional investors	Implement interest rate–based monetary policy and encourage use of money market reference rates and repos

Source: Authors.

pay-as-you-go system to funded systems, reflects social choices and takes time to implement. Complementary funded arrangements, such as mandatory contributions to privately managed plans or provident funds can support LCBM development (BIS 2019). Additional instruments, including pension-like insurance products, can help mobilize financial savings. Tax incentives can encourage participation in voluntary pension systems, complementary programs, and life insurance products. As the institutional investor base matures, gradually relaxing mandatory investment requirements and adopting "prudent person rules" would reduce overexposure to government securities and broaden investment allocation choices. Finally, greater financialization of household savings through collective investment schemes requires strong legal and regulatory frameworks to protect investors and a neutral tax regime that avoids double taxation (IMF and World Bank 2021).

Shallow liquidity and concentrated investor bases can amplify spillovers from shocks, underscoring the need to deepen market liquidity. Strengthening LCBMs reinforces the Integrated Policy Framework[47] by improving monetary transmission, reducing currency mismatches, and mitigating capital flow volatility. To this end, the IMF and World Bank are scaling up capacity development on money markets, FMI, and bond market reforms, integrating these priorities into surveillance and IMF-supported lending programs to ensure durable progress (Box 3.2). Table 3.1 summarizes the key priorities in LCBM development for different groupings of EMDEs.

To improve LCBMs, appropriate steps should be taken across all the key LCBM building blocks:

a. Sound monetary policy frameworks and deeper money markets are vital (IMF 2015). FMs should adopt and operationalize interest rate–based frameworks using credible policy instruments and transaction-based reference rates. Developing repo markets is critical for robust money markets (IMF and World Bank 2021). Major emerging markets can further expand collateral reuse and term repos as well as facilitate access to NBFIs. Mitigating systemic risks from repo markets during market stress episodes will be critical, supported by consistent application of haircuts and margin requirements, enhanced transparency, and other risk management controls.
b. Issuance strategies should emphasize predictability and transparency to sustain demand and build benchmark bonds to enhance market liquidity. Aligning issuance with monetary operations can stabilize systemic liquidity and reduce issuance volatility. To build a robust yield curve, frontier markets should focus on a limited set of standardized benchmarks, while emerging markets can consolidate liquidity through greater reopenings and regular use of liability management operations.
c. Effective primary dealer frameworks and trading infrastructure remain essential for market liquidity (Adrian, Fleming, and Nikolaou 2025). PD

[47]The Integrated Policy Framework has been developed by the IMF to guide the joint use of monetary, exchange rate, macroprudential, and capital flow management policies by considering policy trade-offs to manage external shocks, along with economy-specific frictions such as shallow markets, currency mismatches, foreign investors' limited appetite for emerging markets' local currency debt, and poorly anchored inflation expectations.

obligations should be balanced and tailored to the stage of market development, from indicative quotes in frontier markets to firm quoting obligations in major emerging markets. PD frameworks in frontier markets must balance privileges with obligations, while in major emerging markets the emphasis should shift to enforcing quoting obligations and participation thresholds for PDs.

d. Policymakers should strengthen market microstructure and systemic safeguards to enhance bond market resilience. Trading activity can be improved in less liquid markets through implementation of electronic interdealer trading platforms and enhanced market transparency through publication of reliable yield curves and better dissemination of pre- and post-trade information. In major emerging markets where repo activity has grown significantly, more robust clearing arrangements may be required. Establishment of central clearing counterparty could reduce counterparty risks and dealer balance sheet strain (Adrian, Nikolaou, and Wu 2025).
e. Prudential treatment of sovereign bonds should avoid reinforcing the sovereign-bank nexus. This can be done by gradually reducing incentives for held-to-maturity holdings and aligning liquidity coverage requirements with global standards. Policymakers should also remove legal and structural impediments to secondary market trading of government securities and support the development of hedging instruments, thereby enabling banks to hold more securities in trading books and improving market liquidity.
f. Domestic sovereign issuance should incorporate sound contractual provisions for debt restructurings. For economies, particularly at a nascent stage of LCBM development, it can be useful for domestic bonds to include provisions relating to the negotiation process and restructuring mechanics to facilitate orderly and predictable resolution if restructuring becomes necessary.
g. Investor base diversification to strengthen market resilience should be a long-term priority and contingent upon broader financial sector development supported by coherent financial sector policies. Pension reforms and greater penetration of the life insurance sector would be critical to expanding the institutional investor base in many EMDEs. Over the medium term, institutional investor demand could be enhanced in frontier markets by aligning investment mandates, solvency rules, and tax treatment. Clear and regular issuance communication can help anchor investor expectations. Large emerging markets can build on pension reforms and promote pooled investment vehicles like mutual funds and voluntary pensions.

