INTERNATIONAL MONETARY FUND

GLOBAL FINANCIAL STABILITY REPORT

Lower for Longer

2019
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Editor's Note (October 18, 2019)

This online version of the GFSR has been updated to reflect the following changes to the print version:

- On page 13 (Table 1.1), the note has been updated.
- On page 31 (2nd column, 2nd paragraph), the 2nd sentence has been updated.
- On page 37 (1st column, 2nd bullet), the 3rd sentence has been updated.
- On page 49 (Figure 3.1.1, panel 5), the chart has been updated.
- On page 51 (2nd column, 1st full paragraph), the 1st sentence has been updated.
- On page 52 (Figure 4.1, panel 5 and 6), the chart titles have been updated.
- On page 54 (2nd column, 2nd paragraph), the 3rd sentence has been updated.
- On page 56 (Figure 4.4, panel 2), the chart has been updated.

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ASSUMPTIONS AND CONVENTIONS

The following conventions are used throughout the *Global Financial Stability Report* (GFSR):

. . . 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, 2018–19 or January–June) to indicate the years or months covered, including the beginning and ending years or months;

/ between years or months (for example, 2018/19) 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).

If no source is listed on tables and figures, data are based on IMF staff estimates or calculations.

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 in the global financial system. In normal times, the report seeks to play a role in preventing crises by highlighting policies that may mitigate systemic risks, thereby contributing to global financial stability and the sustained economic growth of the IMF's member countries.

The analysis in this report was coordinated by the Monetary and Capital Markets (MCM) Department under the general direction of Tobias Adrian, Director. The project was directed by Fabio Natalucci, Deputy Director, as well as by Claudio Raddatz, Advisor, and Anna Ilyina, Division Chief. It benefited from comments and suggestions from the staff in the MCM Department.

Individual contributors to the report were Sergei Antoshin, Adolfo Barajas, Peter Breuer, John Caparusso, Sally Chen, Yingyuan Chen, Kevin Chow, Han Teng Chua, Fabio Cortes, Jannic Cutura, Andrea Deghi, Dimitris Drakopoulos, Martin Edmonds, Zhi Ken Gan, Rohit Goel, Sanjay Hazarika, Frank Hespeler, Henry Hoyle, Mohamed Jaber, Andy Jobst, David Jones, Will Kerry, Oksana Khadarina, Piyusha Khot, Robin Koepke, Mindaugas Leika, Sheheryar Malik, Evan Papageorgiou, Thomas Piontek, Jochen Schmittmann, Patrick Schneider, Dulani Seneviratne, Juan Solé, Felix Suntheim, Laura Valderrama, Jerome Vandenbussche, Jeffrey Williams, Xinze Juno Yao, Akihiko Yokoyama, Peichu Xie, Yizhi Xu, and Xingmi Zheng. Input was provided by Cristina Cuervo, Salim Darbar, Dirk Jan Grolleman, Shuyi Liu, Erlend Nier, Sohaib Shahid, Nobu Sugimoto, Peter Windsor, and Janice Yi Xue. Magally Bernal, Monica Devi, Breanne Rajkumar, and Andre Vasquez were responsible for word processing.

Gemma Diaz from the Communications Department led the editorial team and managed the report's production with editorial assistance from Lucy Scott Morales, Nancy Morrison, Katy Whipple/The Grauel Group, AGS, and Vector Talent Resources.

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, central banks, national treasuries, and academic researchers.

This GFSR reflects information available as of September 27, 2019. The report benefited from comments and suggestions from staff in other IMF departments, as well as from Executive Directors following their discussion of the GFSR on October 3, 2019. However, the analysis and policy considerations are those of the contributing staff and should not be attributed to the IMF, its Executive Directors, or their national authorities.

FOREWORD

Over the past six months, the twists and turns of trade disputes have continued to buffet financial markets, business sentiment has weakened further, and concerns about downside risks to the global economy have increased. The shift toward a more dovish monetary policy stance across the globe, which has been accompanied by a pronounced decline of longer-term yields, helped mitigate such concerns. Market pricing now suggests that rates will remain lower for longer than anticipated at the beginning of the year, and about $15 trillion of outstanding debt features negative yields.

Lower government bond yields have contributed to easing of global financial conditions compared with six months ago, particularly in the United States and the euro area. While easier financial conditions have supported economic growth and helped contain downside risks to the outlook in the near term, they have also encouraged more financial risk-taking and a further buildup of financial vulnerabilities, putting medium-term growth at risk.

Indeed, the analysis presented in this report points to elevated vulnerabilities in the *corporate* and in the *nonbank financial* sectors in several large economies. Lower yields have compelled insurance companies, pension funds, and other institutional investors with nominal return targets to invest in riskier and less liquid securities. As a result, these investors have become a larger source of funding for nonfinancial firms, which, in turn, facilitated a rise in corporate debt burdens. According to the analysis in this report, the share of debt owed by firms with weak debt repayment capacity is already sizable in several major economies and could reach post–global financial crisis levels in the event of a material economic downturn. Furthermore, low rates in advanced economies have spurred capital flows to emerging and frontier economies, facilitating further accumulation of external debt.

The search for yield in a prolonged low-interest-rate environment has led to *stretched valuations* in risky asset markets around the globe, raising the possibility of sharp, sudden adjustments in financial conditions. Such sharp tightening could have significant macroeconomic implications, especially in countries with elevated financial vulnerabilities.

Vulnerabilities are also present in the *global US dollar funding markets*. In this report, we take a deep dive into the funding profile of US dollar–denominated assets of non-US banks. While postcrisis financial regulation has improved the resilience of banking sectors in many dimensions, US dollar funding fragilities amplify adverse shocks and create spillovers to countries that borrow in US dollars from foreign non-US banks, thus becoming a source of vulnerability for the global financial system.

Policymakers should lean against the buildup of vulnerabilities by deploying and developing macroprudential tools as warranted and by maintaining stringent financial supervision. Macroprudential tools are well developed in some markets and jurisdictions. For example, many countries have demand-side tools for the housing market (such as limits on loan-to-value and debt-to-income ratios), but more jurisdictions would benefit from the activation of broad-based macroprudential tools, such as the countercyclical capital buffer. For the corporate sector, and for market-based finance more broadly, macroprudential tools are often lacking, highlighting the need to urgently develop such tools.

Of course, the main drivers of global downside risks have been trade tensions and policy uncertainties. Thus, the main priorities for policymakers are to resolve trade disputes, to provide clarity of economic policies, and to develop and deploy macroprudential tools to address the rise of financial vulnerabilities.

EXECUTIVE SUMMARY

The October 2019 *Global Financial Stability Report* at a Glance

Key Vulnerabilities in the Global Financial System

- Rising corporate debt burdens
- Increasing holdings of riskier and more illiquid assets by institutional investors
- Greater reliance on external borrowing by emerging and frontier market economies

What Should Policymakers Do?

- Address corporate vulnerabilities with stricter supervisory and macroprudential oversight
- Tackle risks among institutional investors through strengthened oversight and disclosures
- Implement prudent sovereign debt management practices and frameworks

Financial markets have been buffeted by the ebb and flow of trade tensions and growing concerns about the global economic outlook. Weakening economic activity and increased downside risks have prompted a shift toward a more dovish stance of monetary policy across the globe, a development that has been accompanied by sharp declines in market yields. As a result, the amount of bonds with negative yields has increased to about $15 trillion. Investors now expect interest rates to remain very low for longer than anticipated at the beginning of the year. Chapter 1 discusses how investors' search for yield has left asset prices in some markets overstretched and fostered a further easing in financial conditions since the April 2019 *Global Financial Stability Report*.

Accommodative monetary policy is supporting the economy in the near term, but easy financial conditions are encouraging financial risk-taking and are fueling a further buildup of vulnerabilities in some sectors and countries. Chapter 2 shows that corporate sector vulnerabilities are already elevated in several systemically important economies as a result of rising debt burdens and weakening debt service capacity. In a material economic slowdown scenario, half as severe as the global financial crisis, corporate debt-at-risk (debt owed by firms that are unable to cover their interest expenses with their earnings) could rise to $19 trillion—or nearly 40 percent of total corporate debt in major economies—above crisis levels.

Very low rates are prompting investors to search for yield and take on riskier and more illiquid assets to generate targeted returns, as discussed in Chapter 3. Vulnerabilities among nonbank financial institutions are now elevated in 80 percent of economies with systemically important financial sectors (by GDP). This share is similar to that at the height of the global financial crisis. Vulnerabilities also remain high in the insurance sector. Institutional investors' search for yield could lead to exposures that may amplify shocks during market stress: similarities in investment funds' portfolios could magnify a market sell-off, pension funds' illiquid investments could constrain their ability to play a role in stabilizing markets as they have done in the past, and cross-border investments by life insurers could facilitate spillovers across markets.

Capital flows to emerging markets have also been spurred by low interest rates in advanced economies (see Chapter 4). These inflows of capital have supported additional borrowing: median external debt in emerging market economies has risen to 160 percent of exports from 100 percent in 2008. In some countries, this ratio has increased to more than 300 percent. In the event of a sharp tightening in global financial conditions, increased borrowing could raise rollover and debt sustainability risks. For example, some overindebted state-owned enterprises may find it harder to maintain market access and service their liabilities without sovereign support.

Greater reliance on external borrowing in some frontier market economies could also increase the risk of future debt distress.

Regulation put in place in the wake of the global financial crisis has improved the overall resilience of the banking sector, but pockets of weaker institutions remain. Negative yields and flatter yield curves—along with a more subdued growth outlook—have reduced expectations of bank profitability, and the market capitalization of some banks has fallen to low levels. Banks are also exposed to sectors with high vulnerabilities through their lending activities, leaving them susceptible to potential losses. In China, the authorities had to intervene in three regional banks. Among non-US banks, US dollar funding fragilities—which were a cause of significant stress during the global financial crisis—remain a source of vulnerability in many economies, as discussed in Chapter 5. This dollar funding fragility could amplify the impact of a tightening in funding conditions and could create spillovers to countries that borrow in US dollars from non-US banks.

Environmental, social, and governance (ESG) principles are becoming increasingly important for borrowers and investors. ESG factors could have a material impact on corporate performance and may give rise to financial stability risks, particularly through climate-related losses. Authorities have a key role to play in developing standards for ESG investing. This role, along with the need to close data gaps and encourage more consistent reporting, is discussed in Chapter 6.

Against the backdrop of easy financial conditions, stretched valuations in some markets, and elevated vulnerabilities, medium-term risks to global growth and financial stability continue to be firmly skewed to the downside. *Macroeconomic and macroprudential policies* should be tailored to the particular circumstances facing each economy. In countries where economic activity remains robust but vulnerabilities are high or rising amid still easy financial conditions, policymakers should urgently tighten macroprudential policies, including broad-based macroprudential tools (such as the countercyclical capital buffer). In economies where macroeconomic policies are being eased in response to a deterioration in the economic outlook, but where vulnerabilities in particular sectors are still a concern, policymakers may have to use a more targeted approach to address specific pockets of vulnerability. For economies facing a significant slowdown, the focus should be on more accommodative policies, considering available policy space.

Policymakers urgently need to take action to tackle financial vulnerabilities that could exacerbate the next economic downturn:

- *Rising corporate debt burdens:* Stringent supervision of bank credit risk assessment and lending practices should be maintained. Efforts should be made to increase disclosure and transparency in nonbank finance markets to enable a more comprehensive assessment of risks. In economies where overall corporate sector debt is deemed to be systemically high, in addition to sector-specific prudential tools for banks, policymakers may consider developing prudential tools for highly leveraged firms. Reducing the bias in tax systems that favors debt over equity financing would also help reduce incentives for excessive borrowing.
- *Increasing holdings of riskier and more illiquid securities by institutional investors:* The oversight of nonbank financial entities should be strengthened. Vulnerabilities among institutional investors can be addressed through appropriate incentives (for example, to reduce the offering of guaranteed return products), minimum solvency and liquidity standards, and enhanced disclosure.
- *Increased reliance on external borrowing by emerging and frontier market economies:* Indebted emerging market and frontier economies should mitigate debt sustainability risks through prudent debt management practices and strong debt management frameworks.

Global policy coordination remains critical. There is a need to resolve trade tensions, as discussed in the April 2019 *World Economic Outlook*. Policymakers should also complete and fully implement the global regulatory reform agenda, ensuring that there is no rollback of regulatory standards. Continued international coordination and collaboration is also needed to ensure a smooth transition from LIBOR to new reference rates for a wide range of financial contracts around the world by the end of 2021.

IMF EXECUTIVE BOARD DISCUSSION SUMMARY

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 October 3, 2019.*

Executive Directors broadly shared the assessment of global economic prospects and risks. They observed that global growth in 2019 is expected to slow to its lowest level since the global financial crisis, reflecting a broad-based weakening of industrial output and business confidence amid rising trade tensions. While growth is expected to pick up modestly in 2020, the outlook is precariously hinged on a turnaround in a small number of countries that are currently underperforming or under stress. Meanwhile, overall growth in low-income developing countries continues to be relatively resilient, although prospects for convergence toward advanced economy income levels remain challenging.

Directors noted with concern that the global economy faces increased downside risks. Most notable in the near term are intensifying trade, technology, and geopolitical tensions with associated increases in policy uncertainty. Directors also pointed to the risk of an abrupt tightening of financial conditions that could be triggered by a range of events. They noted that downside risks remain elevated in the medium term, reflecting increased trade barriers, a further accumulation of financial vulnerabilities, and the consequences of unmitigated climate change.

Given these risks, Directors stressed the need to enhance multilateral cooperation, with most considering it a priority to de-escalate trade tensions, roll back the recent tariff increases, and resolve trade disagreements cooperatively. Directors also urged policymakers to limit greenhouse gas emissions and reduce global imbalances. Closer multilateral cooperation on international taxation and global financial regulatory reforms would help address vulnerabilities and broaden the gains from economic integration.

Directors underscored the urgency of deploying policies proactively to secure growth and enhance resilience. They supported the more accommodative monetary policy stance in many economies while emphasizing the continued importance of remaining data-dependent and clearly communicating policy decisions. Directors noted that the very low interest rates have expanded fiscal resources in many countries. They broadly agreed that, where fiscal space exists and debt is sustainable, high-quality fiscal policy should be used to support aggregate demand where needed. Ensuring debt sustainability requires rebuilding buffers in countries with relatively weaker fiscal positions, although the pace could be calibrated as market conditions permit to avoid prolonged economic weakness and disinflationary dynamics. If downside risks materialize, policymakers should stand ready to implement a contingent, and possibly coordinated, response.

Directors emphasized the importance of growth-enhancing structural reforms in all economies. The priority is to raise medium-term growth, improve inclusiveness, and strengthen resilience. Structural policies can help ease adjustment to shocks and boost output over the medium term, narrow within-country income differences, and encourage faster convergence across countries. Many countries should continue to strengthen institutions, governance, and policy frameworks to bolster resilience and growth prospects.

Directors noted that the prolonged low interest rate environment in advanced economies has encouraged risk-taking, including among institutional investors, and led to a continued build-up in financial vulnerabilities. These include rising risks in non-bank financial institutions, mounting corporate debt burdens, and a growing reliance on external borrowing by emerging and frontier market economies. Directors highlighted the urgent need to safeguard financial stability through stronger and broader macroprudential policies, and address corporate vulnerabilities with stricter supervision and oversight. They also supported the call for

strengthened oversight and disclosures of institutional investors and prudent sovereign debt management practices and frameworks, as well as a closer monitoring of U.S. dollar funding fragility. Directors reiterated their call for the full implementation of the global regulatory reform agenda.

Directors noted that emerging market and developing economies need to implement an appropriate mix of fiscal, monetary, exchange rate, and macroprudential policies. Ensuring financial resilience is a priority in emerging and frontier markets that are vulnerable to abrupt reversals of capital flows.

Directors urged low-income developing economies to adopt policies aimed at lifting potential growth, improving inclusiveness, and combating challenges that hinder progress toward the 2030 Sustainable Development Goals. Priorities include strengthening monetary and macroprudential policy frameworks and tackling debt vulnerabilities. Directors emphasized the need for fiscal policy to be in line with debt sustainability and progress toward development goals, importantly through building tax capacity while protecting the vulnerable. Complementarity between domestic revenues, official assistance, and private financing is essential for success, while investing in disaster readiness and climate-smart infrastructure will also be important. Countries need to improve education quality, narrow infrastructure gaps, enhance financial inclusion, and boost private investment. Commodity exporters should continue diversifying their economies.

Directors broadly welcomed the focus of the *Fiscal Monitor* on climate change. Most Directors concurred that carbon taxation, or similar pricing approaches such as emissions trading systems, is an effective tool for reducing emissions. Depending on country circumstances and preferences, other approaches, such as feebates and regulations, are also worth considering. Directors noted that, for climate change mitigation policies to be widely acceptable, they should be part of a comprehensive strategy that includes productive and equitable use of revenues, a social safety net for vulnerable groups, and supportive measures for clean technology investment. While many Directors noted that an international carbon price floor could help scale up mitigation efforts, further work and greater collaboration at the global level would be necessary to reach a broad-based agreement on a fair burden-sharing basis. Many Directors took the opportunity to welcome the Fund's work on analyzing mitigation policy options and integrating such analysis into its surveillance activity, leveraging the expertise within its mandate. Most Directors welcomed the attention paid to sustainable finance that embraces environmental, social, and governance considerations in investment decisions, and emphasized the importance of continued cooperation with other international organizations.

CHAPTER 1

GLOBAL FINANCIAL STABILITY OVERVIEW

LOWER FOR LONGER

Financial markets have been buffeted by the twists and turns of trade disputes amid growing investor concerns about downside risks to the economic outlook. Financial conditions have eased further since the previous Global Financial Stability Report *(GFSR) but appear to be premised on expectations of additional monetary policy accommodation across the globe. Large declines in interest rates have created further incentives for investors to search for yield, leading to stretched valuations in some asset markets. Although accommodative conditions have helped contain near-term downside risks to global growth, they have also fueled a further buildup of financial vulnerabilities. Against this backdrop, medium-term risks to global growth and financial stability continue to be firmly skewed to the downside. Policymakers urgently need to take action to tackle financial vulnerabilities that could exacerbate the next economic downturn.*

The Combination of Trade Tensions and Dovish Monetary Policy Has Led to Significant Swings in Financial Markets

The global economy remains at a difficult juncture, as discussed in the October 2019 *World Economic Outlook* (WEO). Growth has slowed, and inflation has continued to be muted across a number of economies. Trade tensions have persisted, despite the occasional temporary respite, with further rounds of tariffs announced since the previous GFSR.

Global financial markets have ebbed and flowed between periods of trade tension, where risk asset prices have fallen, and temporary truces, where asset prices have rallied. Equity prices of firms most exposed to trade tensions (including the automobile, metals, technology and telecommunications, and transportation sectors) have fared worse than their peers (Figure 1.1, panel 1). Other risk asset markets have moved in lockstep with equities. Credit spreads for lower-rated issuers have been relatively more sensitive to shifts in investor risk appetite (Figure 1.1, panel 2). Option-implied market volatility—which reflects investors' expectations of future variability in markets—has swung between short-lived spikes and longer periods of relative calm (Figure 1.1, panel 3). Some of the price moves in August may have been amplified by relatively strained market liquidity conditions.[1]

Against the backdrop of weakening economic activity and business sentiment, increased downside risks to growth, and continued subdued inflation, central banks across the globe have adopted a more dovish stance. The US Federal Reserve cut its policy rate twice (in July and September) by a total of 50 basis points, the first rate cuts since the financial crisis, and ended the reduction of its securities holdings earlier than previously planned. The European Central Bank lowered the interest rate on its deposit facility by 10 basis points in September and will restart net purchases of assets in November.[2] Many other central banks have adopted a more accommodative stance since the previous GFSR, and there has been a policy easing in economies representing about 70 percent of world GDP. Current and anticipated monetary policy accommodation has substantially boosted risk assets (Figure 1.1, panel 1).

This change in policy stance appears to have been interpreted by financial markets as a turning point in the monetary policy cycle, following a period of rate normalization in some economies. The shift suggests that a sustained normalization of rates and central bank balance sheets may be more difficult than previously envisioned, especially in the context of weaker global growth and when other central banks continue to pursue quantitative easing.

The authors of this chapter are Anna Ilyina (team leader), Will Kerry (team leader), Sergei Antoshin, Sally Chen, Yingyuan Chen, Fabio Cortes, Andrea Deghi, Rohit Goel, Frank Hespeler, Piyusha Khot, Sheheryar Malik, Thomas Piontek, Akihiko Yokoyama, and Xingmi Zheng, with input from Cristina Cuervo, Salim Darbar, Dirk Jan Grolleman, Erlend Nier, Nobu Sugimoto, and Janice Yi Xue, under the guidance of Fabio Natalucci. Magally Bernal, Martin Edmonds, and Andre Vasquez provided editorial assistance.

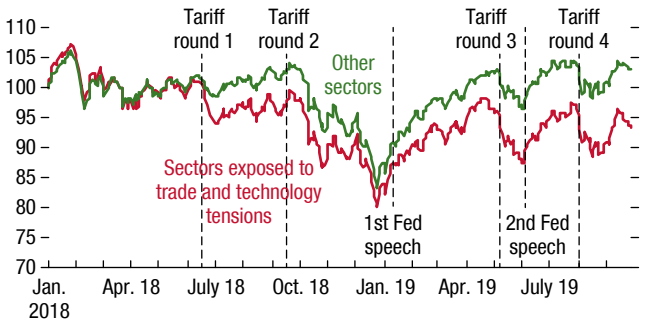
[1]Based on the IMF staff assessment using the jump analysis (see the April 2019 GFSR) and conversations with market participants.

[2]The European Central Bank also announced the introduction of a two-tier system for reserve renumeration, in which part of banks' holdings of excess liquidity will be exempt from the negative deposit facility rate; an extension to three years on the maturity of its longer-term refinancing operations; and a lower interest rate for these operations.

Figure 1.1. Financial Market Developments

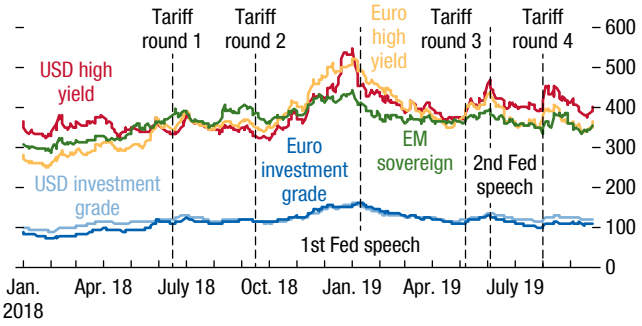
Global equity prices of sectors most exposed to tariffs have fallen in periods with trade tensions ...

1. World Equity Prices
(Index: Jan. 1, 2018 = 100)



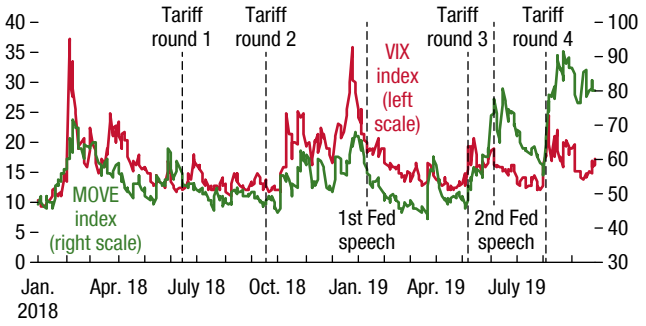
... credit spreads of lower rated issuers have been more sensitive to shifts in risk appetite ...

2. Credit Spreads
(Basis points)



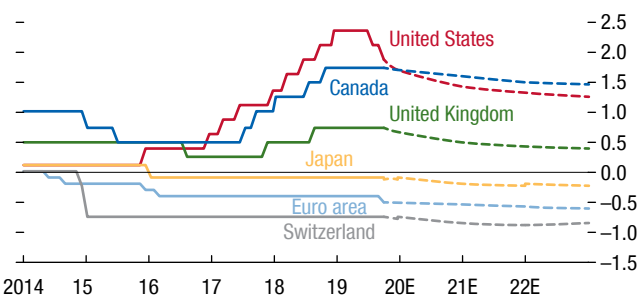
... and market volatility has oscillated in synchrony.

3. Option-Implied Volatilities in the US Equity and Treasury Bond Markets
(Indices)



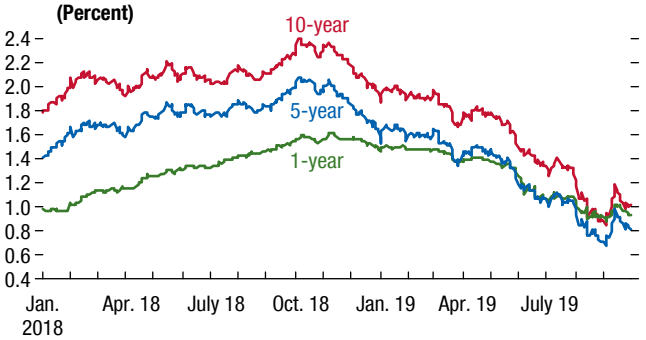
Market pricing suggests that monetary policy will be eased further.

4. Actual and Expected Policy Rates
(Percent)



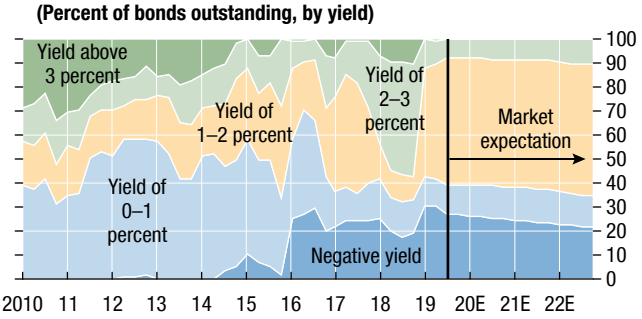
Bond yields have fallen significantly in advanced economies ...

5. Advanced Economy Government Bond Yields
(Percent)



... leading to a growing share of bonds with negative yields.

6. Advanced Economy Government Bonds
(Percent of bonds outstanding, by yield)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: In panels 1–3, the four rounds of tariffs were in June and September 2018 and in May and August 2019. The first Federal Reserve (Fed) speech was by Chairman Jerome Powell on January 4, 2019 at the American Economic Association and the second was on June 4, 2019 at the Federal Reserve Bank of Chicago. In panel 1, "Sectors exposed to trade and technology tensions" comprises automobiles and components, metals and mining, technology and telecommunications (communications equipment, semiconductors, and telecommunications services), and transportation (air freight, containers and packaging, marine transport, and trading companies and distributors). "Other sectors" comprises all other sectors in the MSCI World Equity Index. Panel 5 shows government bond yields (from advanced economies deemed to have systemically important financial sectors, with available data) weighted by the current amount of government debt outstanding. Bond yields from the same countries are used to draw panel 6. E = estimated; EM = emerging market; MOVE = Merrill Option Volatility Estimate; USD = US dollar; VIX = Chicago Board Options Exchange Volatility Index.

In response to recent central bank actions and communications, investors have reassessed the expected monetary policy path. Market pricing points to an additional 45 basis points of policy easing in the United States by the end of 2020 and suggests that policy rates could remain negative in the euro area, Japan, and Switzerland for many years (Figure 1.1, panel 4).

This reassessment of the outlook for monetary policy, along with concerns about the economic outlook and subdued inflation prospects, has led to a sharp decline in market interest rates across the globe. Average 10-year government bond yields in large advanced economies (weighted by sovereign debt outstanding) have fallen by about 75 basis points since the previous GFSR, despite the bounce back from August lows (Figure 1.1, panel 5). Yield curves have also flattened substantially, and in some cases have inverted, with the difference between 10-year, five-year, and one-year yields narrowing dramatically. The amount of bonds with negative yields has increased to about $15 trillion, including more than $7 trillion in government bonds from large advanced economies, or 30 percent of the outstanding stock (Figure 1.1, panel 6). Ten-year yields are now negative in a range of countries, including Austria, Belgium, Denmark, Finland, France, Germany, Japan, the Netherlands, Sweden, and Switzerland. Market pricing indicates that about 20 percent of sovereign bonds will have a negative yield until at least 2022.

Asset Valuations Remain Stretched

Declines in interest rates have further motivated investors to search for yield by increasing duration and credit exposures, a development that has boosted asset valuations.[3] Ten-year term premiums in major markets are now highly compressed, and in some cases below levels justified by fundamentals (Figure 1.2, panel 1). In several countries this misalignment in term premiums has increased since the previous GFSR.

Despite occasional spikes, implied volatility has been relatively contained on average this year. An IMF staff fair-value model points to corporate earnings and payouts as a key factor compressing US equity volatility (Figure 1.2, panel 2). However, the model also suggests that the current level of volatility may not fully account for external factors, such as trade tensions and uncertainty about the global economic outlook.

[3]See Section 1 of Online Annex 1.1 for details of the methodology underlying the asset valuation models used in this chapter.

This divergence could in part result from investors' belief that central banks will respond quickly to a sharp tightening in financial conditions, hence implicitly providing insurance against significant declines in stock prices. This highlights the communication challenges that central banks face when easing monetary policy to support an economic expansion in an environment of increased downside risks.

Other risk assets are also showing signs of stretched valuations.[4] Equity markets appear to be overvalued in Japan and the United States (Figure 1.2, panel 3, shows misalignments scaled by monthly price volatility). Since April, US equity prices have increased whereas fundamentals-based valuations have declined as higher uncertainty about future earnings outweighed the boost from an expected rebound in earnings and lower interest rates. Equity valuations in major emerging markets, however, are closer to fair value, as investors' risk appetite may have been tempered by concerns about trade tensions and the economic growth outlook (see Chapter 4).

IMF staff valuation models also suggest that spreads of high-yield bonds are too compressed relative to fundamentals, along with investment-grade bonds in the euro area and United States (Figure 1.2, panel 4). Furthermore, emerging market bonds appear to be overvalued for more than one-third of issuers included in the JPMorgan Emerging Markets Bond Index Global as of the third quarter of 2019 (see Chapter 4).

Global Financial Conditions Have Eased Further

Sharp declines in market interest rates have resulted in a further easing of financial conditions in advanced economies since the April 2019 GFSR (Figure 1.3, panel 1). In the United States, financial conditions continue to be accommodative relative to historical norms, although the easing has slowed in the third quarter (Figure 1.3, panel 2). In China, financial conditions are marginally tighter as a result of a decline in corporate valuations.[5]

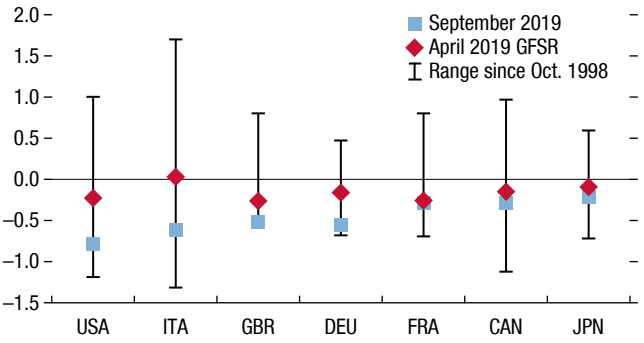
[4]The valuation model for equities includes government bond interest rates as a fundamental factor, and so does not take into account the misalignments in term premiums. Misalignments in the equity and bond models are scaled by standard deviations to aid comparison across economies where the underlying volatility in asset prices may differ. This measure also allows gauging of the potential losses that investors could incur due to correction of misalignments relative to regular price variation in a given market.

[5]In this report, financial conditions are based on price measures, as explained in the October 2018 GFSR Online Annex 1.1. The discussion of Chinese financial conditions in IMF (2019), however, also considers volume measures.

Figure 1.2. Asset Valuations

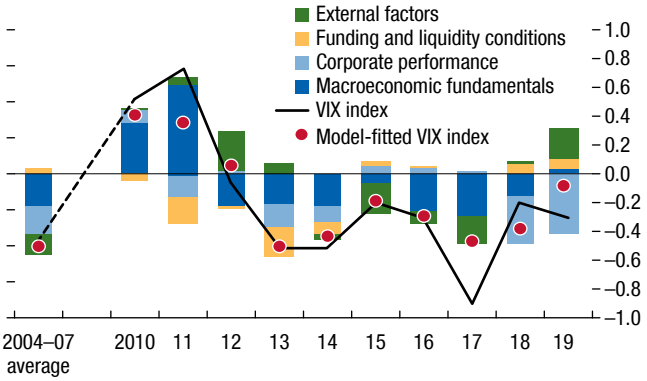
Term premiums have fallen below levels justified by fundamentals.

1. Ten-year Bond Term Premiums: Deviations from Fair Value
(Percentage points, three-month average)



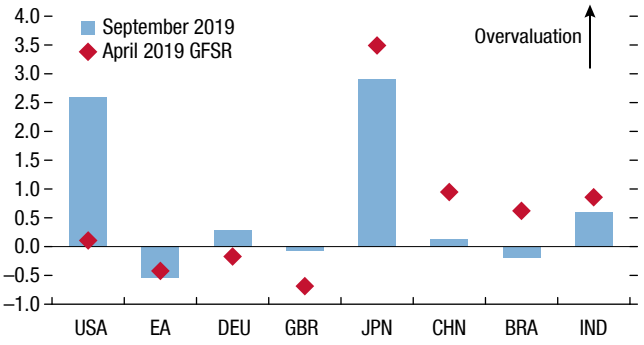
Option implied US equity volatility may not fully reflect external factors, including trade tensions.

2. Drivers of US Equity Volatility
(Standard deviations from mean)



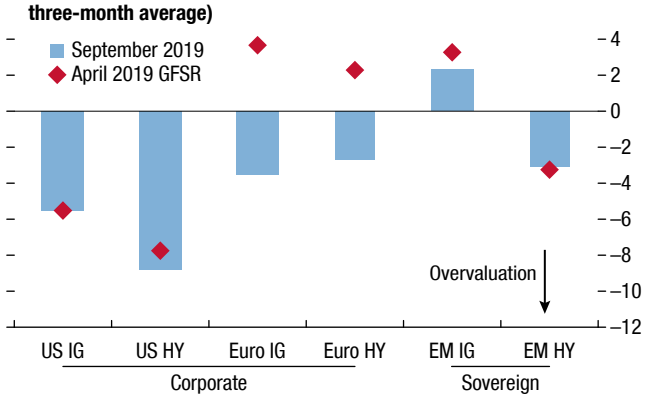
Equity valuations appear stretched in some countries ...

3. Global Equity Markets: Price Relative to Fair Value
(Percent, scaled by standard deviation of returns, three-month average)



... and bond spreads are too compressed relative to fundamentals.

4. Global Bonds: Spread Relative to Fair Value
(Basis points, scaled by standard deviation of spread changes, three-month average)



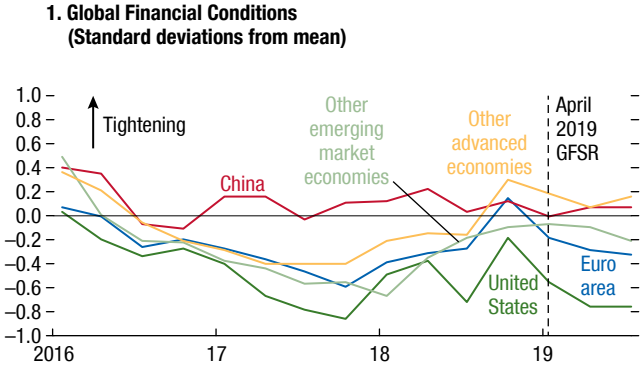
Sources: Bank for International Settlements; Bloomberg Finance L.P.; Consensus Economics; Federal Reserve Board; Fitch; Haver Analytics; IMF, World Economic Outlook database; Institute of International Finance; Philadelphia Federal Reserve Survey of Professional Forecasters; Standard & Poor's; S&P Capital IQ; Thomson Reuters I/B/E/S; and IMF staff calculations.
Note: Panel 1 shows 10-year government bond term premium estimates, based on the Adrian, Crump, and Moench (2013) model, relative to the value implied by fundamentals in a number of models. See Box 1.2 in Chapter 1 of the April 2018 GFSR for more information. Panel 2 shows the drivers of equity volatility taken from a model of the VIX index that uses quarterly data from 2004:Q1 to 2019:Q2. Panel 3 shows the percent deviation of equity prices relative to a fair-value model, scaled by the standard deviation of monthly price changes. Panel 4 shows global bond spreads relative to a fair value model, in basis points, scaled by the standard deviation of monthly changes in spreads over three years. Panels 3 and 4 are scaled by standard deviation to aid comparison across economies where the underlying volatility in asset prices may differ. See Section 1 of Online Annex 1.1 for details of the asset valuation models. Data labels in panels 1 and 3 use International Organization for Standardization (ISO) country codes. EA = euro area; EM = emerging market; GFSR = *Global Financial Stability Report*; HY = high-yield; IG = investment-grade; VIX = Chicago Board Options Exchange Volatility Index.

In major emerging markets (excluding China) conditions have eased slightly in aggregate over the past six months.[6] In a broader group of emerging markets, financial conditions varied across regions (Figure 1.3, panel 3). In Asia, financial conditions have slightly eased, mainly because of reductions in external borrowing costs (Figure 1.3, panel 4). Conditions have modestly tightened in Latin America overall—as the recent strains in Argentine markets have been partly offset by some easing in Brazil. In the Europe, Middle East, and Africa region as a whole, conditions are similar to those six months ago, despite some tightening in the second quarter.

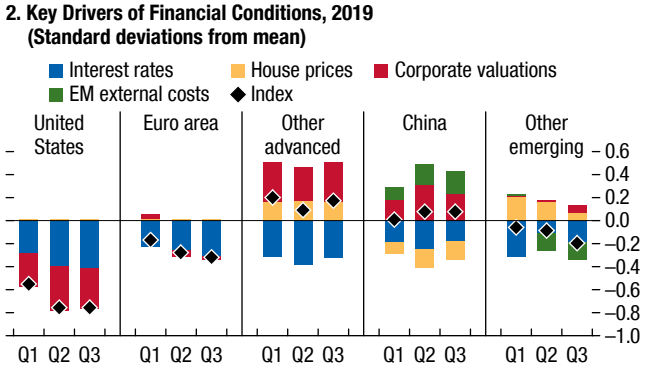
[6]In addition to China, the systemically important emerging market economies are Brazil, India, Mexico, Poland, Russia, and Turkey.

Figure 1.3. Global Financial Conditions

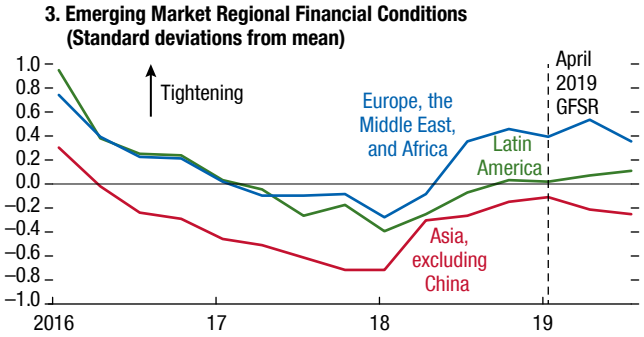
Financial conditions have eased in advanced economies ...



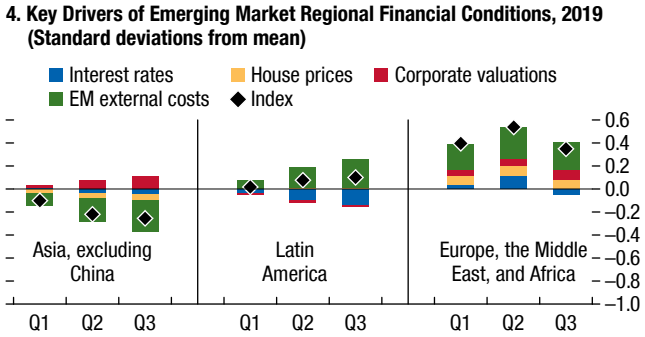
... as interest rates have fallen across the globe.



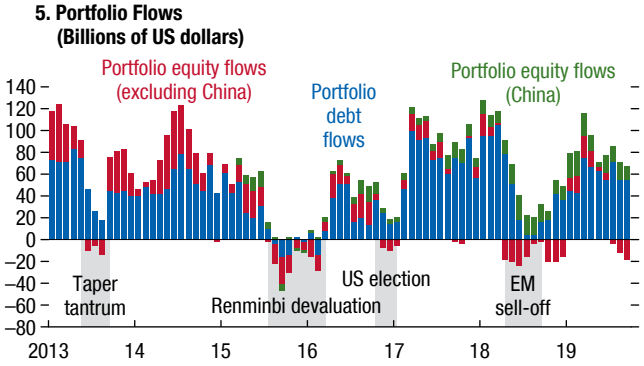
Financial conditions have eased slightly in emerging markets ...



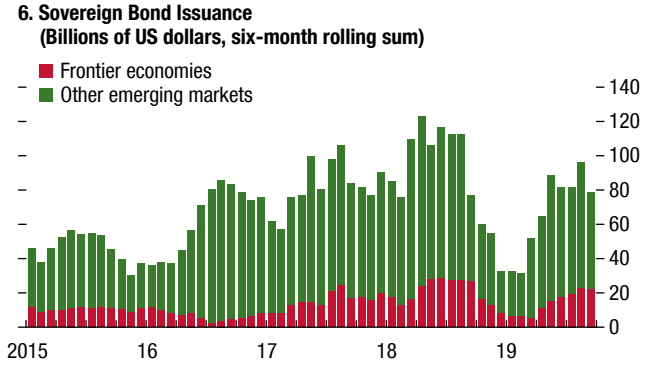
... but have varied across regions.



Portfolio flows rebounded in 2019 ...



... and this has helped support strong issuance.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Bond Radar; Haver Analytics; IMF, International Financial Statistics database; Institute of International Finance; and IMF staff calculations.
Note: The standard deviations and means used for the financial conditions indices are calculated over the period 1996–2019. See Online Annex 1.1 of the October 2018 GFSR for more information on the finanical conditions indices. "Other advanced economies" comprises Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom. "Other emerging market economies" comprises Brazil, India, Mexico, Poland, Russia, and Turkey. In panels 3 and 4, a group of 20 emerging market economies is used. EM = emerging market; GFSR = *Global Financial Stability Report*.

The easing in financial conditions in advanced economies supported a rebound in portfolio flows to emerging markets (Figure 1.3, panel 5). Debt flows have risen as higher-yielding dollar-denominated bonds have become increasingly more attractive than bonds issued by advanced economies. Chinese local currency bond flows have also benefited from the inclusion of the country in benchmark indices (as discussed in the April 2019 GFSR). Increased appetite for emerging market dollar debt has supported a pickup in issuance by emerging and frontier market sovereigns over the past few months (Figure 1.3, panel 6).

Financial Vulnerabilities Continue to Build

The prolonged period of accommodative financial conditions has pushed investors to search for yield, creating an environment conducive to a buildup of vulnerabilities. Lower yields have prompted institutional investors—for example, those with nominal return targets—to invest in riskier and more illiquid assets, providing a growing source of funding for nonfinancial firms and facilitating borrowing by weaker firms. Although this has supported economic activity, it has also increased risks for some lenders and borrowers. Balance sheet vulnerabilities in *nonfinancial companies* and in *nonbank financial entities* are elevated by historical standards in several large economies with systemically important financial sectors (Figure 1.4, panel 1).

Among *other nonbank financial entities*, vulnerabilities are high in 80 percent of economies with systemically important financial sectors, by GDP.[7] This share is comparable to the fraction at the height of the global financial crisis. Vulnerabilities in this sector have increased in the United States and euro area since the April 2019 GFSR (Figure 1.4, panel 2). This largely reflects an increase in leverage and credit exposures as institutional investors have taken on riskier positions to try to meet targeted returns, as discussed in Chapter 3 (Figure 1.5, panel 1).[8] In China, vulnerabilities continue to be high, largely due to leveraged positions in investment vehicles.

In the *insurance sector*, vulnerabilities remain elevated in advanced economies, reflecting the search for yield that has been taking place in the low-interest-rate environment (Figure 1.4, panel 2; Chapter 3).[9]

In the *banking sector*, vulnerabilities continue to be relatively moderate overall. But banks are exposed to vulnerabilities in other sectors through their lending. Figure 1.5, panel 2, illustrates these exposures using data on banking sector credit to domestic and foreign sectors, weighted by the level of vulnerabilities in each sector (using the scores underlying Figure 1.4).[10] This measure is a useful gauge of bank exposures, though it does not take into account the level of capital in the banking system. Chinese banks have the largest weighted exposures by this measure, given their sizable lending to domestic firms, households, and other financial companies. The banking systems in Brazil, India, Korea, and Turkey also have relatively high vulnerability-weighted exposures.

Lower interest rates and flatter yield curves—along with a subdued economic outlook—have driven bank equity market valuations down as investors expect compressed interest margins to reduce the profitability of these institutions. Market-adjusted capitalization—which uses the market value of equity in place of the book value in capital ratios—has fallen. This metric—which has been found to be a relatively good predictor of banking sector stress—can be used, along with regulatory capital ratios, to reveal pockets of weaker banks (Figure 1.5, panel 3).[11] For example, using these indicators of leverage, euro area institutions accounting for more than 30 percent of sample bank assets have relatively weak capitalization, and in China the proportion is about 25 percent. Although this assessment does not cover all aspects of balance sheet vulnerabilities, it chimes with the finding in the April 2019 GFSR that many small and medium-sized Chinese banks have lower capital ratios and profits than the five largest institutions (Figure 1.5, panel 4). These strains have recently surfaced in funding markets and prompted the authorities' interventions in three regional Chinese banks (as discussed in Box 1.1).

Last, some banks may be more exposed to mismatches in their currency exposures and funding profiles. The April 2018 GFSR highlighted potential liquidity risks in the dollar funding of non-US banks. Chapter 5 of this report builds on this work, with a particular focus on synthetic dollar funding

[7]Additional economies have been included in the assessment of vulnerabilities in the other financial sector, which now includes the *Other Emerging Markets* region. This has resulted in an increase in the proportion and number of countries with high and medium-high vulnerabilities relative to the results published in the April 2019 GFSR.

[8]The European Central Bank (2019) notes that the continued search for yield, liquidity risks, and leverage in the euro area nonbank financial sector could amplify the wider financial cycle.

[9]The methodology for assessing vulnerabilities in the insurance sector has been revised with the addition of four new indicators. These include two indicators in the leverage and credit buckets, as well as two indicators measuring vulnerabilities from foreign and equity investments. Data for insurers now start from 2004.

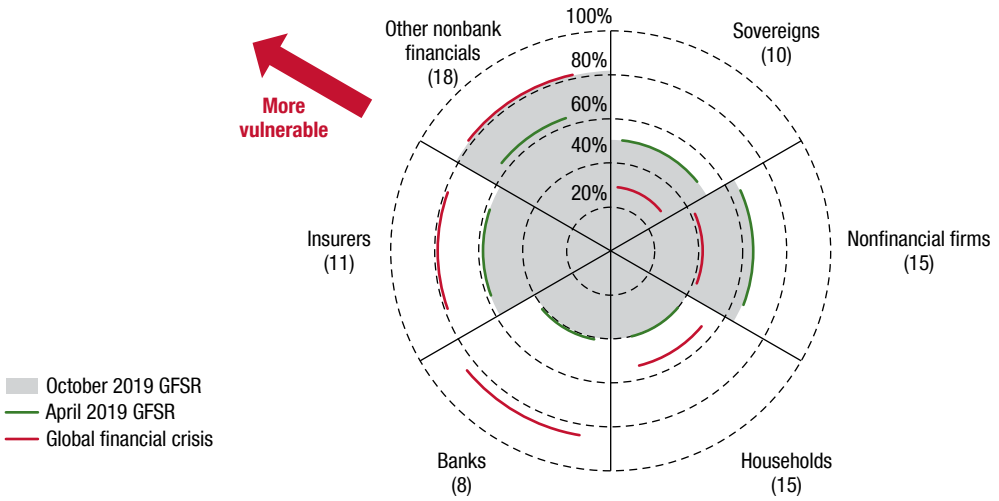
[10]The weights in this calculation are based on vulnerability scores allocated to sectors. These scores show the percentile of the vulnerability rating, relative to historical ratings for the peer group. (Countries are divided into an advanced economy and an emerging market peer group.)

[11]Market-adjusted capitalization is defined as the product of tangible common equity and min(price-to-book ratio,1) presented as a percentage of tangible assets. The thresholds for market-adjusted capitalization used in Figure 1.5, panel 3, are based on the findings in Kerry (2019). The common equity Tier 1 thresholds are ±1 standard deviation around the mean for the sample of banks in the figure.

Figure 1.4. Global Financial Vulnerabilities

Vulnerabilities have increased among nonbank financial institutions and remain high in the corporate sector.

1. Proportion of Systemically Important Economies with Elevated Vulnerabilities, by Sector
(Percent of countries with high and medium-high vulnerabilities, by GDP [assets for banks]; number of countries in parentheses)



Vulnerabilities are elevated in several economies and have increased among other nonbank financial entities in advanced economies.

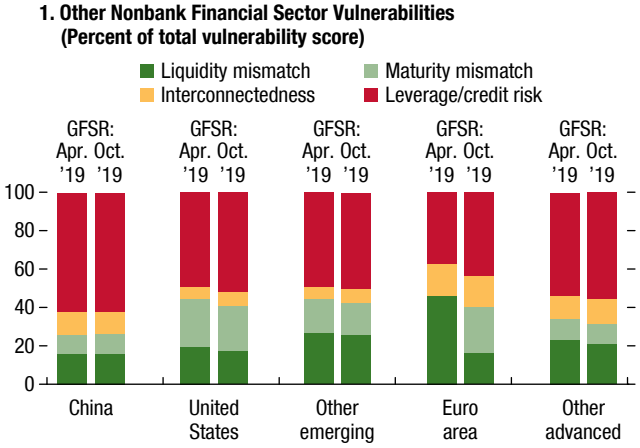
2. Financial Vulnerabilities by Sector and Region

	Sovereigns		Nonfinancial Firms		Households		Banks		Insurers		Other Nonbank Financials	
	Apr. 2019	Oct. 2019	Apr. 2019	Oct. 2019	Apr. 2019	Oct. 2019	Apr. 2019	Oct. 2019	Apr. 2019	Oct. 2019	Apr. 2019	Oct. 2019
Advanced Economies												
United States												
Euro area												
Other advanced												
Emerging Market Economies												
China												
Other emerging												

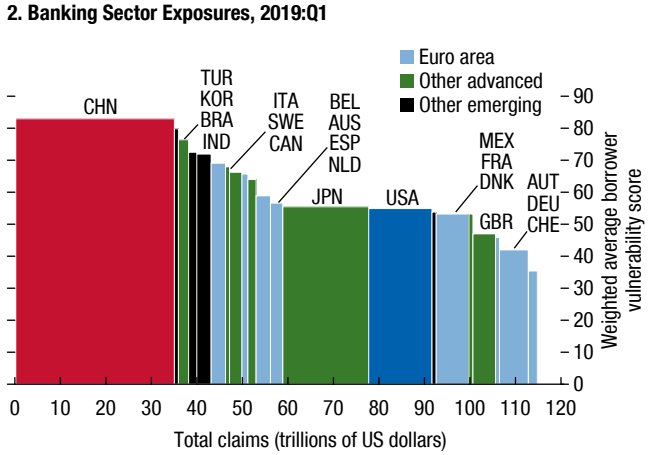
Sources: Banco de Mexico; Bank for International Settlements; Bank of Japan; Bloomberg Finance L.P.; China Insurance Regulatory Commission; European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators database; Reserve Bank of India; S&P Global Market Intelligence; S&P Leveraged Commentary and Data; Securities and Exchange Commission of Brazil; WIND Information Co.; and IMF staff calculations.
Note: In panel 1, global financial crisis reflects the maximum vulnerability value during 2007–08. In panel 2, dark red shading indicates a value in the top 20 percent of pooled samples (advanced and emerging market economies pooled separately) for each sector during 2000–18 (or longest sample available), and dark green shading indicates values in the bottom 20 percent. In panels 1 and 2 for households, the debt service ratio for emerging market economies is based on all private nonfinancial firms. See the April 2019 GFSR online annex for details of the methodology behind this figure. "Other advanced" economies comprises Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom. "Other emerging" economies comprises Brazil, India, Mexico, Poland, Russia, and Turkey. GFSR = *Global Financial Stability Report*.