Nonresident participation in LCBMs should be carefully considered, particularly in nascent frontier markets.

a. The appropriate degree of nonresident participation in a domestic bond market is difficult to establish, so both benefits and risks must be considered. Where adequate levels of financial development have not been attained and where financial market structure—particularly FX and money markets—are shallow and macroeconomic stability is weak, a gradual and phased approach may be useful to open participation of foreign investment in the LCBM. Reliance on short-term debt instruments should be phased out. These can increase rollover risks and amplify volatility during stress, particularly when they offer high real yields. Improving FX hedging tools in emerging markets can attract longer-term, noncarry-trade flows, thereby mitigating capital outflows.
b. Managing high nonresident participation requires strong institutions, especially in the context of an integrated global financial environment. Appropriate FMI systems should support systematic monitoring of nonresident holdings and flows. Periodic assessments of risks associated with nonresident holdings are important for formulating appropriate policy responses and building buffers. As an exception, where macroeconomic and prudential tools are insufficient, temporary and narrowly targeted capital flow management measures may need to be considered in line with the IMF's Institutional View (IMF 2012) to reduce excessive vulnerabilities with nonresident flows.

Box 3.1. Local Currency Debt and Domestic Investors in the Corporate Sector in Emerging Market and Developing Economies

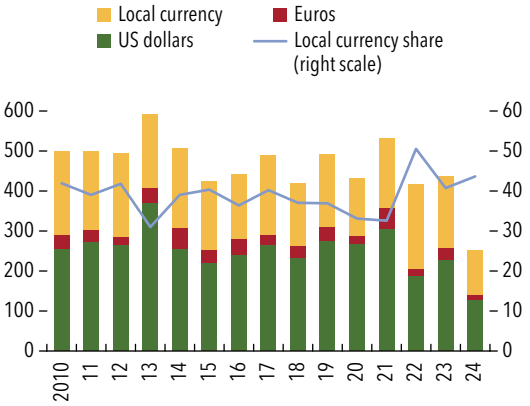
Emerging market corporate debt has not risen strongly in recent years, in contrast with emerging market and developing economy (EMDE) sovereign debt. Aggregation of deal-level data for EMDE (excluding China) corporate bonds and loans shows that issuance has declined significantly from 2022 through the third quarter of 2024, as the postpandemic surge in issuance in 2021 waned (Figure 3.1.1, panel 1). Bonds comprise around 80 percent of emerging market corporate debt issuance, having outgrown loans since the global financial crisis.

This box was prepared by Jason Wu based on the work of Jiayi Li.

Figure 3.1.1. Corporate Debt in Emerging Markets

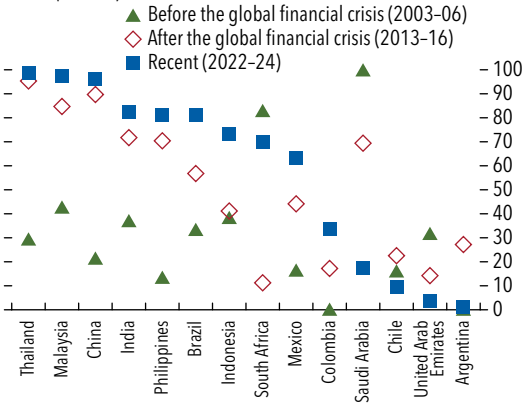
Issuance has declined, but local currency debt has gained ground ...

1. Emerging Market Corporate Debt Issuance
(Billions of dollars, left scale, percent share, right scale)



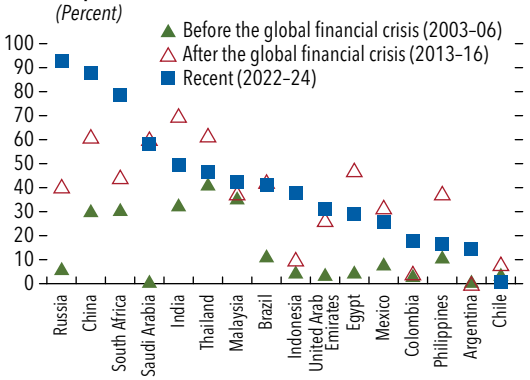
... especially local currency bonds ...

2. Share of Local Currency Bonds in Total Emerging Market Corporate Bonds
(Percent)



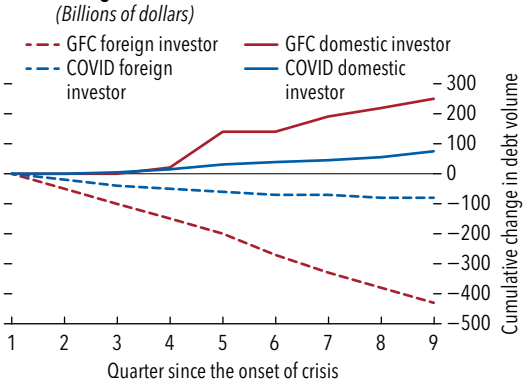
... and, to a lesser extent, corporate loans.