Figure 1.5. Financial Sector Vulnerabilities

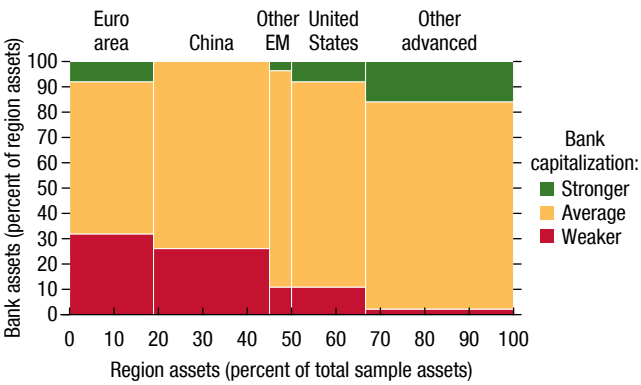
Leverage and credit exposures are a source of vulnerability among other nonbank financial entities.



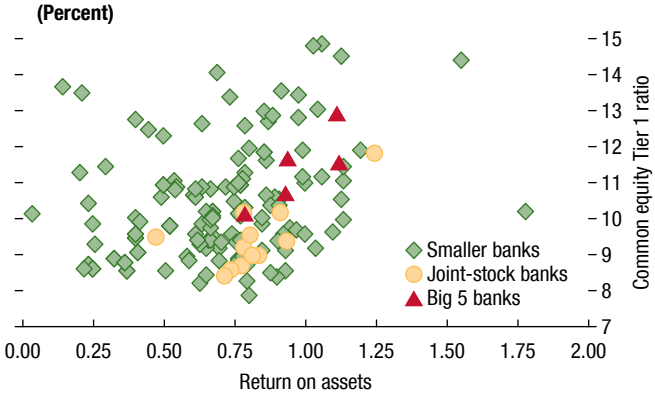
Although banks are stronger overall, some banking systems have large exposures to sectors with high vulnerabilities ...



... and vulnerability indicators vary significantly across individual banks ...



... including among small and medium-sized banks in China.



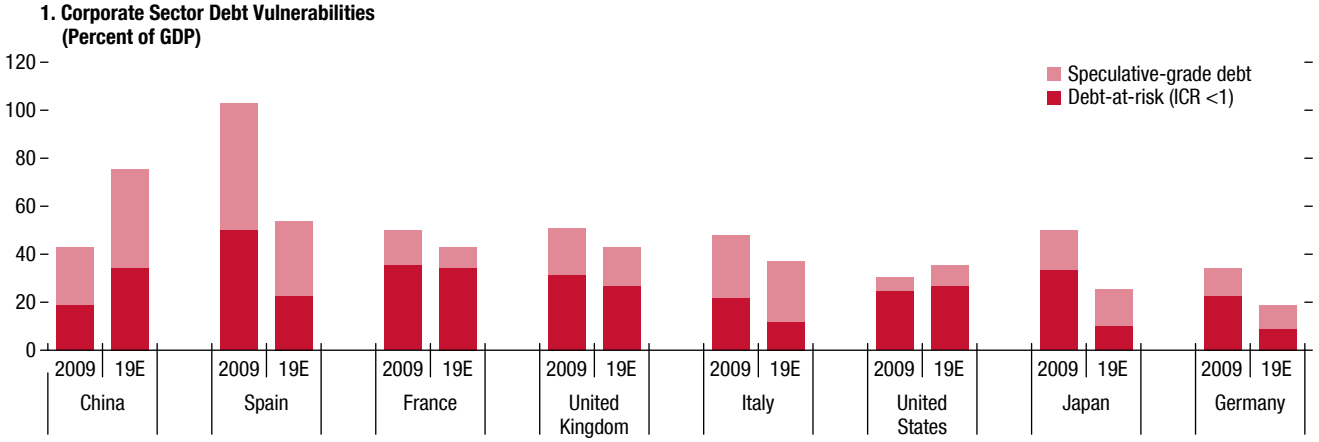
Sources: Banco de Mexico; Bank for International Settlements; Bloomberg Finance L.P.; European Central Bank; Haver Analytics; Institute of International Finance; IMF, International Financial Statistics database; IMF, World Economic Outlook database; national authorities; Orbis; Reserve Bank of India; S&P Market Intelligence; Securities and Exchange Commission of Brazil; WIND Information Co.; and IMF staff calculations.
Note: Panel 1 shows the contribution of leverage and other mismatches to the overall vulnerability score. See Online Annex 1.1 for the April 2019 GFSR for more details. Panel 2 is drawn using banking sector exposures to different sectors in the 29 economies deemed to have a systemically important financial sector, weighted by the vulnerability scores used to produce Figure 1.4. Data labels in panel 2 use International Organization for Standardization (ISO) country codes. Panel 3 is based on a sample of banks that are traded on the stock market and shows data for 2019:Q3 or, if these are not available, the latest available data. The label "stronger banks" shows the lowest proportion of banks that have either a common equity Tier 1 ratio of 15 percent or more, or a market-adjusted capitalization ratio of 3 percent or more. The label "weaker banks" shows the highest proportion of banks that have a common equity Tier 1 ratio of 10 percent or less, or a market-adjusted capitalization ratio of 1.5 percent or less. All other banks are considered to have an average capitalization. Market-adjusted capitalization is the product of min{price-to-book ratio, 1} and tangible common equity, presented as a percentage of tangible assets (see Kerry 2019). US bank assets have been adjusted for derivatives netting. EM = emerging market economy; GFSR = *Global Financial Stability Report*.

and cross-currency basis swaps. It finds that banks with US dollar funding fragilities can amplify the impact of funding shocks, ultimately raising financial stability concerns.

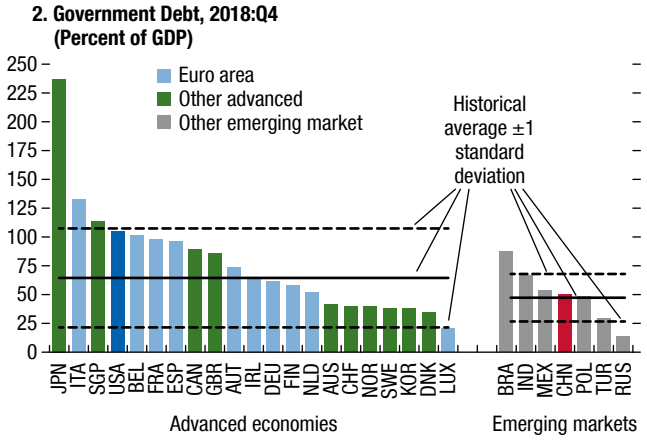
Easy financial conditions have supported financial risk-taking in the *nonfinancial corporate sector*. Vulnerabilities in the corporate sector continue to be elevated, particularly in China, other emerging market economies in aggregate, and the United States (Figure 1.4, panels 1 and 2). Chapter 2 presents a comprehensive assessment of the corporate sector credit quality in eight major economies: China, France, Germany, Italy, Japan, Spain, the United Kingdom, and the United States. It finds that debt issued by companies whose earnings are insufficient to cover interest payments is elevated relative to GDP in several economies and could

Figure 1.6. Nonfinancial Sector Vulnerabilities

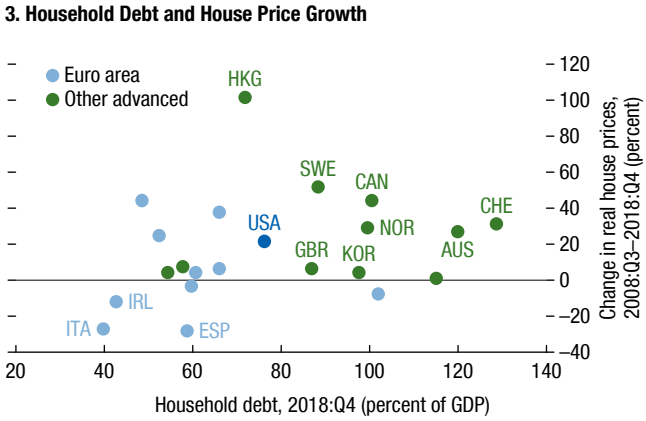
Debt at nonfinancial firms with weak fundamentals is sizable in some economies.



Government debt remains elevated in a few economies ...



... and household debt is high where house prices have boomed.



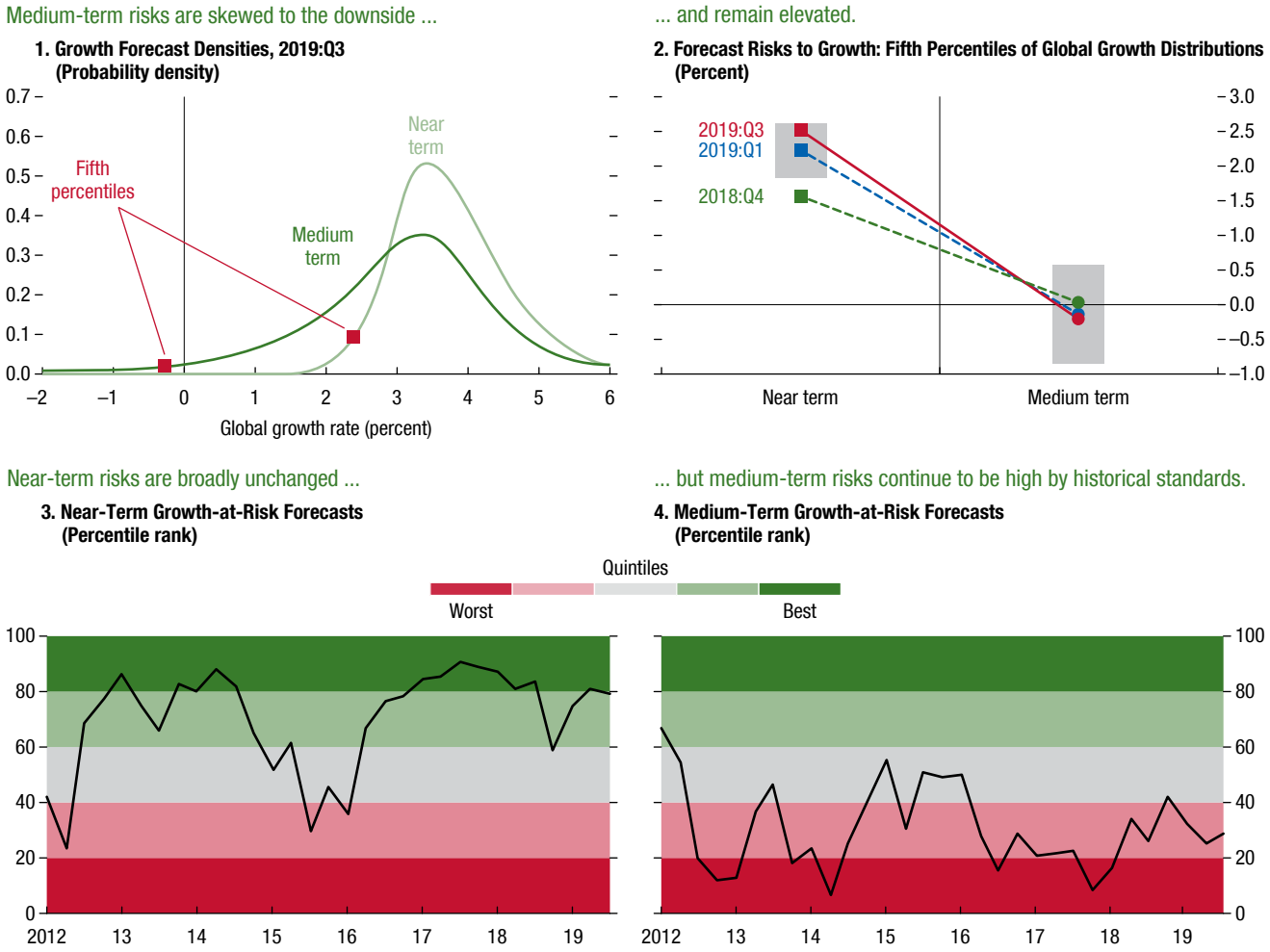
Sources: Haver Analytics; Institute of International Finance; IMF, International Financial Statistics database; IMF, World Economic Outlook database; national authorities; Orbis; S&P Market Intelligence; WIND Information Co.; and IMF staff calculations.
Note: In panel 1, the interest coverage ratio is defined as EBIT (earnings before interest and taxes) relative to interest expense. Speculative grade debt is defined as debt owed by firms with an ICR of less than 4.1 and net debt/assets greater than 0.25, where net debt is gross debt minus cash (see section 2 of Online Annex 1.1). Data for 2019 are estimated. For panel 2, Ireland's public debt is 106 percent if it is scaled by modified gross national income, which removes a large proportion of the multinational activities. In Singapore, government debt is not issued to finance a deficit but rather to deepen the domestic market, to meet the investment needs of the Central Provident Fund, and to provide individuals a long-term savings option. Data labels in panels 2 and 3 use International Organization for Standardization (ISO) country codes. E = estimated; ICR = interest coverage ratio.

approach or exceed the crisis levels in an adverse scenario, which is half as severe as the global financial crisis (Figure 1.6, panel 1). The corporate sector weaknesses are primarily concentrated in small and medium-sized firms and in large Chinese firms, including state-owned enterprises (see Chapter 2).

Low interest rates have reduced debt service costs and may have contributed to an increase in *sovereign debt*. This has made some governments more susceptible to a sudden and sharp tightening in financial conditions, as discussed in the April 2019 *Fiscal Monitor*. Although sovereign sector vulnerabilities are broadly unchanged at the global level, they have fallen slightly in the euro area as a whole as debt levels have declined in some economies. There are, however, several governments with elevated debt relative to their GDP (Figure 1.6, panel 2). Chapter 4 discusses government debt for a broad range of emerging market and frontier economies.

In the *household sector*, vulnerabilities continue to be elevated in China and a number of other advanced economies (Figure 1.4, panels 1 and 2). Many of the economies that managed to escape the worst impact of

Figure 1.7. Global Growth-at-Risk Estimates



Source: IMF staff calculations.
Note: In panel 1, forecast density estimates are centered around the respective *World Economic Outlook* forecasts. In panel 2, the lines indicate pairs of near- and medium-term forecasts, but do not assert a linear relationship between the two periods. The shaded areas correspond to ±1 standard error bands around the previous 2019:Q1 forecast. In panels 3 and 4, the color of the shading depicts the percentile rank for the fifth percentile threshold (Growth-at-Risk) of near- and medium-term growth forecast densities from 1991 onward. The financial conditions index used in the analysis presented in this figure incorporates information on the price of risk, as well as the credit-to-GDP ratio (as a proxy for financial vulnerabilities). See the April 2018 *Global Financial Stability Report* for details of the Growth-at-Risk methodology.

the global financial crisis have subsequently had house price booms. These now tend to be the economies with the highest household-debt-to-GDP ratios (Figure 1.6, panel 3). Conversely, in some countries that were hit the hardest by the global and euro area financial crises, such as Ireland and Spain, household debt has now moderated, and house prices have fallen in real terms. In the United Kingdom and the United States, however, house prices are at least back to the levels during the crisis in real terms.

Financial Stability Risks Remain Elevated in the Medium Term

The easing in financial conditions since the previous GFSR has helped contain near-term downside risks to global growth and financial stability, despite the decline in the baseline growth forecast (see the October 2019 WEO) and continued rise in financial vulnerabilities. On net, near-term growth-at-risk (defined as the fifth percentile of the one-year-ahead forecast distribution) is little changed compared to six months ago (Figure 1.7,

panels 2 and 3).[12] However, the easy financial conditions and stretched asset valuations at this late stage of the cycle suggest that investors may be overly complacent about downside risks.

A number of events could trigger a sharp tightening in financial conditions at the current conjuncture, including an intensification or broadening of trade tensions, a faster-than-expected slowdown in global growth, a sudden market reassessment of the outlook for monetary policy (especially if there is a gap between market expectations and central banks' communications), or the crystallization of political and policy risks (for example, a geopolitical event that leads to contagion and capital flow reversals from emerging markets, renewed concerns about fiscal challenges in highly indebted countries, or a no-deal Brexit). Despite continued uncertainty about Brexit, trading conditions in UK markets have been orderly in recent months. There is a risk, however, that market volatility may rise as key Brexit deadlines approach, and the associated tightening in financial conditions may be substantial in the event of a no-deal Brexit.

Over the medium term, downside risks to global growth and financial stability remain high (Figure 1.7, panels 1 and 4), as easy financial conditions are conducive to a further buildup of vulnerabilities. Box 1.2, using the example of the United States, shows that a higher level of private nonfinancial sector vulnerabilities increases downside risks to growth and financial stability, particularly in the medium term. Furthermore, in the event of a tightening of financial conditions, the level of vulnerabilities matters: if vulnerabilities are already high, downside risks to growth and financial stability would be much more pronounced, in both the near and medium term. This suggests that the best time to take action to reduce financial stability risks is when vulnerabilities are still relatively low and financial conditions are accommodative.

[12]The growth-at-risk framework assesses the downside risks to financial stability by gauging how the range of severely adverse growth outcomes (5th percentile of the growth distribution) shifts in response to changes in financial conditions and vulnerabilities (see Chapter 3 of the October 2017 GFSR for details). Assumptions pertaining to policy responses or macroeconomic shocks (like the oil price shocks), which are explicitly incorporated in the WEO model (see the October 2019 WEO), are captured in the growth-at-risk framework only to the extent that they affect the current economic and financial conditions, or the baseline growth forecast.

Policymakers Should be Mindful of Financial Stability Risks

Concerns about weakening economic activity and rising downside risks to the outlook have prompted policymakers to refocus their efforts on supporting economic growth. Many central banks have already shifted to a more accommodative monetary policy stance, which was appropriate from a macroeconomic perspective (see the October 2019 WEO). With investors anticipating very low interest rates for a long time, financial conditions may ease further at a time when they are already accommodative (Figure 1.8, panel 1).[13] In this context, monetary policy should remain data dependent and any changes in stance should be clearly communicated to avoid mispricing of risk by market participants.

To reduce the risk that additional easing may have the unintended consequence of leading to a further buildup of financial system vulnerabilities, macroprudential policies should be tightened, as warranted. Because the necessary macroprudential tools are lacking in several major economies, such tools should be urgently developed (see Table 1.1).[14]

The *appropriate mix of macroeconomic and financial policies* should be tailored to the particular set of cyclical conditions and vulnerabilities each economy faces:

- *In countries where economic activity remains robust, financial conditions are still easy, and vulnerabilities are high or rising*, policymakers should urgently tighten macroprudential policies, including activating or tightening broad-based tools, to increase the resilience of the financial system and reduce risk-taking.[15] For example, countercyclical capital buffers have been deployed only infrequently (Figure 1.8, panel 2), and more economies with

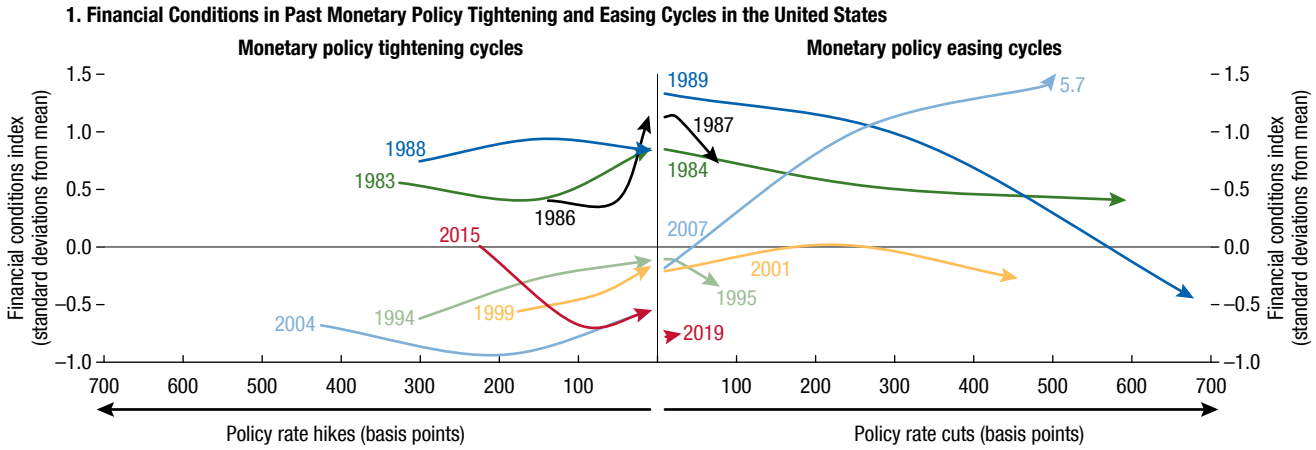
[13]In the United States, financial conditions have actually loosened during the recent monetary policy tightening cycle, in contrast to the previous six tightening cycles (the exception is the 2007 easing cycle, during which financial conditions tightened with the onset of the global financial crisis).

[14]Table 1.1 reflects the number of tools reported in the IMF Macroprudential Policy Survey. Some countries have institutional arrangements that implement macroprudential policies other than through specific tools. For example, in the United States, the Financial Stability Oversight Council has used its power to designate nonbank financial companies that it considers to be of systemic importance, and this entails heightened oversight, including on the part of the Federal Reserve Board.

[15]The authorities should recognize that this may also encourage a shift in lending activity from banks to the nonbank financial sector.

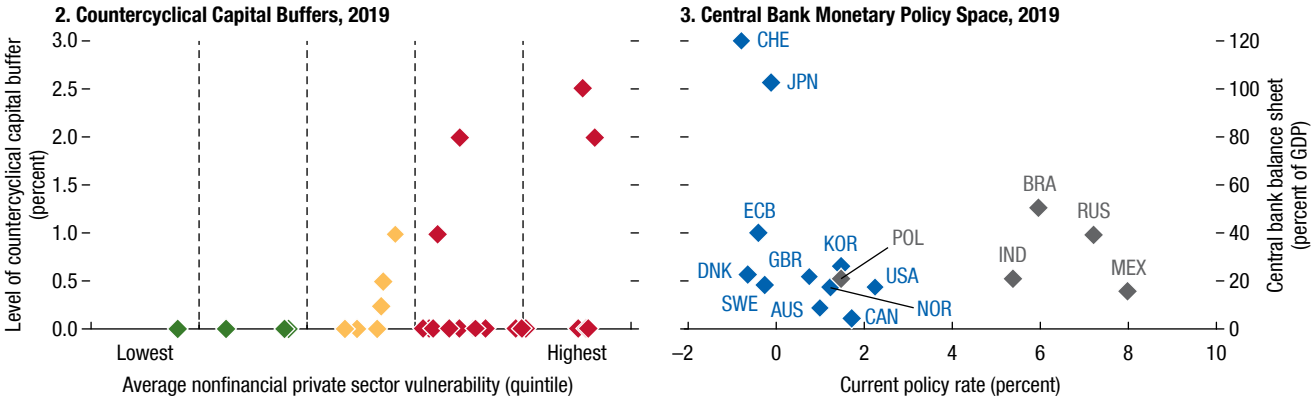
Figure 1.8. Monetary and Macroprudential Policies

Financial conditions are already easy and could ease even further.



Despite elevated vulnerabilities, many countries have not deployed countercyclical capital buffers.

Monetary policy space may be limited in some countries.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, Macroprudential Policy Survey; and IMF staff calculations.
Note: Panel 2 shows the average level of the countercyclical capital buffer in jurisdictions with low (1) to high (5) vulnerabilities in the nonfinancial private sector (average of the household and nonfinancial corporate sectors weighted by the level of debt in each sector), based on the information used to draw Figure 1.4. Green diamonds are used for the lower two quintiles, yellow for the middle quintile, and red for the upper two quintiles. Data labels in panel 3 use International Organization for Standardization (ISO) country codes. ECB = European Central Bank.

high vulnerabilities and still easy financial conditions might benefit from activating this tool (Table 1.1, first column).[16]

- *In countries where macroeconomic policies are being eased but where vulnerabilities are still a concern in particular sectors*, policymakers should consider a more targeted approach, such as stress tests on banks' exposures to certain types of borrowers, higher risk weights on these exposures, or other targeted measures, such as sectoral capital buffers and borrower-based tools, where appropriate.
- *For economies facing a significant slowdown*, the focus should be on more accommodative policies, considering available policy space. While authorities may look at ways to ease monetary policy, there may be limited policy space in many systemically important advanced economies (Figure 1.8, panel 3). Monetary policy could, therefore, be complemented by fiscal easing in countries that have fiscal space and where financial conditions allow. Countercyclical capital buffers could also be released in economies that have built up buffers.

Regulation put in place in the wake of the global financial crisis has improved the overall resilience of the banking sector (see Table 1.2), but pockets

[16]Figure 1.8, panel 2, and Table 1.2 show the level of the countercyclical capital buffer as of summer 2019. Some countries, including Belgium, France, Germany, and Luxembourg, have announced that the buffer will be tightened at a future date.

Table 1.1. Macroprudential Policy Tools

Number of macroprudential policy tools in use, 2018	>3	1–3	0
Level of the countercyclical capital buffer, 2019 (percent)	>1	0–1	0

Economy	Counter-Cyclical Capital Buffer	Nonbank Financial Sector Tools	Household Sector Tools	Corporate Sector Tools
Australia				
Austria				
Belgium				
Brazil				
Canada				
China				
Denmark				
Finland				
France				
Germany				
Hong Kong SAR				
India				
Ireland				
Italy				
Japan				
Korea				
Luxembourg				
Mexico				
Netherlands				
Norway				
Poland				
Russia				
Singapore				
Spain				
Sweden				
Switzerland				
Turkey				
United Kingdom				
United States				

Sources: IMF, Macroprudential Policy Survey; and IMF staff calculations.
Note: The table shows the level of the countercyclical capital buffer as of summer 2019, and the macroprudential measures in place as reported by each country in the Macroprudential Policy Survey, available at https://www.elibrary-areaer.imf.org/Macroprudential/Pages/Home.aspx. Some countries have announced that the countercyclical capital buffer will be tightened at a future date (see footnote 16). The figures on macroprudential tools are complied exclusively from information provided by IMF member countries. Hence, a policy tool's inclusion in, or absence from, the table does not represent a judgment or decision by the IMF on whether a particular tool is macroprudential. Some examples of the tools in the database are (1) for the corporate sector—sector-specific capital requirements, or a cap on loan-to-value ratio for commercial real estate credit; and (2) for the nonbank financial sector—countercyclical capital requirements for insurers, resecuritization prohibitions, or default fund requirements for central counterparties.

of weaker institutions remain. More broadly, robust regulatory and supervisory frameworks and intensive supervision should be the first line of defense when it comes to addressing banks' risk exposures or dollar funding risks in large internationally active banks (see Chapter 5).

Urgent Policy Action Is Needed Where Vulnerabilities Are High and Few Tools Are Available

Policy response is urgent in areas where vulnerabilities are high or rising, whereas the necessary policy tools may be lacking (see Table 1.1):

- *Rising corporate debt burdens:* Stringent supervision of banks' credit risk assessment and lending practices should be maintained. Efforts should be made to increase disclosure and transparency in nonbank finance markets to enable a more comprehensive assessment of risks. In economies where overall corporate sector debt is deemed to be systemically high, policymakers may consider developing prudential tools for highly leveraged firms (see Chapter 2). A widening of the regulatory and supervisory perimeter could be considered to include nonbank financial entities that provide financial intermediation services to firms, as warranted. Reducing the bias in tax systems that favors debt over equity financing would also help reduce incentives for excessive borrowing by firms.
- *Increased holdings of riskier and more illiquid securities by institutional investors:* Policymakers can help address the buildup of vulnerabilities among institutional investors through appropriate incentives (for example, to reduce the offering of guaranteed return products), minimum solvency and liquidity standards, and enhanced disclosures. Efforts should be stepped up to implement policy initiatives to mitigate leverage and other balance sheet mismatches in insurance firms and mutual funds (see Table 1.2 and Chapter 3 for more details). For example, institutional investors should be required to hold liquid assets commensurate with rising risks, informed by stress tests built on severe and plausible assumptions.
- *Increased reliance on external borrowing by emerging and frontier market economies:* Indebted emerging market and frontier economies need to mitigate debt sustainability risks through prudent debt management practices and strong debt management frameworks, taking a holistic view on overall debt-related risks (as discussed in Chapter 4).

Global Policy Coordination Remains Critical

Policymakers also need to complete and implement the regulatory reform agenda (as discussed in previous GFSRs). International resolution frameworks, especially for internationally active firms, need to be developed further, and any rollback of regulatory standards should be avoided.

Table 1.2. Policy Initiatives to Mitigate Leverage and Balance Sheet Mismatches

Banks	**Capital and leverage** BCBS (2019) reported that there has generally been good progress in implementing the capital framework. For the large exposure framework, however, only eight jurisdictions had final rules in force as of end-March 2019. The leverage ratio was revised (to refine the exposure measure, introduce a GSIB buffer, and address concerns about potential "window dressing" of balance sheets) with an implementation date of January 2022. Output floors, providing minimum risk-weights for banks using the advanced approach for Tier 1 capital ratios, will be phased in over the period 2022–27. In December 2017, a discussion paper on the regulatory treatment of sovereign exposures was published. The BCBS has not reached a consensus on this topic and no revisions to the framework have been proposed. **Liquidity, maturity, and foreign currency mismatches** BCBS (2019) noted that all member countries have implemented the liquidity coverage ratio (LCR), whereas only 11 of its 27 members had final net stable funding ratio (NSFR) rules in force as of end-March 2019 (a further 15 countries are in the process of adopting the NSFR). Although Basel III does not include minimum liquidity requirements per currency, the framework requires the monitoring of the LCR and NSFR by material currency. The Basel framework contains capital requirements for market risks stemming from open currency positions. The market risk framework was revised, with an implementation deadline of January 2022.
Insurance Companies	**Capital and leverage** Risk-based capital standards are expected to be adopted for internationally active insurance groups by end-2019, with a five-year monitoring period prior to final review and subsequent international agreement and adoption. This is a substantial delay from the original plan. Implementation of capital requirements for insurance groups may help to prevent regulatory arbitrage. Although more jurisdictions are introducing economic-based solvency regimes (such as Solvency II), there is no common global standard, and this could encourage regulatory arbitrage transactions on a cross-border basis. **Liquidity and maturity mismatches** The IAIS has released guidance on liquidity management and planning and is developing a holistic framework for systemic risks in the insurance sector (including on liquidity risk management). Some jurisdictions (for example, France and Belgium) are enhancing monitoring and policy tools to address potential liquidity risk in the insurance sector. Implementation of economic and risk-based capital frameworks would encourage insurers to minimize duration mismatches. These mismatches may not be fully captured in the current low and negative yield environment, for example under the standard formula in the European Union's Solvency II rules.
Investment Funds	**Leverage** Work is ongoing on leverage measures for investment funds. IOSCO is expected to finalize its leverage report by end-2019. Materially increasing convergence among supervisors on how to measure leverage remains a challenge. **Liquidity mismatches** The February 2018 IOSCO report on liquidity risk management includes new recommendations on the availability and use of additional liquidity management tools, but the language leaves room for wide divergencies in implementation at the national level. An assessment on the implementation of the liquidity risk management recommendations is expected to take place in 2020.

Source: IMF staff.
Note: BCBS = Basel Committee on Banking Supervision; GSIB = globally systemically important bank; IAIS = International Association of Insurance Supervisors; IOSCO = International Organization of Securities Commissions.

Action is needed in two other specific areas discussed in this report. First, market participants need to ensure that they are prepared for the transition from LIBOR to alternative risk-free interest rate benchmarks (see Box 1.3). Authorities are actively consulting the market on a number of issues related to this transition, but despite encouraging signs in many areas, issuance of new products based on LIBOR continues. The continued reliance on LIBOR and the current pace of progress raise concerns about potential financial stability risks if the orderly transition is not completed by end-2021. Supervisors should therefore encourage market participants to net down legacy derivative positions and to accelerate the pace of adoption of the new benchmark rates.

Second, environmental, social, and governance (ESG) principles are becoming increasingly important for both borrowers and investors (see Chapter 6). Closing data gaps will be crucial for individuals, firms, and markets to efficiently price externalities, mitigate risks, and reward long-term benefits from sustainability. To encourage further growth in sustainable finance, progress is needed in developing standards and promoting consistent ESG reporting. Regulators and central banks should take intellectual leadership in assessing ESG risks. The IMF will continue to incorporate ESG considerations critical to the economy into its surveillance. Financial sector policies for mitigating climate change are also discussed in the *Fiscal Monitor*.

Box 1.1. Implications of the Recent Bank Interventions in China

In late May, the Chinese authorities took over Baoshang Bank, imposing marginal haircuts on corporate and interbank depositors. The takeover raised, for the first time in two decades, the possibility of creditor losses. In late July, several large state-owned financial institutions purchased minor stakes in the Bank of Jinzhou, which had been facing liquidity problems for some time. In early August, another regional bank, Hengfeng, received a capital injection from a unit of China's sovereign wealth fund. Unlike Baoshang, there were no haircuts for depositors in the Jinzhou and Hengfeng cases.

Although the challenges facing Baoshang—and many others like it—were well known, the possibility of creditors suffering losses surprised financial market participants. Interbank funding markets became strained as investors questioned the creditworthiness of weaker, smaller banks and nonbank financial institutions. The spread between the funding costs of highly rated and weaker borrowers widened from an average of 16 basis points before the Baoshang takeover to nearly 90 basis points in early July (Figure 1.1.1, panel 1). The negotiable certificates of deposit market, an important source of funding for smaller rural banks, saw sharp declines in issuance for weaker borrowers (Figure 1.1.1, panel 2).

These events underscore several vulnerabilities in the Chinese financial system:

- *Liquidity, funding, and solvency risks:* These three banks were hardly unique; they were among the dozen or so banks that had delayed the release of annual reports. Like many other joint-stock, city, and rural commercial banks, they relied on wholesale funding and held a large share of risky nonloan assets (Figure 1.1.1, panels 3 and 4). In addition, these banks faced challenges—such as low capital and weak profitability—that are similar to those faced by other small and medium-sized banks (see the April 2019 *Global Financial Stability Report*).
- *Interlinkages between banks, nonbank financial institutions, and investment vehicles:* Banks that rely on funding through negotiable certificates of deposit tend to be large investors or guarantors of investment vehicles, which are themselves major investors in such certificates and other bank debt and capital instruments—thereby introducing circularity and interconnectedness that tend to amplify the transmission of shocks.[1]
- *Maturity mismatches and other risks within investment vehicles* that banks issue (such as wealth management products) and invest in (such as asset management products and trust beneficiary rights): These vehicles often rely on short-term wholesale funding and other support from banks to help fund credit to long-term investment projects, including loans to local governments.

The recent liquidity and funding squeeze, and associated solvency concerns, is likely to increase pressure on banks to raise deposit funding while paying more for other sources of funds. This will in turn bring into sharper focus the trade-off these banks face between improving resilience and maintaining credit growth. IMF staff analysis suggests that the loan books of smaller banks would have to contract significantly if banks were required to increase core Tier 1 equity ratios to the system average (10.5 percent) and hold adequate capital against roughly half of their on- and off-balance-sheet shadow credit (see the April 2019 *Global Financial Stability Report*).

The Chinese authorities have taken different approaches to Baoshang, Jinzhou, and Hengfeng banks based on the authorities' assessment of the institution's specific circumstances. Striking a balance between maintaining market liquidity and introducing counterparty solvency risks—a crucial development in the reform of China's financial system—is a delicate task, made more difficult by implicit guarantees. Policymakers urgently need to introduce a bank resolution regime, alongside measures to reform the asset management industry and its linkages to banks (see the December 2017 Financial System Stability Assessment and IMF 2019).

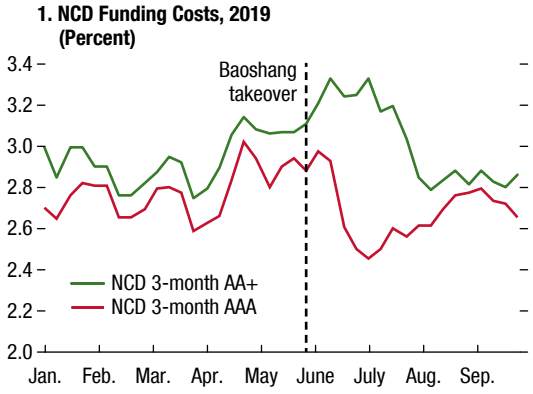
This box was prepared by Sally Chen.

[1]For more information on banks' shadow banking exposure, funding, and risk transmission, see IMF (2016).

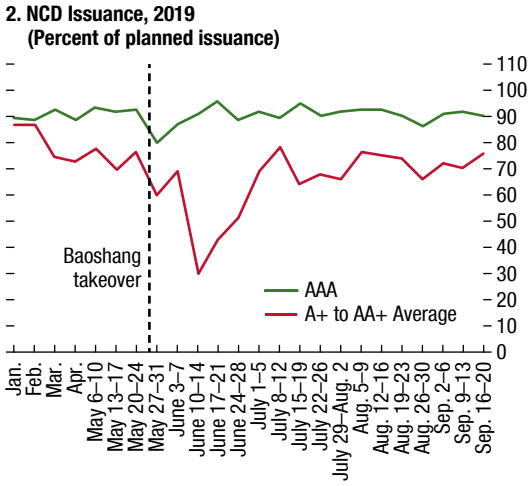
Box 1.1 *(continued)*

Figure 1.1.1. Market Impact of the Recent Bank Interventions

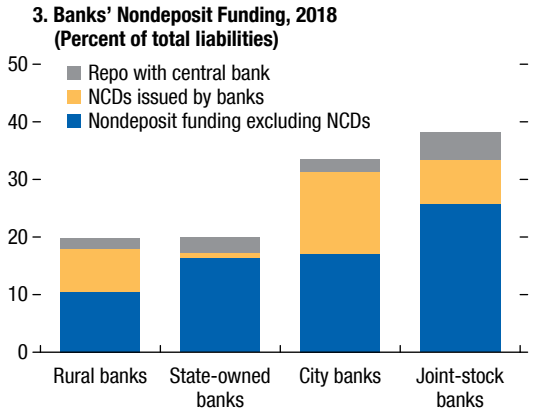
Interest rates on negotiable certificates of deposit (NCDs) diverged for weaker borrowers ...



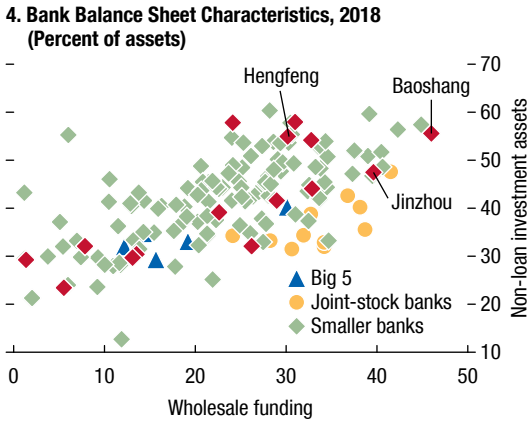
... whereas NCD issuance, particularly from weaker borrowers, fell significantly.



Small banks tend to rely on nondeposit funding ...



... and have large holdings of debt instruments.



Sources: Bloomberg Finance L.P.; SNL Financial; WIND Information Co.; and IMF staff calculations.
Note: Panel 4 shows 2018, or the latest available data for each bank given the multiple delays in annual report publication for some banks; red dots are for banks with a delay in the publication of their annual report. Repo = repurchase agreement.

Box 1.2. Assessing the Impact of Changes in Financial Conditions and Vulnerabilities in the Growth-at-Risk Model for the United States

Financial conditions—measured via financial conditions indices—reflect the pricing of risk and so the cost of funding in the financial system. Easy financial conditions may be supportive of growth in the near term, but they may also encourage excessive risk-taking, thus putting growth at risk over the medium term. Using the growth-at-risk (GaR) framework, this box analyzes how the trade-off between near- and medium-term risks is influenced by the prevailing *level of vulnerabilities*.

In a GaR model, the distribution of future growth outcomes is a function of current economic and financial conditions. The GaR specification for the United States presented in this box differs from the global GaR specification used in the *Global Financial Stability Report* (see Figure 1.7) in two ways:

1. The *financial conditions* index used in this box includes only price of risk variables, whereas the standard *Global Financial Stability Report* specification also includes credit variables as a proxy for private nonfinancial sector vulnerabilities.
2. Information on *vulnerabilities* is included separately (in a linear manner) via a financial vulnerability index for the private nonfinancial sector (households and nonfinancial companies), constructed using the data underlying Figure 1.4.[1]

This box was prepared by Sheheryar Malik.

[1]The private nonfinancial financial vulnerability index used in the GaR specification is constructed as a credit-weighted aggregate of corporate and household financial vulnerability indices. The financial vulnerability index input into the GaR is first orthogonalized with respect to the financial conditions index.

This approach makes it possible to disentangle the effects of changes in both financial conditions and financial vulnerabilities and consider them separately in a comparative static analysis.

In what follows, two counterfactual scenarios are considered, focusing on the United States:

1. *Implications of the level of (private nonfinancial sector) vulnerabilities:* A baseline GaR specification incorporating financial conditions, as well as the financial vulnerability index for the private nonfinancial sector, suggests that medium-term risks are elevated compared to near-term risks (the baseline in Figure 1.2.1, panel 1). Assuming financial conditions remain unchanged, a one-standard-deviation increase in the level of vulnerabilities meaningfully increases medium-term downside risks to growth (blue line in Figure 1.2.1, panel 2).
2. *Impact of a tightening in financial conditions:* Estimates suggest that a one-standard-deviation tightening in financial conditions when vulnerabilities are high (yellow line in Figure 1.2.1, panel 3) increases risks at both time horizons relative to the baseline, with a relatively larger impact over the near term. However, when vulnerabilities are low (green line) and financial conditions are tightened, near-term risks to growth rise relative to the baseline, but medium-term risks are significantly reduced.

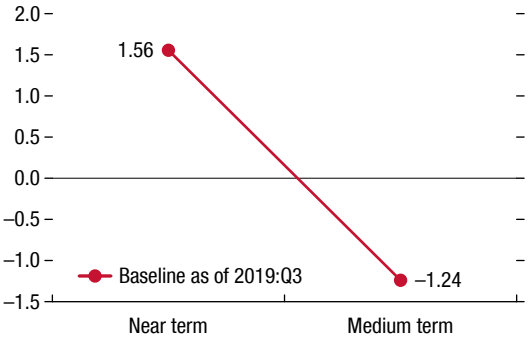
This analysis suggests that policymakers should adopt policies aimed at reducing vulnerabilities while these vulnerabilities are still low and financial conditions are relatively easy.

Box 1.2 *(continued)*

Figure 1.2.1. Financial Conditions and Financial Vulnerabilities in the Growth-at-Risk Model for the United States: A Counterfactual Scenario Analysis

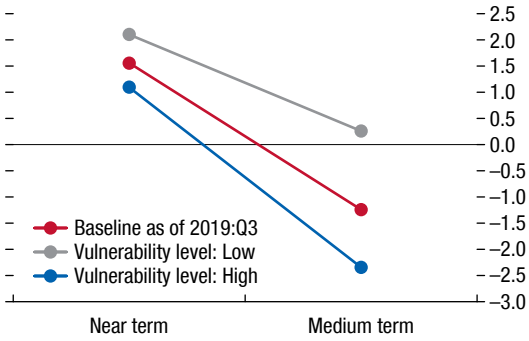
In the baseline specification, medium-term risks are higher than near-term risks.

1. Baseline: Near- and Medium-Term Risks (Fifth percentiles [GaR] of growth forecast distributions, as of 2019:Q3)



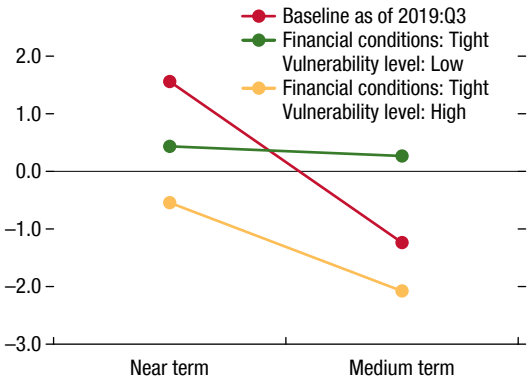
Assuming financial conditions are unchanged, a higher level of vulnerabilities would raise medium-term risks more than near-term risks.

2. Impact of Changing Vulnerability Levels (One-standard-deviation change in PNF FVI)



A tightening in financial conditions when private nonfinancial vulnerabilities are low results in increased risk in the near term, but helps mitigate medium-term risks. In contrast, when vulnerabilities are high, a tightening in financial conditions increases risks at both time horizons relative to the baseline.

3. Impact of Tightening Financial Conditions (One-standard deviation increase in FCI; one-standard-deviation change in PNF FVI)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; and IMF staff calculations.
Note: In panels 1–3, the lines indicate pairs of near- and medium-term forecasts and do not denote a linear relationship between the two horizons. Private nonfinancial (PNF) financial vulnerability indices (FVIs) using the growth-at-risk (GaR) specification are constructed as a credit-weighted aggregate of corporate and household FVIs. FCI = financial conditions index.

Box 1.3. The End of LIBOR: Managing a Challenging Transition

By 2014, many benchmark reference rates demonstrated critical deficiencies, such as scarcity of transactions and lack of transparency in setting rates, thus making their reform or replacement imperative.[1] Authorities have warned that market participants should end their reliance on LIBOR before official sector support for the benchmark is withdrawn at the end of 2021. A major international work program, coordinated by the Financial Stability Board (FSB) at the request of the G20, is underway to help guide this challenging transition process.[2]

Despite the impending discontinuation of LIBOR, it remains a central feature of the global financial system (see Table 1.3.1).[3] In the United States, US dollar LIBOR (USD LIBOR) is linked to about $200 trillion in derivatives and other securities. In addition, there is another $67 trillion of non-USD LIBOR products, mostly linked to sterling and yen LIBOR. The continued reliance on LIBOR poses risks to financial stability, which can be fully addressed only through a timely transition to alternative risk-free reference rates.

Alternative rates have been selected and established in all major jurisdictions and there has been steady progress toward their adoption. There are encouraging signs in many areas. The open interest on the Chicago Mercantile Exchange (CME) for secured overnight financing rate (SOFR) futures has climbed to over $1 trillion and the number of contracts has been rising fast (Figure 1.3.1, panel 1). The volume of new swaps referencing SONIA is now broadly equivalent to those in GBP LIBOR, while the market standard for new issuance of floating rate notes and securitizations in GBP has shifted to SONIA.

Despite the progress, much remains to be done. For example, in the United States and the United Kingdom, open interest in legacy rate futures contracts still dwarfs that in futures contracts based on alternative risk-free reference rates (Figure 1.3.1, panel 2). Meanwhile, issuance of new USD LIBOR-based products continues; 20 percent of US dollar LIBOR derivatives contracts and an even higher share of USD LIBOR cash products are scheduled to mature after 2021.

The continued reliance on LIBOR and the current pace of progress in adopting new benchmarks raise concerns about potential financial stability risks if the orderly transition is not completed by end-2021. While progress has been made to address the

This box was prepared by David Jones, Yingyuan Chen, Sanjay Hazarika, and John Caparusso.

[1]In the case of LIBOR, for example, data from its administrator shows that only a small minority of inputs to the rates produced are based directly on underlying market transactions. See ICE (2019), https://www.theice.com/publicdocs/ICE_LIBOR_Weekly_Report_-_23_Sep_2019_-_27_Sep_2019.pdf.

[2]FSB (2014), Reforming Major Interest Rate Benchmarks.

[3]LIBOR panel banks will no longer be bound by their voluntary agreement with the UK Financial Conduct Authority to issue daily submissions required to compute the rate after 2021. Other IBOR rates, such as those in Japan and Australia, are being reformed in accordance with International Organization of Securities Commissions principles and will continue to be generated.

Table 1.3.1. Risk-Free Reference Rates Replacing LIBOR

	LIBOR Market Size (trillions of US dollars)	Replacement Rate	Administrator	Replacement Rate Launched	Outstanding New RFR-linked Products (trillions of US dollars)[1]
United States	200	SOFR	US Federal Reserve	April 2018	2.2
United Kingdom	30	Reformed SONIA	Bank of England	April 2018	12.5
Euro Area	2	€STR	European Central Bank	October 2019	None
Japan	30	TONA	Bank of Japan	1997	0.65
Switzerland	5	SARON	SIX Swiss Exchange	2009	0.16

Sources: Bloomberg; International Swaps and Derivatives Association; Oliver Wyman; Securities Industry and Financial Markets Association.

Note: €STR = euro short-term rate; LIBOR = London Interbank Offered Rate; OIS = overnight indexed swap; RFR = risk-free rates; SARON = Swiss average rate overnight; SOFR = secured overnight financing rate; SONIA = sterling overnight index average; TONA = Tokyo overnight average rate.

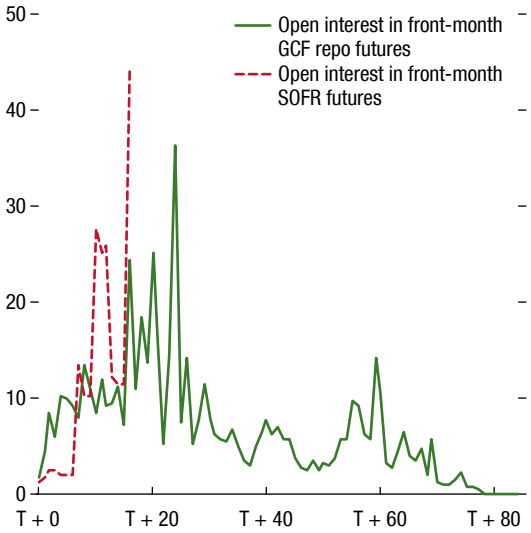
[1]Outstanding for US includes futures, swaps, and floating rate debt; UK includes futures, swaps, and floating rate debt; Japan and Switzerland include only OIS swaps.