3. Share of Local Currency Loans in Total Emerging Market Corporate Loans
(Percent)



Domestic investors entered emerging market corporate debt markets during past crises.

4. Cumulative Emerging Market Corporate Loan Issuance during the Global Financial Crisis and COVID-19
(Billions of dollars)



Sources: Dealogic; and IMF staff calculations.

Note: Data are aggregations from almost 90,000 bond and loan issuances for about 14,000 nonfinancial corporations in emerging market and developing economies from 2000 to the third quarter of 2004. All shares are computed on a volume basis rather than on a deal count basis. GFC = global financial crisis.

Box 3.1 *(continued)*

However, mirroring the sovereign bond market, the local currency share of emerging market corporate debt (by volume) has increased in recent years, having jumped from 34 percent in 2021 to almost 45 percent in the third quarter of 2024 (Figure 3.1.1, panel 1, blue line). Across jurisdictions, corporations from emerging Asia were especially active in issuing local currency bonds. For example, on a volume basis, Malaysian and Thai corporations have almost exclusively issued bonds in local currency in the 2022 to 2024 period (Figure 3.1.1, panel 2). The same trend is observed qualitatively for corporate loans (Figure 3.1.1, panel 3), although the growth of local currency loans may be somewhat attenuated by EMDE corporations having bolstered borrowing relationships with banks headquartered in foreign jurisdictions that prefer foreign currency loans.

Domestic investors in corporate debt may have played a stabilizing role when markets were under strain. Following the onsets of the global financial crisis and the pandemic, domestic investors have increased their holdings of EMDEs' corporate loans, boosting debt volumes, while nonresident investors have retraced their holdings notably (Figure 3.2.1, panel 4). This finding resonates with the empirical findings of this chapter: Higher domestic investor shares in EMDE sovereign bonds attenuate the adverse impacts of global shocks.

Box 3.2. Case Studies of Local Currency Bond Market Reforms in Emerging Market and Developing Economies Supported by IMF Technical Assistance

Deepening Local Currency Bond Markets and Mitigating Sovereign Debt Portfolio Risks in Georgia

Supported by a joint programmatic technical assistance on debt management (2018–22), Georgia—a highly dollarized economy—made significant progress in deepening its domestic bond market and reducing foreign exchange risk. While government debt averaged around 40 percent of GDP between 2018 and 2024, the share of domestic marketable debt increased with tenors extending up to 11 years, lowering the foreign exchange debt share from 81 to 70 percent.

Benchmark issuance underpinned market growth, while liability management operations, including a 2024 switch operation, raised the average time to maturity for domestic securities from 2.6 years to 3.5 years (2018–24). A 2021 Eurobond ensured refinancing and preserved international market access.

The Ministry of Finance, with the support of the National Bank of Georgia, launched the Market Makers Pilot Program in 2020. This program improved price discovery on benchmark bonds (approximately $1.2 billion), although banks remain dominant investors. Transparency enhancements aim to attract more nonbank and foreign investors, while diversification remains a priority.

This box was prepared by Arindam Roy and Bryan Gurhy.

Laying the Foundations for a Robust Local Currency Bond Market in Bangladesh

Confronted with higher financing needs and falling concessional flows, Bangladesh identified local currency bond market development as a policy priority. A joint IMF–World Bank local currency bond market diagnostic mission in 2023 identified major distortions—including interest rate caps, central bank participation in auctions, and reliance on costly nonmarketable domestic debt in the form of national savings certificates; all of which hampered price discovery and market development.

Foundational reforms followed, supported by conditionality in the context of the IMF program. Conditions included transition to an interest rate–based monetary policy framework, removal of the lending rate cap, elimination of central bank government bond purchases, quarterly issuance calendars, publication of a daily secondary market yield curve, and expanded access through over-the-counter and stock exchange trading. National savings certificate rates were linked to market yields from 2025 to reduce market fragmentation. Follow-up technical assistance guided reforms on primary dealer framework guidelines in June 2025, removing underwriting obligations and emphasizing market making activities by primary dealers.

These efforts doubled the nominal stock of marketable bonds between 2019 and 2024, with benchmark bonds exceeding $500 million, securing FTSE Frontier Emerging Market Bond Index inclusion. While this may attract foreign investment, reducing the sovereign-bank nexus remains a key challenge

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