Box 1.3 *(continued)*

Figure 1.3.1. Market Products Linked to LIBOR and to New Risk-Free Reference Rates

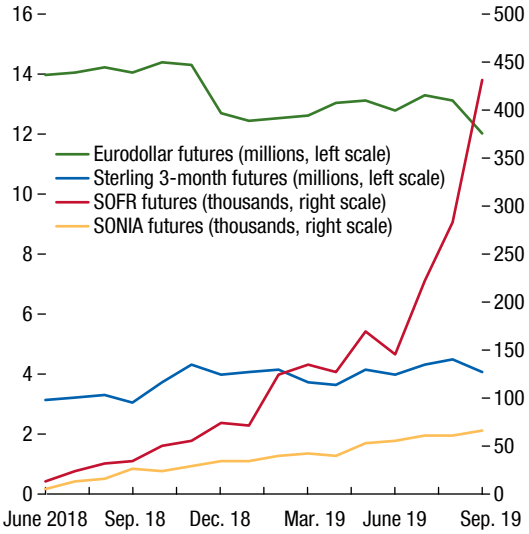
SOFR futures are gaining traction ...

1. Open Interest of SOFR Futures and General Collateral Financing Repo Futures
(Thousands of contracts; T + 0 = month of introduction)



... but volumes of alternative risk-free rate futures are still small relative to LIBOR-based rates.

2. Open Interest of LIBOR-based Futures and Alternative Reference Risk-Free Rates
(Number of contracts)



Sources: Bloomberg Finance L.P.; Federal Reserve Bank of New York; and IMF staff.
Note: GCF = general collateral financing; LIBOR = London Interbank Offered Rate; repo = repurchase agreement; SOFR = secured overnight financing rate; SONIA = sterling overnight index average.

remaining hurdles, work needs to accelerate in some areas to meet the envisaged timeline. Outstanding issues include:

1. *Legal uncertainty:* Derivatives contracts will need to be either renegotiated to refer to alternative risk-free reference rates or amended to include fallback provisions (where these do not already exist in an appropriate form) for a different rate to replace LIBOR should the latter become unavailable.[4] The FSB has been working with the International Swaps and Derivatives Association (ISDA) on amending its standard documentation to include robust fallback clauses for derivatives. This process is nearing its conclusion and has received broad support from market participants.[5] These fallbacks are expected to be available for adoption in Q1 2020, and, for example, the LCH Group has given advance notice of its intention to adopt the changes for all new and existing contracts.[6] However, the adoption of the amended protocol may not be universal before end-2021, especially for derivatives that are not centrally cleared.[7]
2. *Liquidity of markets in new reference rates:* LIBOR rates are typically produced daily at a variety of maturities, from overnight to one year. However, many risk-free reference rates are produced

[4]In the United States, the Alternative Reference Rate Committee has provided guidance for fallback reference rate language for all new-issue LIBOR-linked cash products. Investors in these products purchase them knowing that the reference rate will change with the cessation of LIBOR and need to value the securities accordingly. Separately, some recommendations on fallbacks for cash products have been prepared as well.

[5]ISDA (2019a).

[6]LCH (2018), https://www.lch.com/membership/ltd-membership/ltd-member-updates/lchs-position-respect-isdas-recommended-benchmark.

[7]Centrally cleared derivatives will automatically adopt the amended ISDA protocol. For derivatives that are not centrally cleared, adoption is voluntary.

Box 1.3 *(continued)*

only for the overnight tenor.[8] This difference in the characteristics of the new reference rates will require markets to adapt to new ways of referencing interest rate benchmarks. This can be addressed in part by calculating term rates from derivatives on overnight risk-free reference rates, but the robustness of such rates will depend on sufficient liquidity in the underlying markets (Heitfeld and Park 2019). This underscores a chicken and egg problem in the transition: the limited depth and liquidity of derivative markets in some risk-free reference rates may be hampering the growth of linked cash products. This in turn may be slowing the development of risk-free reference rate derivatives. Authorities should actively encourage the development of trading products in longer maturities to eventually build out a longer yield curve.

3. *Replacing unsecured LIBOR rates with nearly risk-free reference rates:* Unlike LIBOR, alternative risk-free rates do not contain appreciable credit risk. In normal times, both types of rates would move together on average and typically be expected to closely track central bank interest rates.[9] However, during periods of sustained stress in funding markets, differences in the underlying dynamics of these markets may lead to a notable divergence in rates—as witnessed, for example, during the global financial crisis or, more recently, during episodes of strains in USD funding markets. For example, under stressed conditions, such divergence may pose challenges for instruments such as cross-currency swaps that reference multiple risk-free reference rates. Market participants will need to develop risk management tools to ensure that any new basis risks can be appropriately managed.
4. *Value transfer:* The replacement of LIBOR with new risk-free reference rates will likely affect the financial position of existing trades that mature after 2021. The scale of this impact depends on a variety of factors, including the rate adjustments needed to account for the changes in credit risk and in terms, as well as the degree to which market participants take action to mitigate these risks. The International Swaps and Derivatives Association (ISDA) has recently selected the "compound in arrears" approach for term adjustment and the historical mean/median approach for credit risk adjustment in derivatives contracts that reference LIBOR in USD or other currencies. Relative to alternative adjustment methods that had been considered, this approach is expected to have only a modest valuation impact on derivative positions.[10] ISDA is currently consulting on final parameterization of this approach and these fallbacks are expected to be available for adoption in 2020:Q1.

A successful transition to alternative benchmarks requires the following:

Transition planning, coordination, and raising awareness: Continued international coordination and collaboration between authorities and market participants is needed to accelerate the pace of adoption of the new benchmark rates. Regulators and supervisors should determine the extent of reliance on LIBOR within their financial systems and engage with market participants to ensure risks are mitigated effectively; LIBOR remains deeply embedded throughout the global financial system, including in many emerging markets. International standard setting bodies should examine the implications of the discontinuation of LIBOR for their existing frameworks.[11]

Reducing legal uncertainties: Supervisors should encourage market participants to net down legacy derivative and swap positions and to transition legacy derivatives to new reference rates. Authorities should also encourage adoption of contractual fallback provisions (such as the amendments that will be offered in the ISDA protocols) to mitigate problems

[8]In June 2019, the FSB's Official Sector Steering Group (OSSG) published a users' guide to overnight risk-free rates setting out how these can be used in cash market products. FSB (2019), https://www.fsb.org/wp-content/uploads/P040619-1.pdf.

[9]Through use of risk-free rates in the majority of financial products, many end-users will no longer be exposed to the risk of moves in credit premiums that do not relate to their own credit standing.

[10]ISDA (2019b), Consultation on Final Parameters for the Spread and Term Adjustments in Derivatives Fallbacks for Key IBORs.

[11]For example, the International Accounting Standards Board (IASB) is proposing changes to its rules on hedge accounting to provide relief to firms affected by the benchmark reform. The European Insurance and Occupational Pensions Authority (EIOPA) has also added the monitoring of LIBOR transition to their 2019 priorities.

Box 1.3 *(continued)*

emerging from the discontinuation of LIBOR-based reference rates. Such fallbacks are not intended as a substitute for the conversion of existing contracts before LIBOR becomes unavailable but are an important backstop to mitigate financial stability risks.

Improving liquidity of new risk-free reference rates: As market participants transition to instruments based on risk-free reference rates, authorities should encourage liquidity in these new instruments, for instance, by issuing obligations linked to these rates and also by encouraging the development of trading products in longer maturities by market participants.[12]

[12]Institutions like Freddie Mac, Fannie Mae, and the World Bank have to date issued over $47 billion in floating rate notes linked to SOFR.

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CHAPTER 2

GLOBAL CORPORATE VULNERABILITIES

RISKIER BUSINESS

Easy financial conditions have extended the corporate credit cycle, with further financial risk-taking by firms and continued buildup of debt. Corporate sector vulnerabilities are already elevated in several systemically important economies, reflecting rising debt and often weak debt service capacity. Slowing growth and escalating trade disputes may further weaken firms' profitability in the baseline scenario, whereas in a material economic downturn debt-at-risk could rise to the levels seen in the aftermath of the global financial crisis. This could result in losses at bank and nonbank financial institutions with significant exposures to highly indebted nonfinancial firms—a development that could amplify shocks. The challenge facing policymakers is addressing corporate vulnerabilities before the next downturn.

High Corporate Leverage Can Exacerbate the Next Economic Downturn

During the global financial crisis, countries with high leverage in the banking and household sectors experienced more severe recessions.[1] But corporate leverage can also amplify shocks,[2] as corporate deleveraging could lead to depressed investment and higher unemployment, and corporate defaults could trigger losses and curb lending by banks. For example, corporate debt overhang aggravated the economic outcomes of the euro area debt crisis.[3] Since then, corporate debt levels have risen globally—prompting the question of how risky and systemic global corporate debt has become.

This chapter examines corporate vulnerabilities in several systemically important countries.[4] It shows that the outlook for firms has weakened despite very low interest costs. Debt has risen and is increasingly used for financial risk-taking—to fund corporate payouts to investors, as well as mergers and acquisitions (M&A), especially in the United States. In addition, global credit is increasingly flowing to riskier borrowers. The April 2019 GFSR discussed the credit quality of large firms, BBB-rated bond issuers, and leveraged loan borrowers. This chapter presents a comprehensive assessment of the corporate sector credit quality using the broadest data coverage available.[5] It concludes that debt-at-risk (debt owed by companies whose earnings are insufficient to cover interest payments) and speculative-grade debt[6] are already elevated in several major economies and could approach or exceed crisis levels in an adverse scenario considered by the IMF staff. Banks and nonbank financial institutions with significant exposures to small and medium-sized enterprises (SMEs), syndicated leveraged loans, direct credit, and high-yield corporate bonds may be particularly susceptible to losses in such an adverse scenario and could amplify the shock by curtailing credit to the economy.

The Outlook for Firms Has Weakened but Funding Conditions Remain Favorable

Slowing global growth and escalating trade disputes have started to affect nonfinancial firms. In China, Europe, and the United States, expected corporate sales have decelerated this year (Figure 2.1, panel 1). In addition, profit margins—although still solid—have declined in the United States this year amid rising wages and elevated input costs

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[1]See Aikman, Haldane, and Nelson 2013; Jorda, Shularick, and Taylor 2012; Mian, Sufi, and Verner 2016; Chapter 2 of the October 2017 *Global Financial Stability Report* (GFSR); Chapter 3 of the April 2012 *World Economic Outlook*.

[2]See Bernanke, Gertler, and Gilchrist 1996; Kaplan 2019.

[3]See Antoshin and others 2017; Bank of England 2019; Bridges, Jackson, and McGregor 2017; Jungherr and Schott 2018; Kalemli-Ozcan, Laeven, and Moreno 2019.

[4]These include China, France, Germany, Italy, Japan, Spain, the United Kingdom, and the United States.

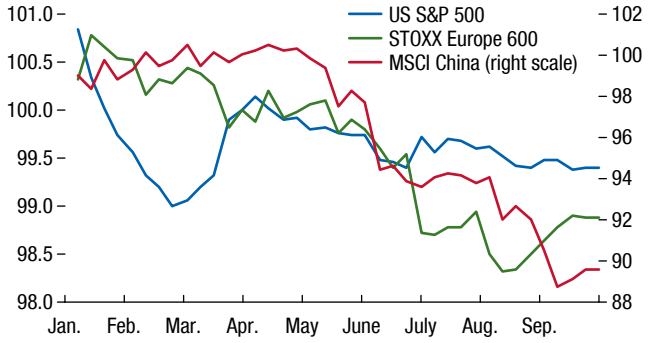
[5]A firm-level analysis is carried out using full samples from Bureau van Dijk Orbis, S&P Capital IQ, and WIND Information Co., with data validation using Bloomberg Finance L.P. The firm-level analysis was extended to the system level using national data sources. See Section 2 of Online Annex 1.1 for details.

[6]Debt-at-risk is defined as debt at firms with an interest coverage ratio (ICR)—defined as the ratio of earnings before interest and taxes to interest—below 1. Speculative-grade debt is defined as debt at firms with implied speculative-grade ratings based on ICR and net debt to assets.

Figure 2.1. Corporate Performance and Outlook

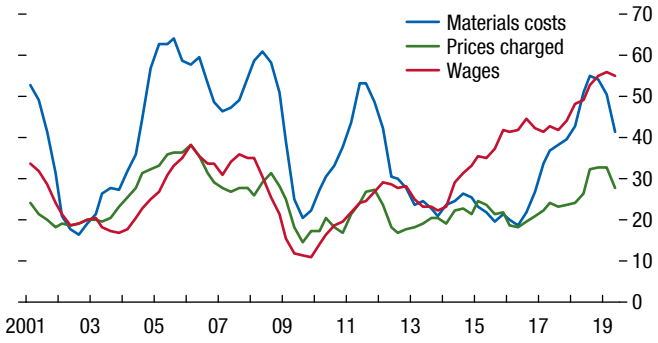
Slower global growth and escalating trade disputes have curbed expected sales growth, especially in China.

1. Global Large Firms: 2019 Sales
(Index, blended actual and forecast sales, April 1, 2019 = 100)



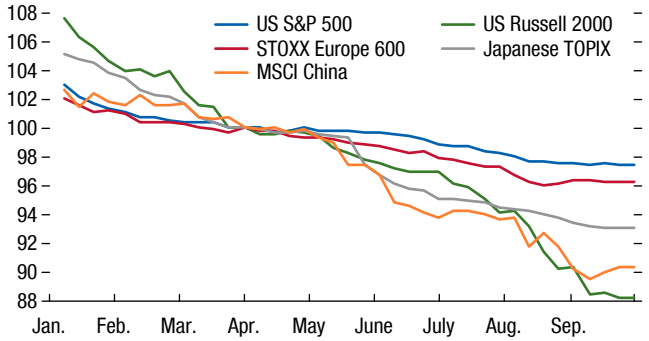
US firms reported elevated labor and input costs.

2. US Business Conditions Survey: Net Share of Respondents Reporting Rising Labor and Input Costs and Prices Charged
(Four-quarter moving average, percent)



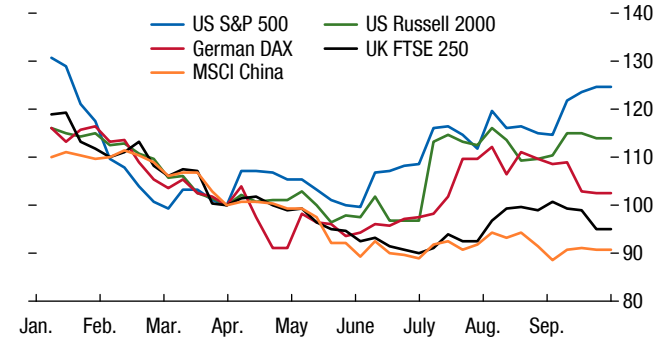
Expected earnings growth has decelerated, particularly at Chinese, Japanese, and US small firms ...

3. Global Large Firms: 2020 Earnings per Share Estimates
(Index, April 1, 2019 = 100)



... and uncertainty about future earnings has risen in recent months in the United States and Europe.

4. Global Large Firms: Dispersion in Earnings Forecasts
(12-months forward; April 1, 2019 = 100)



Sources: National Association for Business Economics; Thomson Reuters I/B/E/S; and IMF staff calculations.

(Figure 2.1, panel 2), and managers have become more concerned about tariffs. As a result, corporate earnings forecasts have been revised down since April (Figure 2.1, panel 3). In addition, uncertainty about future earnings—measured as the dispersion in analysts' forecasts—has recently increased further (Figure 2.1, panel 4).

Corporate bond spreads are very low by historical standards and appear to be compressed relative to fundamentals, reflecting primarily strong investor risk appetite. According to an IMF staff model,[7] rising corporate debt, weaker economic fundamentals, and higher economic uncertainty all imply that spreads should be wider. Misalignments are relatively large in the United States and moderate in Europe (Figure 2.2, panel 1). Declining interest rates have led to outflows from loan mutual funds and inflows into bond funds, further suppressing bond yields (Figure 2.2, panel 2). Stretched valuations often precede economic downturns and can be an additional source of vulnerability (see Chapter 1). Bank lending standards have broadly eased since 2016 in both the United States (Figure 2.2, panel 3) and the euro area and remain favorable, though with a modest tightening for small firms in Europe (Figure 2.2, panel 4).

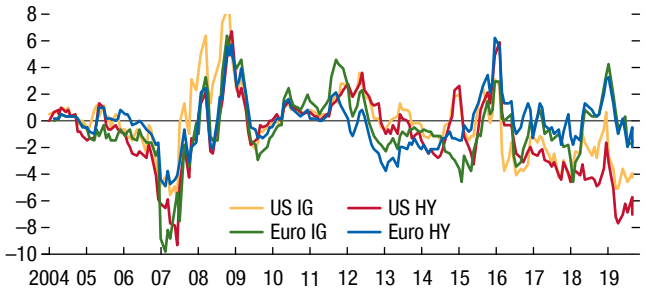
Global issuance of corporate bonds and syndicated loans has remained robust this year, still dwarfing

[7]The corporate bond valuation model uses three groups of explanatory variables—economic factors, measures of uncertainty, and leverage—similarly to Collin-Dufresne, Goldstein, and Martin (2001) and Ericsson, Jacobs, and Oviedo (2009)—based on the theoretical underpinnings in Black and Scholes (1973) and Merton (1974). See Section 1 of Online Annex 1.1.

Figure 2.2. Funding Conditions and Debt Accumulation

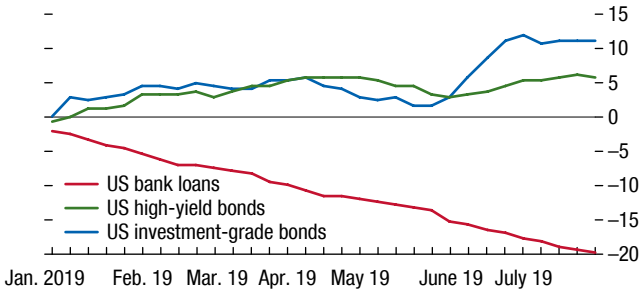
Corporate bond spread misalignments are relatively large in the United States and moderate in the European market.

1. Corporate Bond Spread Misalignments
(Misalignments in percent of actual prices divided by historical price volatility)



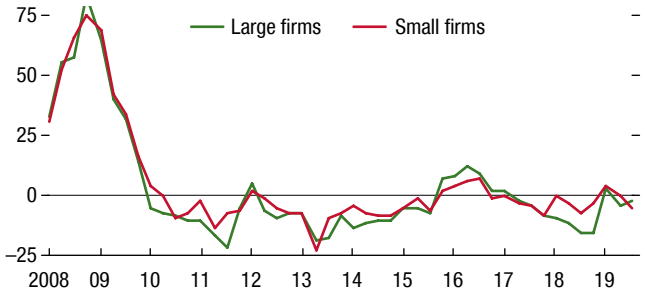
Bond funds have recently benefited from allocations away from loan funds, as falling interests rates have made floating-rate loans relatively less attractive.

2. Cumulative Fund Flows to US Corporate Bond and Loan Mutual Funds and Exchange-Traded Funds
(Percent of assets under management)



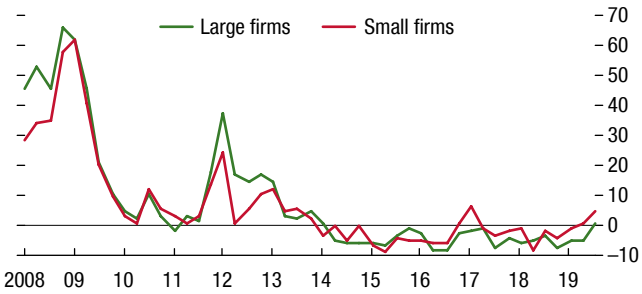
Bank lending standards in the United States have eased considerably since the crisis ...

3. US Bank Lending Standards
(Survey net balances, percent of responses)



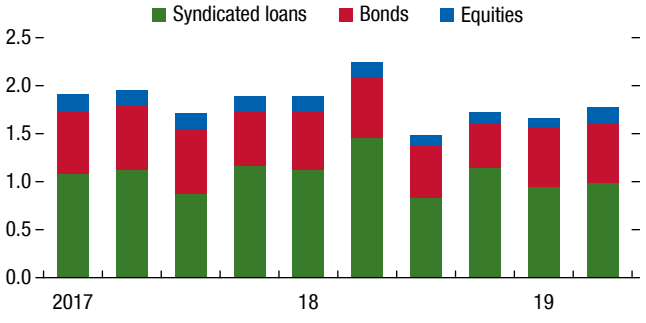
... whereas the easing has been less pronounced in the euro area.

4. Euro Area Bank Lending Standards
(Survey net balances, percent of responses)



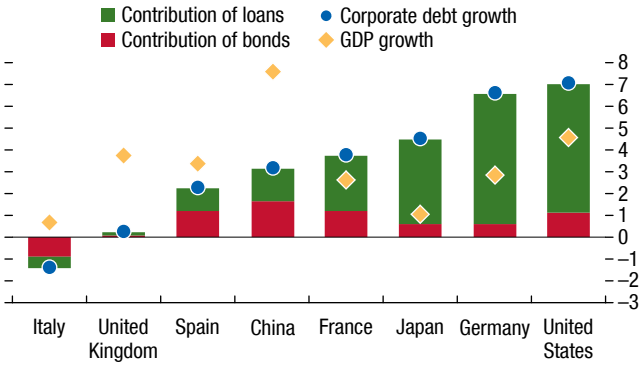
Market-based debt issuance has remained robust this year, dwarfing equity issuance ...

5. Gross Issuance of Corporate Bonds, Syndicated Loans, and Equities
(Trillions of US dollars)



... and corporate debt has risen faster than GDP in several major economies.

6. Corporate Debt Growth, Contributions from Bonds and Loans, and GDP Growth
(Percent, growth from 2018:Q1 to 2019:Q1)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Consensus Economics Inc.; Dealogic; EPFR Global; European Central Bank; Federal Reserve; Haver Analytics; national statistics on bonds and loans; S&P Global Markets Intelligence; Thomson Reuters I/B/E/S; and IMF staff calculations.
Note: Panel 1 shows results from a corporate bond valuation model. Negative values indicate overvaluation in the bond markets. See Section 1 of Online Annex 1.1. In panels 3 and 4, positive values indicate a net tightening since a prior quarter. HY = high-yield; IG = investment-grade.

equity issuance (Figure 2.2, panel 5). Relative to GDP, corporate debt has continued to rise in several major economies, particularly the United States, Germany (though from low levels), and Japan (Figure 2.2, panel 6). The bulk of the recent increase in US corporate debt was funded by leveraged loans and private lending.

Financial Risk-Taking and Riskiness of Lending Have Risen

Financial risk-taking by US companies in the form of payouts and M&A has increased—in contrast with subdued capital expenditures.[8] Surges in financial risk-taking usually precede economic downturns. Payouts—dividends and share buybacks—at US large firms have grown to record high levels in recent quarters (Figure 2.3, panel 1), whereas debt-funded payouts have increased since 2017. Smaller firms have increasingly used leveraged loans and high-yield bonds to fund payouts to boost investors' returns this year (Figure 2.3, panel 2). Debt-funded payouts can considerably weaken a firm's credit quality.

M&A volume has surged to record levels in the United States, partly because of the tax reform, dominating the global M&A landscape (Figure 2.3, panel 3). The markups on intangibles[9] associated with debt-funded M&A by US large firms have risen significantly in recent quarters (Figure 2.3, panel 4), signaling increased bets on future gains despite a weakening outlook. As M&A activity becomes riskier, potential impairments could ensue, weakening corporate credit quality.

In the leveraged loan market, the volume of debt-funded M&A and leveraged buyout (LBO) transactions remains high (Figure 2.3, panel 5). Over the first half of 2019, highly leveraged deals accounted for close to 60 percent of LBO activity. Firms increasingly use earnings projections incorporating so-called add-backs[10] based on their expectations of cost savings and synergies in M&A deals to boost the amount they can borrow. Earnings add-backs in M&A and LBO deals have reached record highs and could considerably understate the extent of leverage in the market (Figure 2.3, panel 6) by overstating future earnings.

The riskiness of credit allocation rose significantly in major advanced economies from 2016 to 2018 (Figure 2.4, panel 1), in particular because of nonbank lenders.[11] In Europe, the nonbank segment of the leveraged loan market (so-called institutional loans) has expanded rapidly in recent years, whereas investor covenant protections have weakened (Figure 2.4, panel 2). Similar trends are evident in the United States: provision of credit, especially to risky firms, has shifted further to nonbanks (Figure 2.4, panel 3), whereas the credit quality of new loans continues to deteriorate[12] (Figure 2.4, panel 4). The share of highly leveraged deals has grown and now surpasses precrisis highs (Figure 2.4, panel 5). In addition, significant growth has occurred in the nonbank private lending market, which has reached nearly $1 trillion.[13] Private debt funds[14] currently hold the largest exposure and capital available for deployment (so-called dry powder) across loans to SMEs (Figure 2.4, panel 6). In this segment, search for yield and heightened competition have led to weaker underwriting standards and rising leverage.

Corporate Debt Vulnerabilities Are Already Elevated

To assess the credit quality of global corporate debt, IMF staff analysis[15] employs the broadest database coverage available and focuses on (1) *debt-at-risk*—defined as the debt at firms with an interest coverage ratio (ICR—ratio of earnings before interest and taxes to interest) below 1; and (2) *speculative-grade debt*—debt at firms with speculative-grade credit quality based on the ICR and the net debt-to-assets ratio.[16] Although firms with ICRs below 1 are at a more imminent risk of distress, the rising share of speculative-grade bonds

[8]See the October 2017 GFSR.

[9]See Crouzet and Eberly 2018.

[10]Earnings or EBITDA (earnings before interest, taxes, depreciation, and amortization) add-backs are positive adjustments to earnings related to expenses that are expected to be eliminated after an M&A or LBO deal. These could include expected cost savings (synergies) and some of compensation, transaction costs, and legal fees.

[11]See Chapter 2 in the April 2018 GFSR; Bank of Japan 2019.

[12]See Gluckman and others 2019.

[13]See Muthukrishnan, Hu, and Webster 2019.

[14]See Preqin 2019.

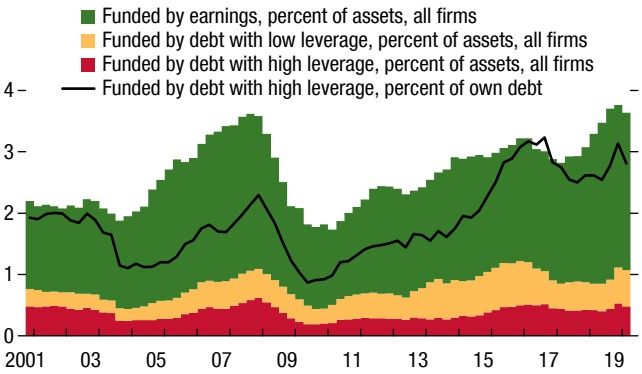
[15]The analysis is conducted for China, France, Germany, Italy, Japan, Spain, the United Kingdom, and the United States. See Section 2 of Online Annex 1.1.

[16]This includes debt of all firms in the data set with an ICR less than 4.1 and a net debt-to-assets ratio greater than 0.25. Net debt is gross debt minus cash. Net debt is used because many firms have increased their buffers, as shown in recent GFSRs. The thresholds are empirically established based on constituents of the global investment-grade and speculative-grade bond indices.

Figure 2.3. Financial Risk-Taking

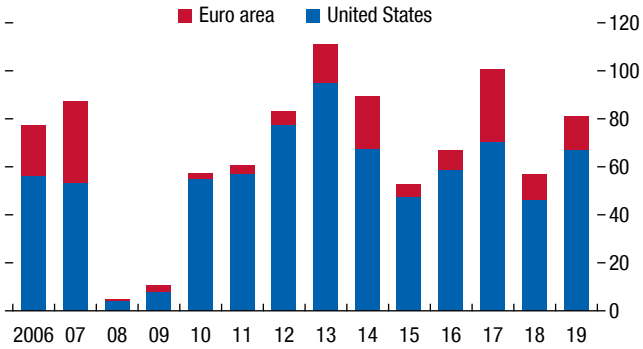
Debt-funded payouts at large firms have risen further ...

1. S&P 500 Nonfinancial Firms: Payouts
(Percent of total assets and of own debt, annualized)



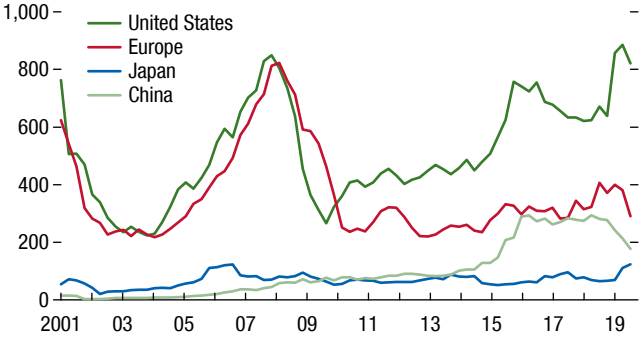
... and firms with speculative-grade credit quality have used more debt to carve out shareholder payments.

2. High-Yield Bonds and Leveraged Loans Used for Dividend and Share Buyback Recapitalizations
(Billions of US dollars)



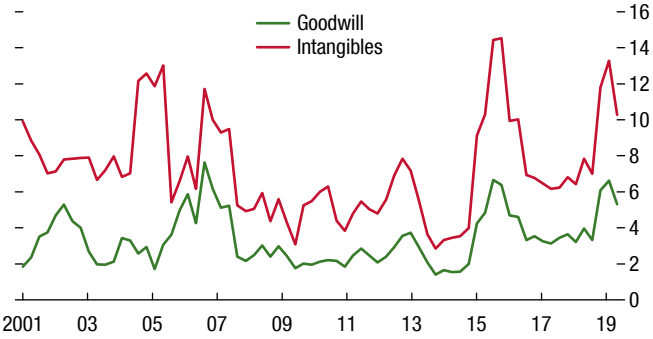
Mergers and acquisitions (M&A) activity has become rampant in the United States ...

3. Global Mergers and Acquisitions Deals
(Billions of US dollars)



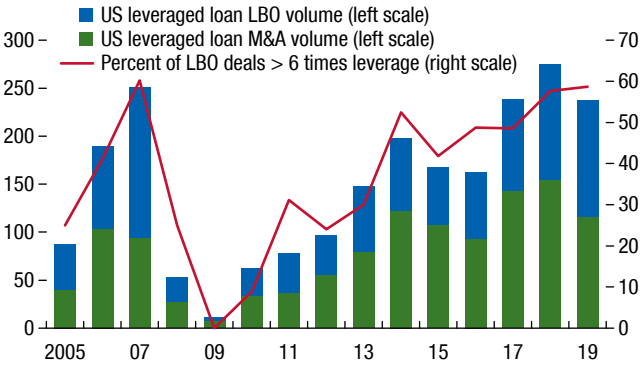
... and bets on future gains in debt-funded M&A have risen since last year.

4. S&P 500 Nonfinancial Firms: Increases in Goodwill and Other Intangibles
(Percent of total debt, annualized)



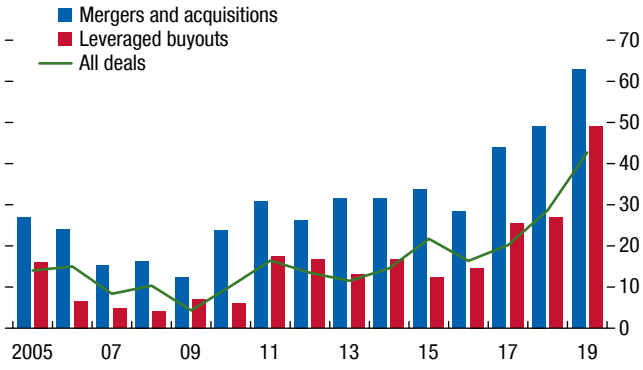
In the United States, the volume of M&A and leveraged buyout (LBO) transactions funded by US leveraged loans remains high ...

5. US Leveraged Loan M&A and LBO Volume
(Billions of US dollars; percent)



... and bets on cost savings and synergies have led to record high earnings adjustments.

6. US Leveraged Loan Deals with EBITDA Add-Backs
(Percent of new issuance)

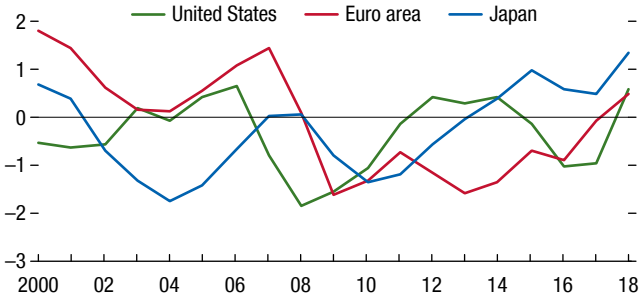


Sources: Bloomberg Finance L.P.; Dealogic; S&P Leveraged Commentary & Data; and IMF staff calculations.
Note: For panels 2 and 5, 2019 is estimated. EBITDA = earnings before interest, taxes, depreciation, and amortization; LBO = leveraged buyout; M&A = mergers and acquisitions.

Figure 2.4. Riskiness of Global Lending

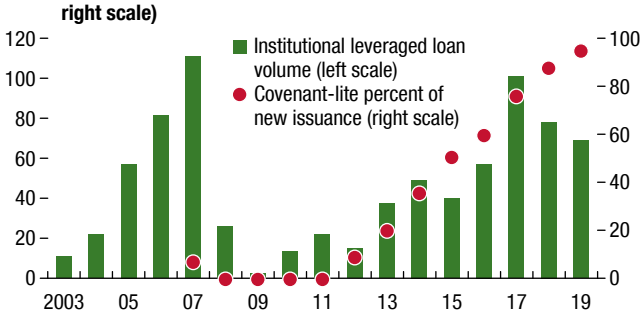
Riskiness of credit allocation has recently risen globally.

1. Riskiness of Credit Allocation
(Based on debt overhang; *z*-score during 1995–2018)



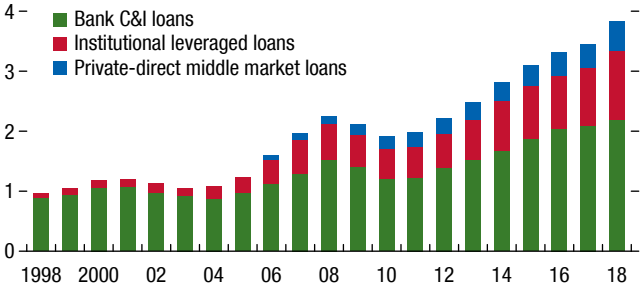
Leveraged lending in Europe has grown rapidly, whereas covenant protections have weakened.

2. European New Issue Institutional Leveraged Loan Volume
(Billions of euros on left scale; percent of new issuance on right scale)



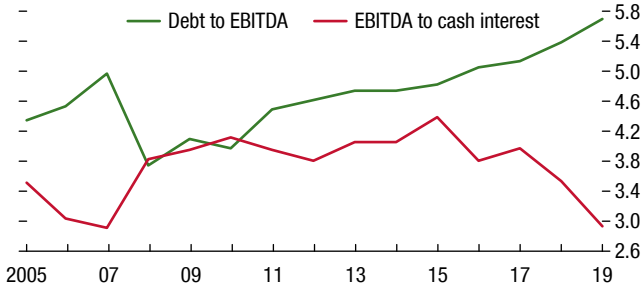
In the United States, nonbank lending has expanded faster than loans provided by banks ...

3. US Outstanding Loans
(Trillions of US dollars)



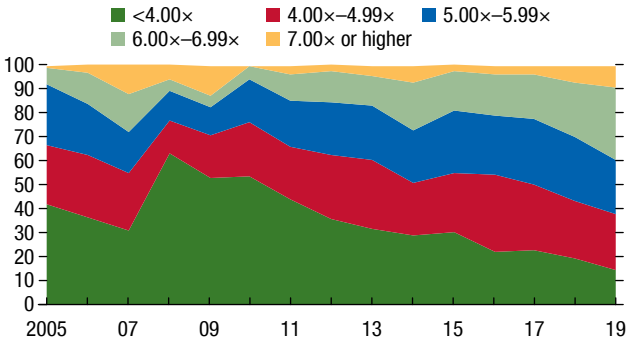
... and credit metrics in the leveraged loan market have continued to weaken ...

4. Average Leverage and Coverage Ratios on New Issue US Leveraged Loans
(Multiple)



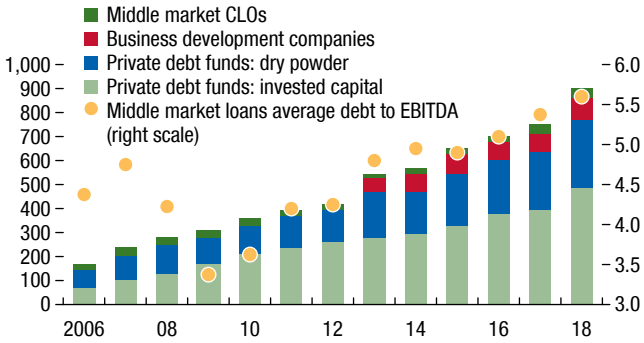
... with highly leveraged deals representing a growing portion of the new issue market.

5. US Leveraged Loan Issuance by Leverage Multiple
(Percent)



The search for yield has driven rapid growth in private, small risky loans and rising leverage.

6. US Middle Market and Private Credit Assets under Management and Leverage
(Billions of US dollars, left scale; multiples, right scale)



Sources: Preqin 2019; S&P Leveraged Comentary & Data; Worldscope; and IMF staff calculations.
Note: In panel 1, the riskiness of credit allocation based on debt overhang is the average vulnerability decile of top issuers minus average vulnerability decile of bottom issuers, where top issuers are firms in the top quintile of change in debt divided by lagged assets, bottom issuers are firms in the bottom quintile of change in debt divided by lagged assets, and debt overhang is debt-to-EBITDA (see Chapter 2 in the April 2018 *Global Financial Stability Report*). For panel 3, private-direct middle market loans do not include dry powder of private debt funds. The middle market, as defined by Standard & Poor's, is composed of firms that have $50 million or less in earnings before interest, taxes, depreciation, and amortization (EBITDA). Private loans refer to financing that is directly negotiated between a lender (typically an asset manager) and a borrower (typically a small- to medium-sized company with speculative-grade debt), and for which a syndicate bank is not involved. For panel 6, dry powder refers to the amount of capital that has been committed to a private capital fund minus that amount that has been called by the general partner for investment. C&I = commercial and industrial; CLOs = collateralized loan obligations.

is generally considered a good leading indicator of future corporate sector distress.[17]

Since the global financial crisis, the global recovery and easy financial conditions have supported nonfinancial firms' profits, lowered their interest burden, and encouraged borrowing (see Figure 2.5):

- *Profitability* trends have varied across countries and types of firms since 2009. In China, SMEs remain highly profitable, but large firms, including state-owned enterprises, have relatively weak profitability. In Europe and Japan, profitability is now close to median global levels. In the United States, large firms remain highly profitable, but SMEs seem to have weak profitability.
- *Interest costs* have broadly declined over the past several years. In China and the United States, the wedges in interest costs between large firms and SMEs continue to be significant—in contrast with Europe.
- *Debt-to-assets ratios* have declined in Europe and Japan, and more recently, in China—reflecting deleveraging efforts—but remain elevated at large firms in several countries. Debt ratios have risen to record levels at US large firms. The increases in gross debt have been partly offset by larger cash holdings.
- *Debt-at-risk* (as a share of total debt) in the SME segment has risen to high levels in the United States and remains elevated in the United Kingdom and some euro area countries, notwithstanding significant improvements since 2009. Debt-at-risk at large firms has declined to relatively low levels in Japan and the United States but remains elevated in the United Kingdom and—to a lesser extent—in China.

Despite notable declines in Europe and Japan, corporate vulnerabilities remain significant in several countries (Figure 2.6). The estimated share of speculative-grade debt in total corporate sector debt is now nearly 50 percent in China and the United States and is even higher in Italy, Spain, and the United Kingdom, despite notable declines since the global financial crisis. Furthermore, the share of debt-at-risk in total corporate sector debt is above 25 percent in the United Kingdom and the United States.

[17]For example, Çelik, Demirtas, and Isaksson 2019 show that periods of significant increases in the share of speculative-grade bonds were regularly followed by significant increases in corporate default rates.

Corporate Debt-at-Risk May Increase Further in an Economic Downturn

An adverse scenario could be triggered by some of the risk factors discussed in Chapter 1, including escalating trade tensions. The same GDP shock is applied to all the countries—at half the average severity of the global financial crisis in terms of declines in GDP growth, whereas interest rates paid by firms rise to half the level in the global financial crisis.[18] Based on the IMF staff corporate bonds valuation model, spreads are projected to widen significantly as corporate fundamentals deteriorate, economic uncertainty rises, and current misalignments disappear (Figure 2.7). Firms would face lower profits and—given heavy debt loads, valuation pressures, and likely limited market liquidity—would not be able to deleverage quickly.

In this adverse scenario, debt-at-risk rises quickly as weaker profits and higher interest costs lower the ICRs (Figure 2.8, panels 1 and 2). In France and Spain, debt-at-risk is approaching the levels seen during previous crises; while in China, the United Kingdom, and the United States it exceeds these levels. This is worrisome given that the shock is calibrated to be only about half what it was during the global financial crisis. This increase in debt-at-risk can be explained by the growth in indebtedness after the global financial crisis.

The speculative-grade debt and debt-at-risk are economically significant in several countries, given their high aggregate corporate debt levels (Figure 2.8, panel 3).[19] In China, France, Spain, and the United Kingdom, the significant increase in the debt-at-risk in the adverse scenario can be partly explained by a large share of speculative-grade debt in these countries, some of which migrates to the debt-at-risk category in the adverse scenario. The deterioration of credit quality in China and the United Kingdom is driven mainly by large firms, while in France and Spain it is attributable to both large firms and SMEs. On aggregate, in these eight economies, the debt-at-risk would amount to $19 trillion, or nearly 40 percent of total corporate debt, in the adverse scenario in 2021.

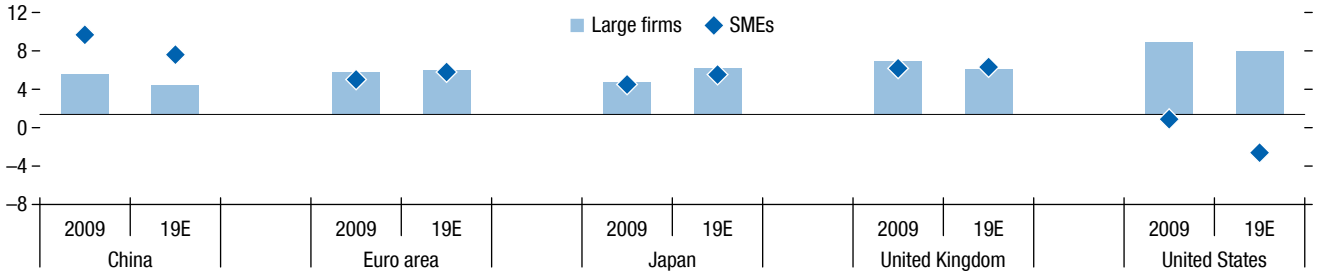
[18]See Section 2 of Online Annex 1.1.

[19]The number for the debt-at-risk in France is higher than what was reported in France's 2019 Financial Sector Assessment Program (IMF 2019), mainly because the debt-at-risk in this report is calculated at the system level, whereas the Financial Sector Assessment Program uses the debt-at-risk in the sample.

Figure 2.5. Corporate Fundamentals: Ingredients of Firms' Debt Servicing Capacity

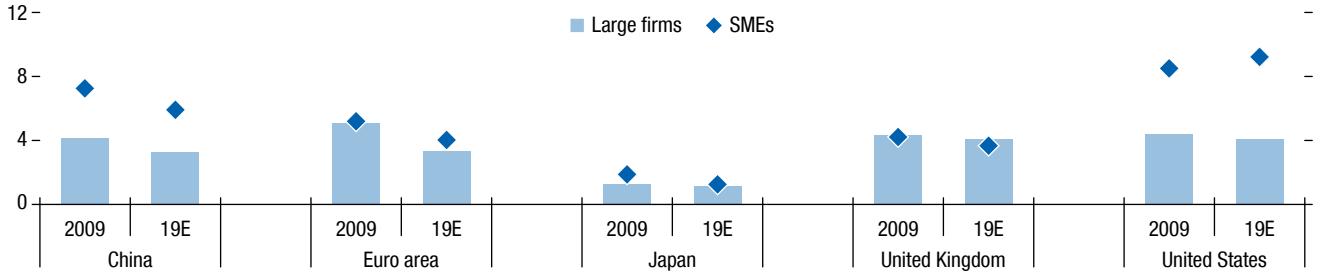
Since 2009, profitability has improved at European SMEs, Japanese firms, and US large firms.

1. Nonfinancial Firms: Profitability (EBIT to assets, aggregate)



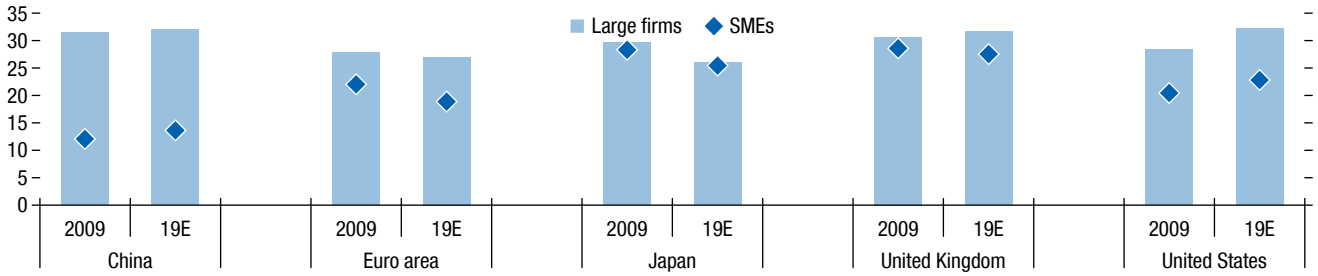
Most firms have benefited from easy financial conditions, with little differentiation in costs by firm size in Europe and Japan.

2. Nonfinancial Firms: Effective Interest Rate on Debt (Interest to debt, aggregate)



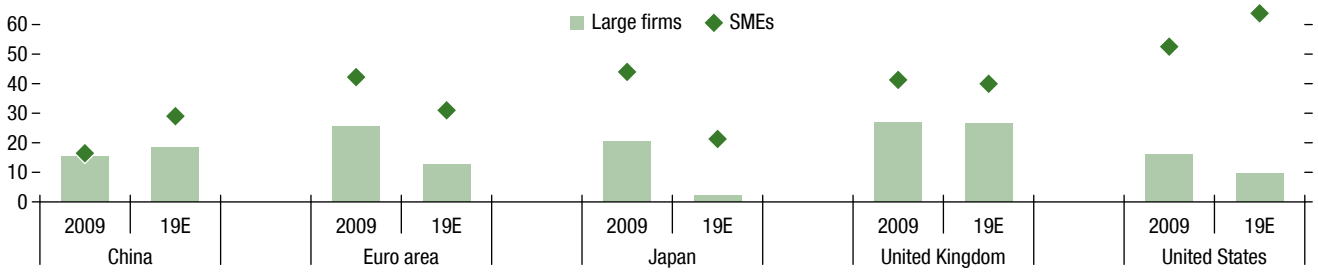
Debt-to-asset ratios have declined in Europe and Japan, but increased at US firms.

3. Nonfinancial Firms: Debt-to-Asset Ratios (Percent, aggregate)



Debt-at-risk has fallen in the euro area, Japan, and at US large firms but has remained elevated at UK firms and has risen in China and at US SMEs.

4. Nonfinancial Firms: Debt at Firms with EBIT-to-Interest Ratios Below 1 (Percent of total corporate debt)

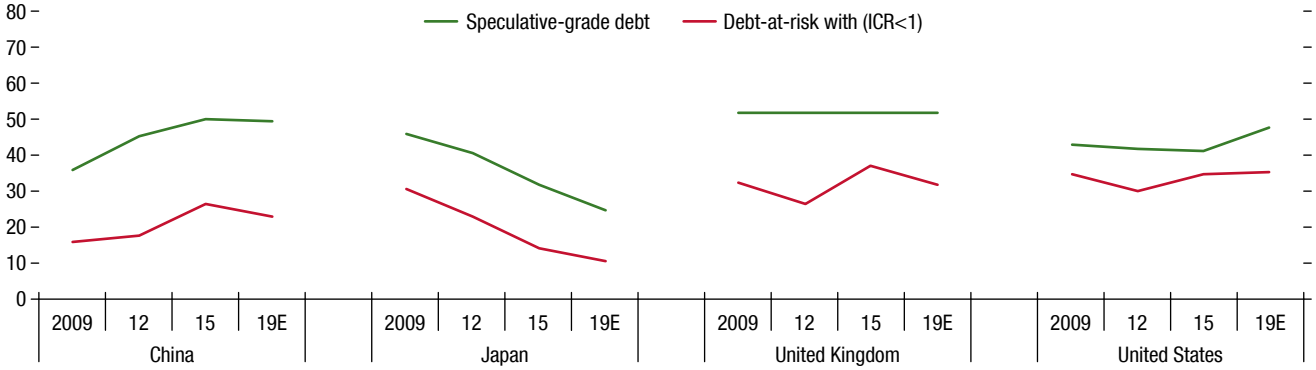


Sources: Bureau van Dijk Orbis; S&P Global Market Intelligence; WIND Information Co.; and IMF staff calculations.
Note: The sample includes about 1.3 million firms from Orbis, 10,000 firms from Capital IQ, and 10,000 Chinese firms from WIND. The sample's coverage is based on aggregate corporate debt from the Bank for International Settlements and national sources and is at least 44 percent in China, 38 percent in France, 55 percent in Germany, 53 percent in Italy, 51 percent in Japan, 62 percent in Spain, close to 100 percent in the United Kingdom, and 39 percent in the United States. The data for 2019 are estimates. E = estimated; EBIT = earnings before interest and taxes; SME = small and medium-sized enterprise.

Figure 2.6. Speculative-Grade Debt and Debt-at-Risk

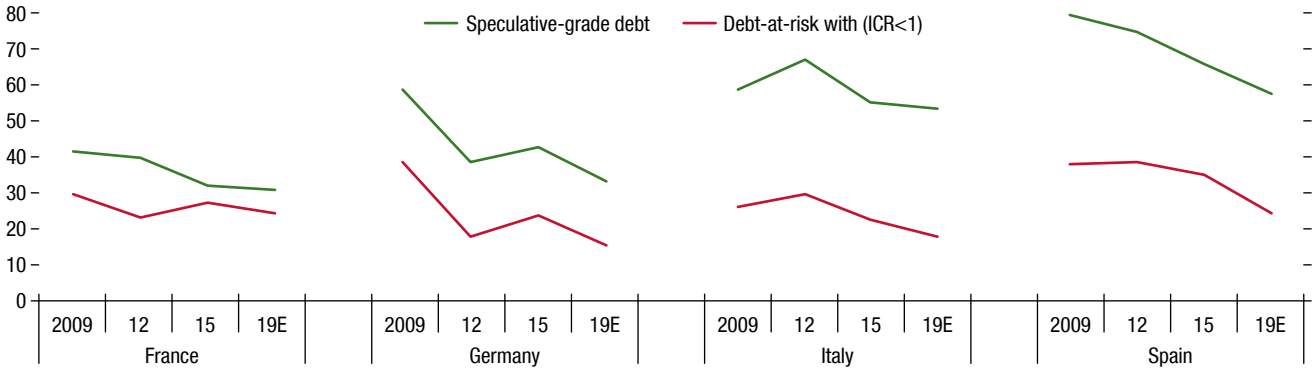
The shares of speculative-grade debt and debt-at-risk remain significant in China, the United Kingdom, and the United States, but have declined in Japan.

1. Nonfinancial Firms: Speculative-Grade Debt and Debt-at-Risk (ICR<1)
(Percent of total corporate debt)



In the euro area, credit quality has improved, but the shares of speculative-grade debt are still sizable.

2. Nonfinancial Firms: Speculative-Grade Debt and Debt-at-Risk (ICR<1)
(Percent of total corporate debt)



Sources: Bank for International Settlements (BIS); Bureau van Dijk Orbis; Haver Analytics; S&P Global Market Intelligence; WIND Information Co.; and IMF staff calculations.
Note: The sample includes about 1.3 million firms from Orbis, 10,000 firms from Capital IQ, and 10,000 Chinese firms from WIND. The sample's coverage is based on aggregate corporate debt from BIS and national sources and is at least 44 percent in China, 38 percent in France, 55 percent in Germany, 53 percent in Italy, 51 percent in Japan, 62 percent in Spain, close to 100 percent in the United Kingdom, and 39 percent in the United States. The panels show the outcomes for the overall corporate sector based on an extrapolation of the results for the sample of firms. The data for 2019 are estimates. Aggregate corporate debt in France includes intercompany debt. E = estimated; EBIT = earnings before interest and taxes; ICR = interest coverage ratio.

Some Financial Institutions Have Large Exposures to Corporate Credit Risks

High corporate debt-at-risk may translate into higher credit losses for financial institutions with significant exposures to corporate loans and bonds. Smaller and regional banks are more exposed to the SME segment, which is found to be relatively weak in several European countries and in the United States.[20] In the euro area and China, a large fraction of corporate loans comes from banks (Figure 2.9, panel 1), and thus, banks have significant exposure to corporate risks. In the United States, bond and institutional leveraged loans holders face weakening credit quality, as discussed in the April 2019 GFSR. US regional banks are more exposed to SMEs and risky commercial real estate loans and increasingly buy tranches of syndicated leveraged loans originated by large banks.[21] Nonbank lenders have a different risk profile from banks, and their behavior in a downturn, as well as their impact on credit markets and any implication for banks, have not been tested.

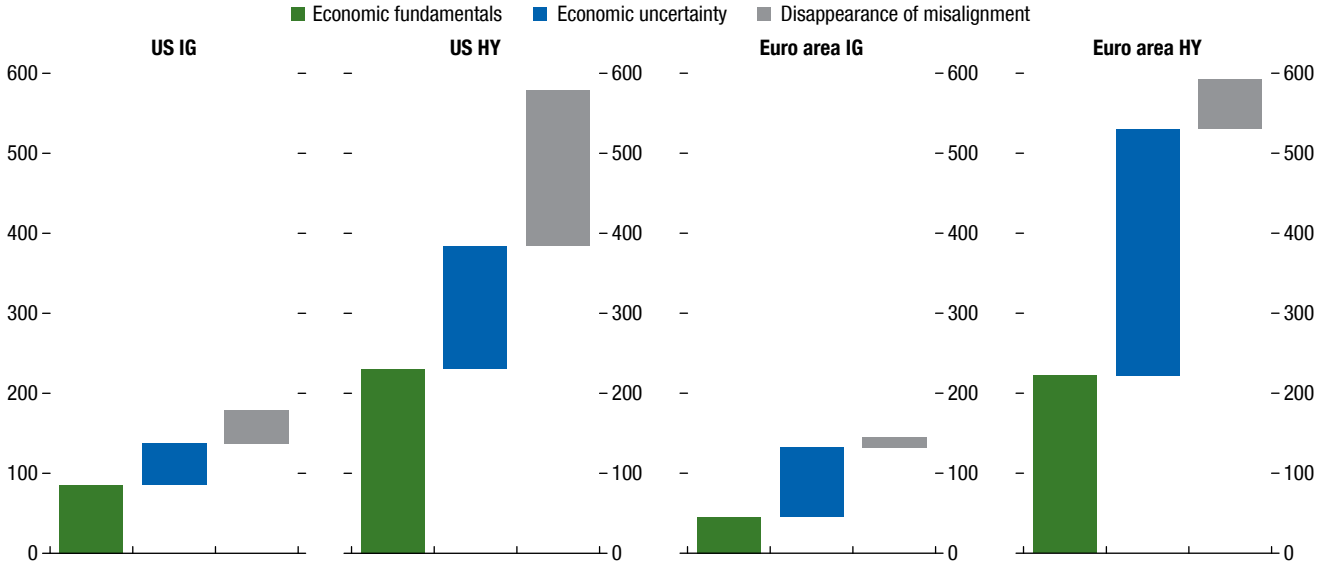
[20]See European Central Bank 2019.

[21]See Usai and others 2019.

Figure 2.7. Corporate Bond Spreads: The Adverse Scenario

Corporate bond spreads could widen significantly in a stress scenario with weaker growth, higher economic uncertainty, and reduced investor risk appetite.

Corporate Bond Spread Scenario: United States and Euro Area
(Cumulative changes in spreads, basis points)



Sources: Bloomberg Finance L.P.; Consensus Economics Inc.; Haver Analytics; S&P Global Market Intelligence; Thomson Reuters I/B/E/S; and IMF staff calculations.
Note: The scenario analysis is based on the corporate bond spread valuations model (see Figure 2.2). HY = high yield; IG = investment grade.

In addition to credit exposures, liquidity risks could be higher in a downturn, given that the shares of bonds held by mutual funds and exchange-traded funds, as well as by foreign investors, have risen (Figure 2.9, panels 2 and 3).

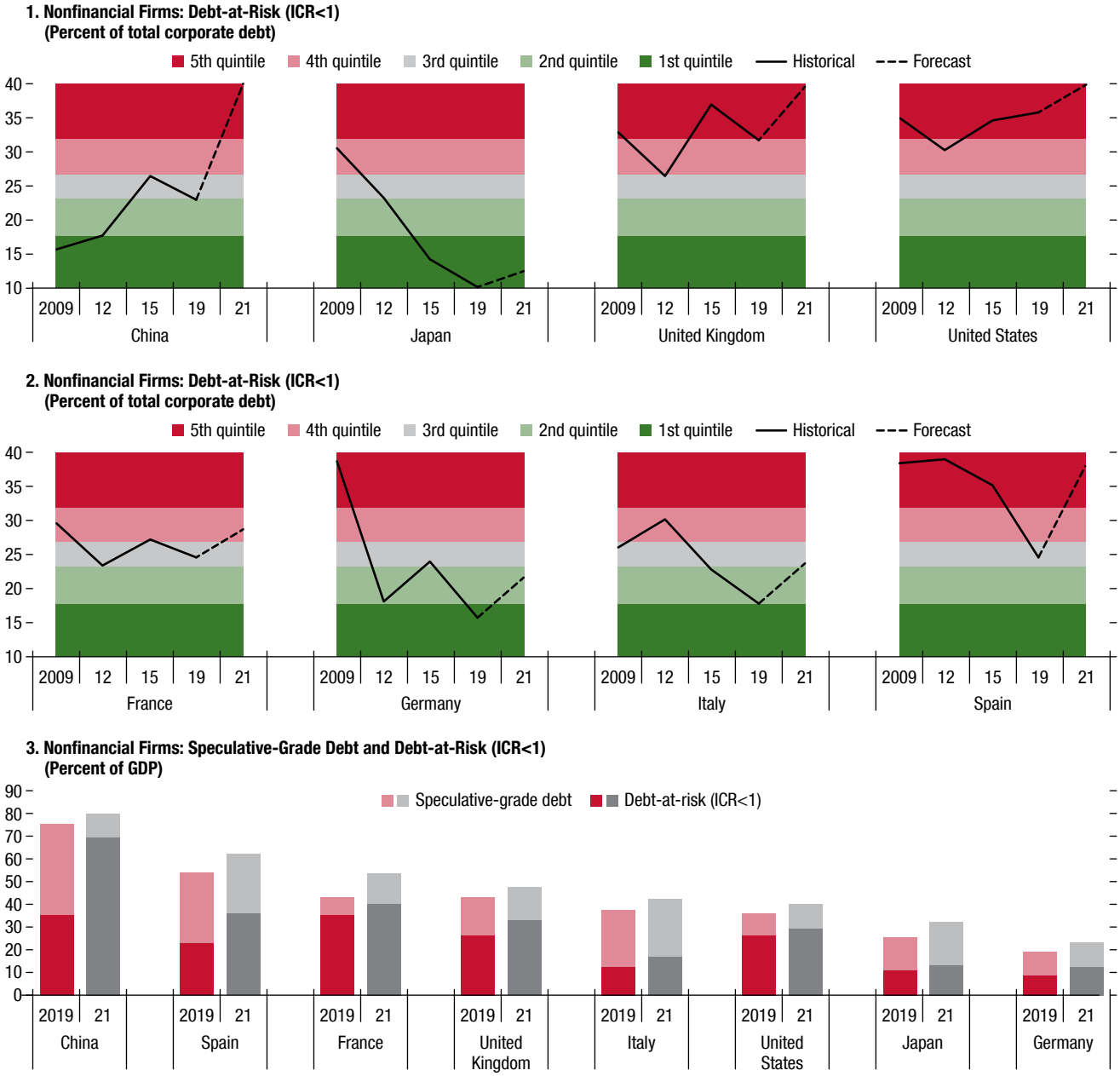
Conclusion

Corporate sector vulnerabilities are elevated across countries, albeit to different degrees. The key concerns in the three major economic regions are as follows:

- *In China*, overall corporate debt is very high, and the size of speculative-grade debt is economically significant. This is mainly because of large firms, including state-owned enterprises. In addition, the debt-at-risk in China is found to be very sensitive to deteriorations in growth and funding conditions (because of a large share of speculative-grade debt) and it surpasses postcrisis crests in the adverse scenario presented in this chapter. The assessment of the potential systemic impact of corporate vulnerabilities is complicated by the implicit government guarantees and the lack of granular data on corporate sector exposures of different segments of the large, opaque, and interconnected financial system in China.
- *In Europe*, progress in deleveraging since the euro area debt crisis has been significant. Both aggregate corporate debt and debt-at-risk have declined in major economies. However, the window of opportunity for an organic cyclical improvement in credit metrics has likely closed. Sales and profits at large firms in the euro area appear to have weakened more than at their US peers this year. Furthermore, the levels of speculative-grade debt and debt-at-risk are already high in several countries—mainly because of SMEs. In an adverse scenario, the debt-at-risk is estimated to approach crisis levels in France, Spain, and the United Kingdom. Small and medium banks—which are still numerous in several countries—have large exposures to SMEs.
- *In the United States*, a combination of solid fundamentals at large firms and easy financial conditions has shaped an exuberant environment and helped boost corporate valuations. Financial risk-taking by nonfinancial companies has increased, often

Figure 2.8. Corporate Debt-at-Risk: The Adverse Scenario

Corporate credit quality is projected to weaken in a stress scenario emulating half the severity of the global financial crisis.



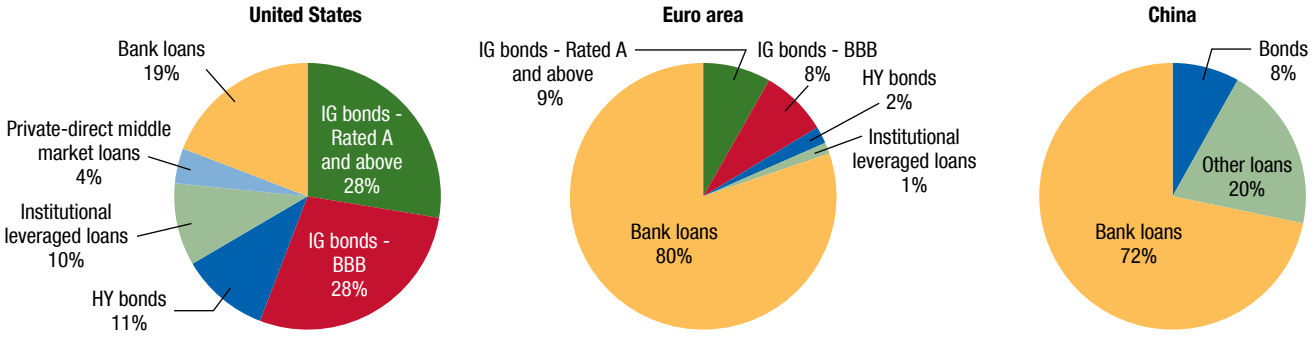
Sources: Bank for International Settlements (BIS); Bureau van Dijk Orbis; Haver Analytics; S&P Global Market Intelligence; WIND Information Co.; and IMF staff calculations.

Note: The sample comprises about 1.3 million firms from Orbis; 10,000 firms from Capital IQ; and 10,000 Chinese firms from WIND. The sample's coverage based on aggregate corporate debt from the BIS and national sources is at least 44 percent in China, 38 percent in France, 55 percent in Germany, 53 percent in Italy, 51 percent in Japan, 62 percent in Spain, close to 100 percent in the United Kingdom, and 39 percent in the United States. The panels show the outcomes for the overall corporate sector based on an extrapolation of the results for the sample of firms. The data for 2019 are estimates, and 2021 data are forecasts in the adverse scenario. In panels 1 and 2, the dark red and red areas correspond to the 80th and 60th percentiles in the pooled sample of eight major economies from 2009 to 2018. In panel 3, the 2019 number for the debt-at-risk in France is higher than what is reported in France's 2019 Financial Sector Assessment Program (FSAP), mainly because the debt-at-risk in this report is calculated at the system level, whereas the FSAP uses the debt-at-risk in the sample. Aggregate corporate debt in France includes intercompany debt. EBIT = earnings before interest and taxes; ICR = interest coverage ratio.

Figure 2.9. Shift in the Provision of Corporate Credit and the Investor Base

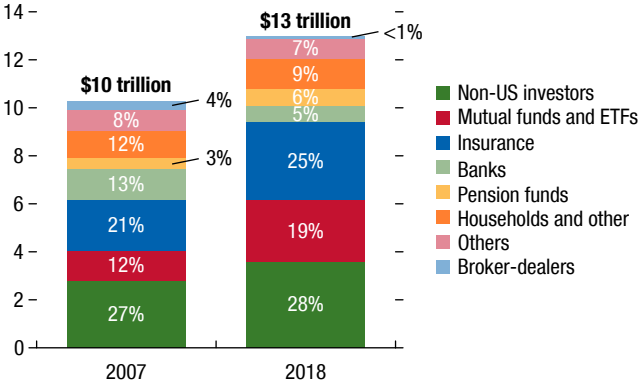
Capital market instruments have gained in prominence in the United States, whereas bank lending remains prevalent in the euro area and China.

1. Composition of Corporate Credit as of 2018
(Percent)



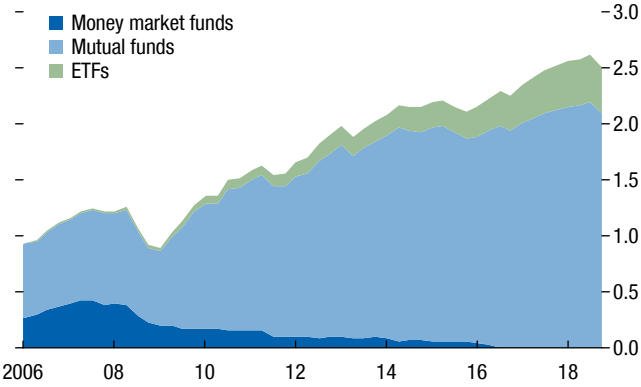
Ownership of US corporate bonds has shifted to investment funds and foreign investors ...

2. US Corporate Bond Ownership
(Trillions of US dollars)



... as mutual fund ownership of US corporate bonds has increased more than 150 percent from levels before the global financial crisis.

3. US Corporate Bond Fund Ownership
(Trillions of US dollars)



Sources: Bank for International Settlements; European Central Bank; Federal Reserve; Haver Analytics; Morgan Stanley; People's Bank of China; S&P Leveraged Commentary & Data; and IMF staff calculations.
Note: In panels 1 (the United States and the euro area), 2, and 3, financial corporate debt is included. For panels 2 and 3, the calculation for corporate bonds also includes holdings of foreign issues by US residents. ETFs = exchange-traded funds; HY = high yield; IG = investment grade.

funded by debt. Of particular concern is the rapid growth in the risky leveraged loan and private credit segments. Recent shifts in the investor base toward capital markets and nonbanks have been conducive to these developments. The analysis in this chapter shows that the US SME segment is relatively weak, which is a key factor in the IMF staff assessment of elevated speculative-grade debt and debt-at-risk. Banks and nonbank financial institutions that are highly exposed to corporate paper, leveraged loans, private credit, and SME loans would be susceptible to losses in an adverse scenario, possibly amplifying the magnitude of the downturn by cutting back on credit to the economy.

Policies Are Needed to Address Corporate Sector Vulnerabilities

These findings suggest that corporate vulnerabilities should be addressed urgently, and that policy uncertainty should be reduced to minimize the likelihood of an adverse scenario.

Financial *regulation and oversight* should remain robust and rigorous.[22] Policymakers should consider broadening the regulatory and supervisory perimeter to include nonbank financial intermediaries

[22]For example, see specific policy recommendations in France's 2019 Financial Sector Assessment Program.

as warranted—especially those with large exposures to firms:

- *Regulators and supervisors of regional banks* should closely monitor and address, as needed, the sizable exposures of such institutions to potentially vulnerable nonfinancial firms and commercial real estate through adequate risk management, provisioning, and capital buffers.
- *Disclosures at nonbank financial institutions*, including their exposures, should be improved. This is a crucial step toward monitoring systemic risk. In particular, *transparency in the growing private debt market* should be enhanced, including through collection of data on cross-border exposures.

More countries would benefit from actively using *macroprudential tools* to increase their financial systems' resilience and to cool down credit growth where it may be posing risks to financial stability. At the same time, authorities should be mindful of the risks of shifting vulnerabilities from banks to nonbank financial institutions and of exacerbating regulatory arbitrage:

- *Broad-based macroprudential tools* (such as *countercyclical buffers*) should be activated preemptively in countries where economic conditions are still relatively benign or financial conditions are still loose.
- Where credit developments are a concern in a particular sector, countries should conduct *targeted stress tests at banks* and could also consider more *targeted sectoral capital buffers for banks or increase risk weights* on such exposures (see the October 2014 GFSR). Countries may also consider developing *prudential tools for highly leveraged firms*.[23]

Countries should reduce potential debt bias in tax systems—which allows firms to deduct at least some interest expenses and thus may encourage excessive corporate borrowing.[24]

[23]In France, for example, authorities tightened large exposure limits for bank credit to indebted companies.

[24]See De Mooij and Hebous 2018; IMF 2016.

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CHAPTER 3

INSTITUTIONAL INVESTORS

FALLING RATES, RISING RISKS

Lower-for-longer yields may prompt institutional investors to seek riskier and more illiquid investments to earn their targeted return. This increased risk-taking may lead to a further buildup of vulnerabilities among investment funds, pension funds, and life insurers, with grim implications for financial stability. Furthermore, institutional investors' strategies to search for yield may introduce additional risks. Low yields promote an increase in portfolio similarities among investment funds, which may amplify market sell-offs in the event of adverse shocks. The need to satisfy contingent calls arising from pension funds' illiquid investments could constrain the traditional role they play in stabilizing markets during periods of stress. High-return guarantees and duration mismatches are driving an increase in cross-border investments by some life insurers, which could facilitate the spillover of shocks across borders. The underlying vulnerabilities could amplify shocks and should therefore be closely monitored and carefully managed.

Falling Interest Rates Encourage Greater Risk-Taking by Institutional Investors

A prolonged period of even lower interest rates may promote a further buildup of vulnerabilities.[1] The monetary policy cycle may have reached a turning point in major advanced economies (Chapter 1), and the amount of global bonds with negative yields has reached almost $15 trillion (Figure 3.1, panel 1).[2] Persistently low and declining yields on fixed-income instruments have continued to drive institutional investors—especially those with nominal return targets or investment mandate constraints—to boost returns by using leverage and investing in riskier and less liquid assets.

Fixed-income investment funds have reacted to declines in interest rates by shifting the composition of their portfolios toward riskier and less liquid investments. These funds have invested in assets of lower or even unrated credit quality (Figure 3.1, panel 2) and increased their effective average portfolio maturities (Figure 3.1, panel 3).[3] Funds have also decreased their liquidity buffers and may face greater pressure than in the past to sell their less liquid holdings in the event of increased investor redemptions (Box 3.1 shows that these risks are notably higher for smaller funds and for fixed-income funds based in the euro area).[4] Meanwhile, funds based in major currency areas have concentrated investments in assets denominated in their base currencies. Although it has alleviated risks stemming from currency mismatches, the increased home currency bias has contributed to more concentrated exposures and greater similarity in portfolios.

Defined-benefit pension funds are also under pressure to take on more risk. Liabilities to pension beneficiaries typically have a longer duration than pension assets, so declines in interest rates disproportionately increase the present value of liabilities, weakening the long-term solvency of pension funds. Among defined-benefit pension funds in the Netherlands, United Kingdom, and United States that report mark-to-market liabilities, the value of future obligations has increased sharply when long-term interest rates have fallen (Figure 3.1, panel 4). To better match their liabilities, pension funds have increased their exposure to long-duration assets, taking greater illiquidity risk in exchange for higher returns. As a result, they have increased investments in alternative asset classes

This chapter was prepared by Peter Breuer (team leader), Juan Solé (team leader), Yingyuan Chen, Fabio Cortes, Frank Hespeler, Henry Hoyle, Mohamed Jaber, David Jones, Piyusha Khot, and Akihiko Yokoyama, with input from Peter Windsor, under the guidance of Fabio Natalucci and Anna Ilyina.

[1]This chapter does not attempt to assess the appropriate monetary policy stance in each jurisdiction. Instead, taking policy as given, the chapter explores changes in investors' risk-taking and their potential implications for financial stability.

[2]Besides accommodative monetary policies, aging trends and low productivity in most advanced economies are adding further downward pressure on interest rates. Older populations will likely alter the future general equilibrium profile of credit demand and risk aversion.

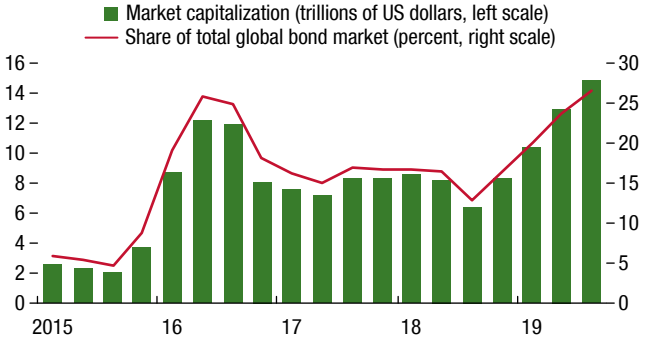
[3]Fund samples include fixed-income funds domiciled in all major economies, with shares denominated in all major currencies and with assets of at least $1 billion. They represent some 60 percent of the global bond fund industry's assets of $10.5 trillion (as of March 2019). Funds are denominated in US dollars (70 percent), euros (10 percent), and other currencies (20 percent).

[4]Similar effects have been reported in Di Maggio and Kacpercyk (2017), highlighting money market fund managers' reaction to the low-yield environment by increasing the riskiness of portfolios or even shifting their business from the management of money market funds to the management of fixed-income funds with riskier portfolios.

Figure 3.1. Institutional Investors' Increased Risk-Taking in a Persistently Low-Interest-Rate Environment

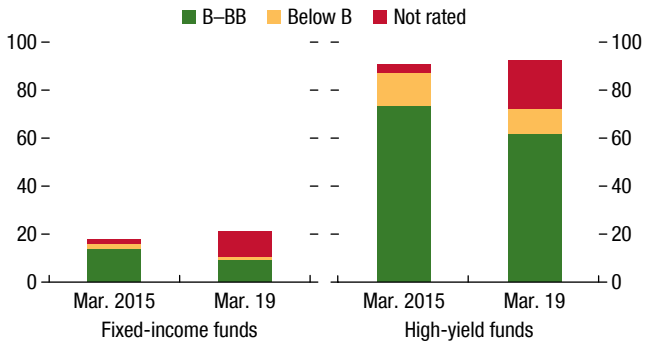
Expected monetary easing has led to a new peak in global bonds outstanding with negative yields ...

1. Market Capitalization and Share of Negative Yielding Global Bonds (US dollars; percent)



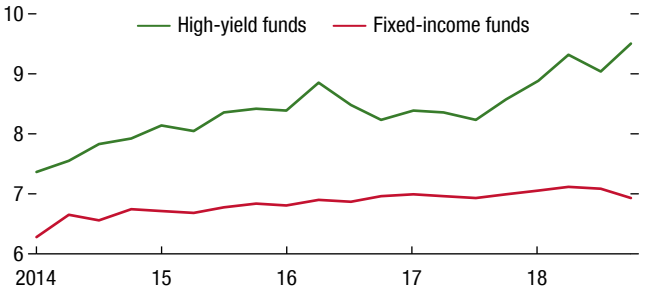
... leading fixed-income funds to search for yield by increasing their holdings of lower-credit-quality debt ...

2. Fixed-Income Funds: Low-Rated Portfolios by Credit Quality (Percent of fixed-income portfolio)



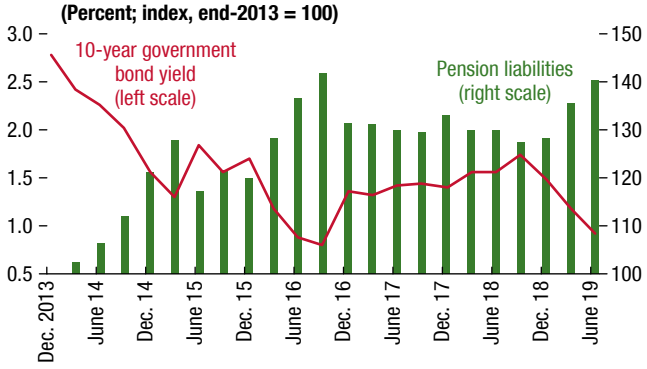
... and lengthening the average effective maturities of fixed-income funds holdings.

3. Fixed-Income Funds: Effective Maturity (Years)



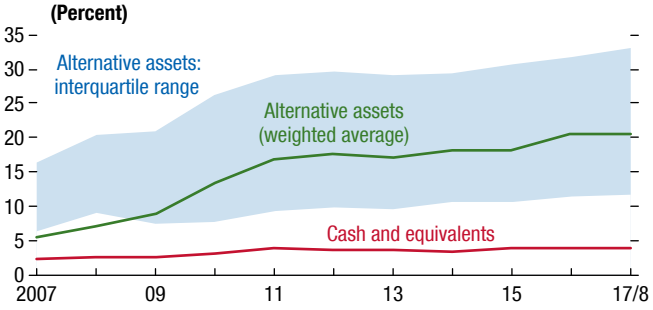
Pension funds' liabilities have increased as yields have declined ...

4. Pension Funds: Long-Term Interest Rates and Defined-Benefit Pension Liabilities (Percent; index, end-2013 = 100)



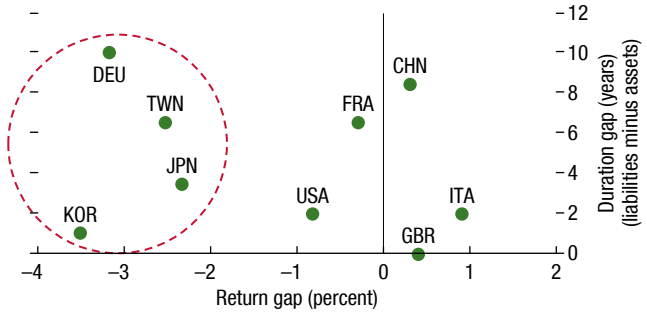
.... prompting them to increase exposure to illiquid, often highly leveraged alternative investments.

5. Large Pension Funds: Alternative Asset and Cash Allocations (Percent)



Return guarantees add to insurers' pressures.

6. Life Insurers: Guaranteed Return Spreads and Duration Mismatches



Sources: Bloomberg Finance L.P.; Haver Analytics; ICE Bond Indices; JPMorgan Chase & Co; Korea Life Insurance Association; Life Insurance Association of Japan; Milliman; Moody's; Morningstar; SNL Financial; Swiss Re; Taiwan Insurance Institute; US National Association of Insurance Companies; and IMF staff calculations.
Note: Panels 2 and 3 use available data for funds with assets of at least $1 billion reported in Morningstar. Series are constructed as balanced panels. For panel 4, pension liabilities are drawn from a sample of Dutch, UK, and US defined-benefit pensions with $5.5 trillion in assets as of 2019:Q1. Dutch pension data are from national balance sheet data; UK pension data reflect Pension Protection Fund data; US pension data consist of the market value of liabilities for the 100 largest private pensions, as calculated by the actuarial firm Milliman. Interest rate shown is simple average of Dutch, UK, and US 10-year government bond yields at the end of the quarter. Panel 5 is based on asset allocation data of 700 of the largest pension funds, representing $13 trillion in assets. For panel 6, the nine countries are the largest life insurance jurisdictions, accounting for 73 percent of the world's life insurance premiums (Source: Swiss Re). Data labels in panel 6 use International Organization for Standardization (ISO) country codes. The data for duration gap and return guarantees in panel 6 are obtained from Moody's.

such as private equity, real estate, and infrastructure, which often involve long-term lockup periods and significant embedded leverage (Figure 3.1, panel 5).

Life insurers face similar pressures to achieve the guaranteed returns on the insurance policies they have offered. Gaps between guaranteed returns and domestic sovereign bond yields, as well as duration mismatches between assets and liabilities, remain wide, most notably for some European countries (including Germany) and major Asian insurers (Figure 3.1, panel 6). This has prompted life insurers to increase their holdings of lower-rated and long-duration bond investments (see the October 2017 *Global Financial Stability Report*) and, in some cases, of foreign investments.

The Renewed Search for Yield May Have Implications for Financial Stability

Higher demand for risky assets from institutional investors may further boost asset prices and could encourage more borrowing by nonfinancial firms (see Chapter 2). In addition, rising balance sheet vulnerabilities may force institutional investors to react to shocks in a way that could amplify their impact on markets and on the broader economy given the growing importance of institutional investors as a source of funding.

As institutional investors increase duration and credit risks, they become more susceptible to a repricing of risks. With rising mismatches between illiquid asset holdings and the promise of daily liquidity to investors, *investment funds* may be facing increasing pressure to sell into an illiquid market in response to investor redemptions, which could exacerbate declines in asset prices. An increase in similarities across investment funds' portfolios raises the potential for their actions to amplify a sell-off. Contingent calls from the illiquid investments of *pension funds* could reduce their liquidity, limiting their ability to play a stabilizing role during market stress. The cross-border portfolio allocation of some *insurers* could contribute to the propagation of shocks across markets, even if sell-offs were driven by seemingly unrelated factors.

Increasing Portfolio Similarities of Investment Funds Raise the Potential to Transmit Shocks

The low-yield environment appears conducive to higher conformity in investment strategies, exacerbating a structural trend driven by benchmarking and compensation (see the April 2019 *Global Financial Stability Report*). The returns between the top and bottom deciles of fixed-income funds are becoming more correlated. This correlation appears to have increased as sovereign yields declined and reversed when yields rose, suggesting a greater similarity in fund investment strategies—with stronger home currency biases and lower cash positions—when yields are low (Figure 3.2, panels 1 and 2).

Growing portfolio similarities, combined with low cash buffers, raise the potential for rapid transmission of shocks to other investment funds, amplifying market stress. Higher exposures to home currencies also intensify the local fund industry's vulnerability to domestic asset price movements through similar exposures across funds.

Expectations of further monetary easing provide incentives for funds to increase their holdings of illiquid assets. The sensitivity of fixed-income funds' returns to proxies for market illiquidity tends to rise as sovereign yields fall, indicating a greater willingness of funds to hold more illiquid assets (Figure 3.2, panel 3).[5] Should the need arise to sell some of these illiquid assets, the similarity in portfolios and rapidly falling prices could transmit the shock quickly through the financial system. This could, for instance, amplify a widening in credit spreads in the US corporate bond market if funds were to reduce their considerable exposures abruptly (Figure 3.2, panel 4).

Pension Fund Risk-Taking May Increase the Potential for Market Procyclicality

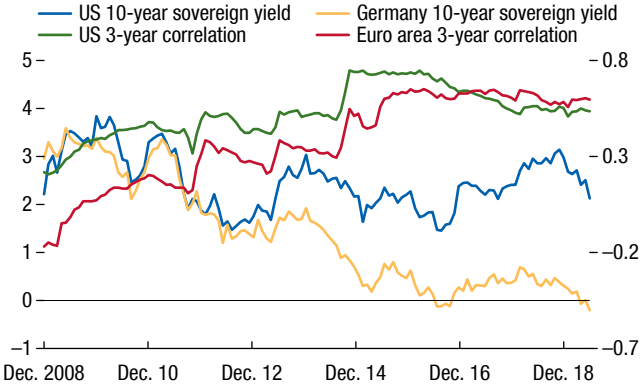
Pension funds' increased risk-taking raises their exposure to credit, market, and liquidity risks. In addition to the increase in alternative, illiquid investments (Figure 3.1, panel 5), the largest pension funds' notional derivatives positions have risen to 155 percent of net assets, on average, from 95 percent in 2011 (Figure 3.3, panel 1). Use of direct on-balance-sheet

[5]Return sensitivities are estimated with bivariate models regressing contemporaneous fund flows and fund returns on two lags and a set of contemporaneous illiquidity factors (based on a principal component analysis of spreads between overnight interest swaps and risk-free rates; turnover ratios in US bond markets; the spread between 30-year on-the-run and off-the-run US Treasuries; the Bloomberg US government securities liquidity index; and 10-year US swap spreads). Fund-specific sensitivities are aggregated and weighted by assets. Sector averages for sensitivities to individual illiquidity factors are aggregated across all available principal components using respective shares in total group variance as weights. Note that the 2016 decrease in the sensitivity follows expectations of a change in US monetary policy to a less accommodative stance.

Figure 3.2. Fixed-Income Fund Risks and Increasing Portfolio Similarities

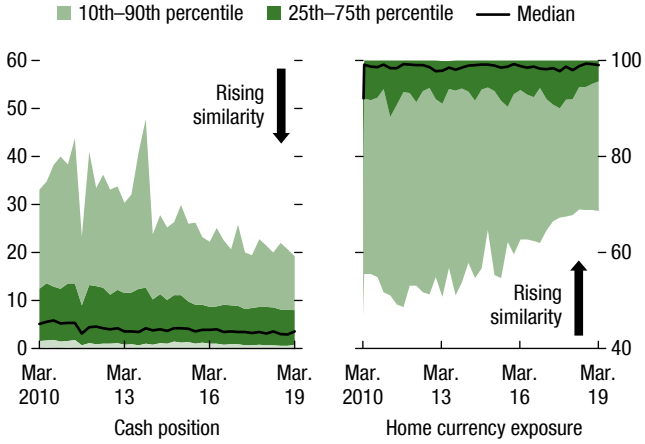
Return correlations of fixed-income funds have increased with lower interest rates ...

1. Correlation of Top and Bottom Return Deciles of Fixed-Income Funds (Yield in percent, left scale; correlation, right scale)



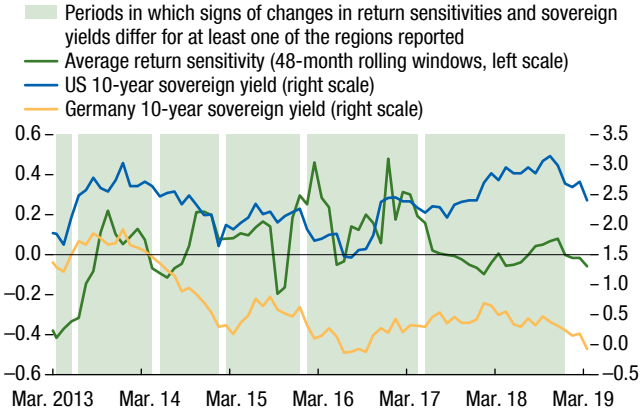
... reflecting rising similarities in home currency exposures and cash positions across fund portfolios.

2. Fund Positions in Cash and Major Currencies (Percent of assets)



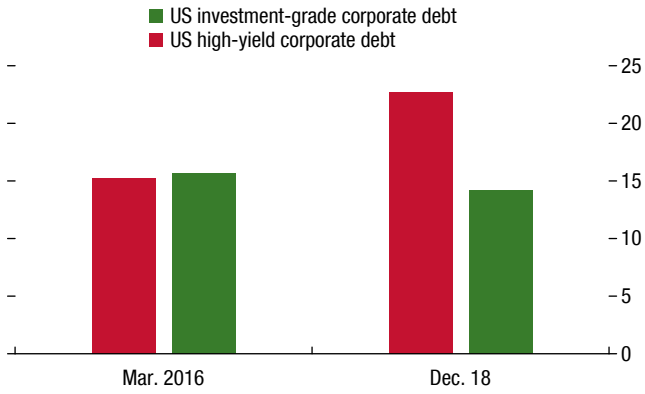
With declining interest rates fund returns became more sensitive to illiquidity factors ...

3. Sensitivity of Fund Returns to Illiquidity Proxies (Coefficients, left scale; percent, right scale)



... as fixed-income funds continued to increase their share in riskier US corporate credit markets.

4. Holdings of US Corporate Credit by Global Fixed-Income Funds (Percent of US corporate credit markets)



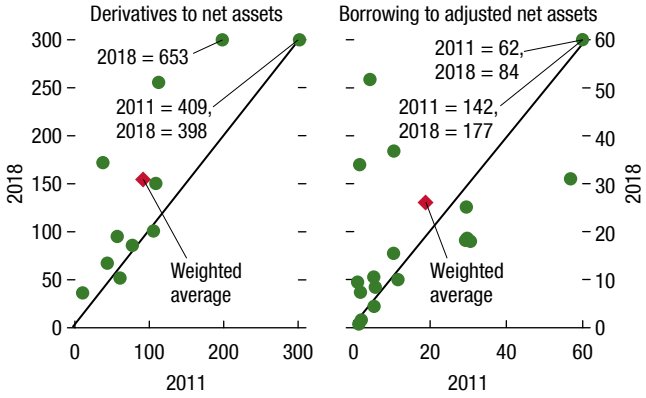
Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; International Investment Funds Association; MarketAxxess; Morningstar; Refinitiv Datastream; and IMF staff calculations.

Note: Samples include fixed-income funds with assets over $1 billion, representing some 60 percent of the global bond fund industry's assets. Panel 1 reports correlations between the 10th and the 90th percentile of the cross-sectional return distribution. Panel 2 is constructed using balanced panels. Major net asset value currencies in panel 2 include the US dollar, the euro, and the British pound. Panel 3 reports, for fixed-income funds with assets of at least $5 billion, sensitivities of returns to illiquidity factors estimated in bivariate vector autoregression models, which regress fund returns and fund flows on their lags, a set of illiquidity factors, and euro and British pound exchange rates against the US dollar. Illiquidity factors include principal components derived from a group of illiquidity indicators comprising spreads between three-month Treasuries and three-month overnight index swaps for the euro area, the United Kingdom, and the United States, turnover ratios in high-yield and investment-grade US debt markets, the spread between 30-year on-the-run and off-the-run US Treasuries, the Bloomberg US government securities liquidity index, and the 10-year US swap spread. Return sensitivities, evaluated at the 5 percent significance level, for respective principal components, are aggregated across funds on an asset-weighted base and subsequently combined to one metric using the weights of individual principal components within the group's variation. Estimated models are rolled over the period between March 2009 and March 2019 using 48-month windows for each estimation. Panel 4 is constructed using unbalanced panels.

Figure 3.3. Pension Fund Risk-Taking and Countercyclical Investment Capacity

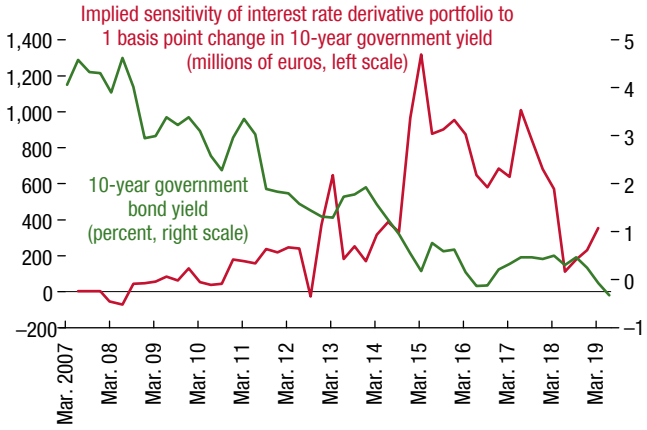
Use of derivative- and leverage-based strategies has grown, increasing market and liquidity risk related to margin calls ...

1. Pension Funds: Notional Derivatives to Net Assets and Borrowing, 2011 and 2018 (Percent)



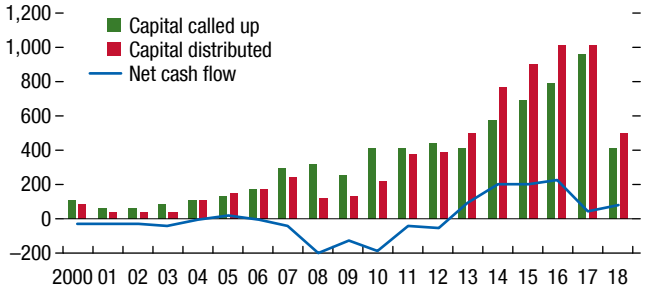
... as suggested by the changing interest rate hedge sensitivity of Dutch pension funds.

2. Netherlands: Pension Sector Interest Rate Hedge Sensitivity and 10-Year German Government Bond Yield



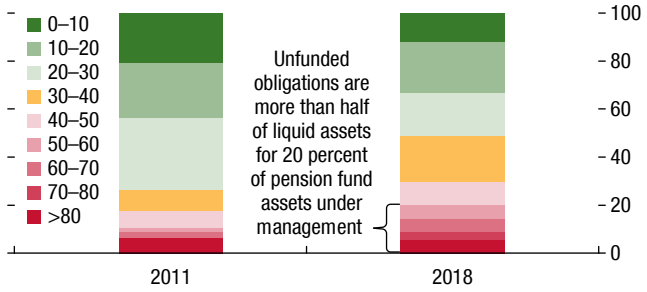
Rising exposures to illiquid assets carry unfunded commitments that could be called on in a severe downturn, increasing liquidity outflows ...

3. Private Capital Markets: Total Investor Capital Calls and Capital Distributions (Billions of US dollars)



... posing a risk particularly for the growing segment, with contingent liquidity demands that are more than half of liquidity buffers.

4. Global Pension Funds: Estimated Contingent Obligations as a Percentage of Cash and Fixed-Income Assets, by Total Assets under Management (Percent)



Sources: Bloomberg Finance L.P.; De Nederlandsche Bank; pension fund annual reports; Preqin, and IMF staff calculations.
Note: For panel 1, each green dot in left box represents one of 11 of world's 50 largest defined-benefit pension funds with available data, representing $2 trillion in assets; the right box has the same sample plus nine funds with an additional $1 trillion in assets. Adjusted net assets are net assets less the higher assets classified as illiquid or difficult-to-value or private equity and real estate investments. For panel 2, the red line is a rolling four-quarter beta of changes in the net fair value of the interest rate derivatives portfolio and changes in the 10-year German government bond yield. For panel 3, data for 2018 are through the first half of the year. For panel 4, fixed income, cash, and estimated unfunded obligations to external fund managers are based on a balanced panel of 273 defined-benefit pension funds with about $8 trillion in assets. Unfunded obligations are estimated as one-third of alternative investments.

financial leverage has also grown, particularly when net assets are adjusted for illiquid assets that are typically not available to repay borrowing and have separate and undisclosed embedded leverage (Figure 3.3, panel 1).

Although derivatives-based positions are used to reduce duration mismatches, many funds dynamically adjust these hedges in anticipation of changes in interest rates. In the Netherlands, the sensitivity of the interest rate derivatives portfolio to changes in interest rates increased when rates fell and declined when rates were expected to rise (Figure 3.3, panel 2). This active management magnifies gains when rates fall and limits losses when rates rise but can contribute to procyclicality in interest rate markets (Domanski, Shin, and Sushko 2017; Greenwood and Vissing-Jorgensen 2018; Klingler and Sundaresan 2018). Alternative investments also typically entail leveraged exposures to assets that in many cases have stretched valuations, such as corporate equity and debt in leveraged buyout deals (Chapter 2, Figure 2.3, panel 5).

Even when used as a hedge, in stress periods margin calls on derivative positions can create sizable contingent liquidity demands that can be met only by selling or lending other assets or by closing out the position.[6] Similarly, capital commitments on alternative asset investments may be more likely to be drawn on a net basis following periods of severe market stress when opportunities abound as a result of lower valuations—or due to the use of credit lines collateralized with these capital commitments—and could thus create liquidity outflows. For instance, during the global financial crisis, investors experienced net liquidity outflows as managers called in capital commitments to take advantage of attractive investment opportunities at the same time as distributions from previously drawn commitments fell (Figure 3.3, panel 3).[7]

These potential liquidity needs have grown relative to liquid assets. Liquidity buffers have declined relative to alternative investments in many pension funds. For approximately 20 percent of pension fund assets under management, estimated capital commitments related to alternative investments are more than half of their liquid assets (Figure 3.3, panel 4). Of note, drawdowns of alternative asset capital commitments following market stress would be in addition to potential liquidity requirements related to derivative and leveraged positions, for which there are insufficient data.

Given higher liquidity risks, pension funds will likely have to set aside more of their liquid assets to cover potential outflows during and after periods of stress, especially if market funding becomes more expensive. This would make it more difficult for them to buy assets traded at distressed price levels, limiting their ability to invest countercyclically and thus play a stabilizing role during periods of market stress. Limited portfolio rebalancing capacity could also exacerbate pension fund losses, transmitting stress to sponsoring governments and firms by increasing contingent liabilities. Pension funds' dynamic adjustment of leverage-based strategies could also increase volatility during periods of rapid increases in interest rates.

[6]The magnitude of market losses and margin calls depends on the size, directionality, and asset composition of pension funds' unfunded derivative positions.

[7]Alternatively, capital calls could be lower than expected following periods of severe stress if weak debt-raising conditions hinder deal making, or if alternative asset managers agreed to limit capital calls at the request of important investor clients.

Increased Cross-Border Portfolio Allocation by Life Insurers Could Create New Risk Transmission Channels

Larger-than-average spreads between return guarantees and local yields as well as duration mismatches (Figure 3.1, panel 6) have driven Asian life insurers (Japan, Korea, Taiwan Province of China) to search for yield, increasing their foreign assets to nearly $1.5 trillion, almost double the amount five years ago (Figure 3.4, panel 1).[8] Given relatively small domestic corporate bond markets (Figure 3.4, panel 2), foreign corporate bonds represent an attractive investment for these insurers (Figure 3.4, panel 3). A significant share of such investments has been in US dollar credit—the largest credit market globally[9]—where the Asian insurers' combined share of the market has risen to 11 percent from 8 percent over the past five years. This increase has been driven mainly by life insurers from Taiwan Province of China, which added $0.25 trillion in new investment in US dollar–denominated credit during 2013–18, equivalent to almost 15 percent of the increase in market capitalization over the period.

Life insurers from Taiwan Province of China may be vulnerable because of their large concentrated foreign exposures and relatively weak capital buffers:

- *Foreign exposures* have grown rapidly to more than two-thirds of their assets over the past five years, significantly above the levels of their peers (Figure 3.4, panel 4).[10] Although these insurers are selling more US dollar–denominated policies, this is not keeping pace with the rise in their foreign investments, widening currency mismatches between assets and liabilities.[11]
- The *capital adequacy* of Taiwanese insurers is weaker relative to peers (Figure 3.4, panel 4), which could reduce their ability to absorb adverse shocks.

[8]These three jurisdictions are among the eight largest globally, accounting for almost 20 percent of all global life insurance premium volumes.

[9]As of December 2018, the US dollar J.P. Morgan US Liquid index had a market capitalization of more than $6 trillion, compared with $2.5 trillion for the ICE Bank of America Merrill Lynch Euro Corporate index and less than $0.2 trillion for the ICE Bank of America Merrill Lynch Japan Corporate index.

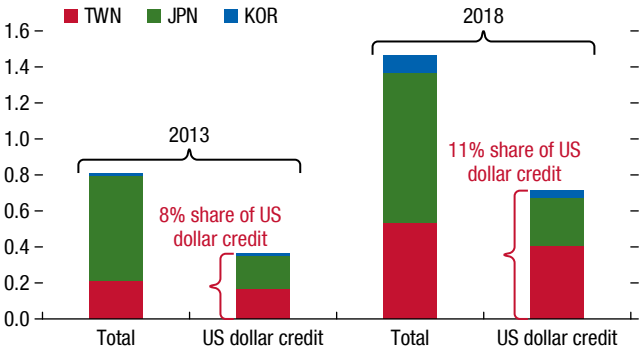
[10]The foreign exposure of other major Asian jurisdictions has also grown, but to a lesser extent. Japanese and Korean life insurers have increased their foreign investments to 24 percent and 14 percent of their assets, from 17 percent and 5 percent, respectively, five years ago.

[11]About one-quarter of their foreign currency investments are unhedged.

Figure 3.4. Asian Life Insurers and Increased Cross-Border Portfolio Allocation

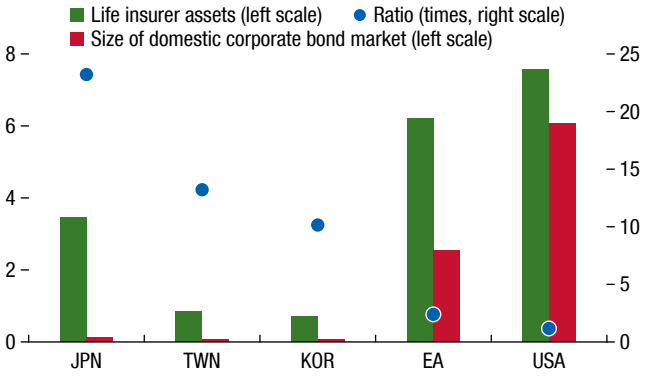
Low domestic yields have led to a sharp increase in the foreign investments of major Asian jurisdictions ...

1. Foreign Cross-Border and US Dollar Credit Investment (Trillions of US dollars)



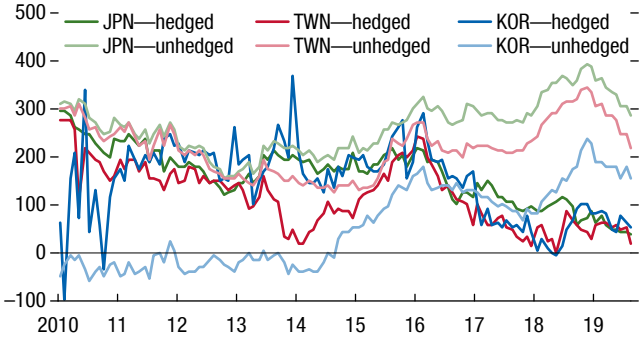
... partly due to the small size of their domestic corporate bond markets ...

2. Life Insurers' Assets and Size of Domestic Corporate Bond Markets (Trillions of US dollars)



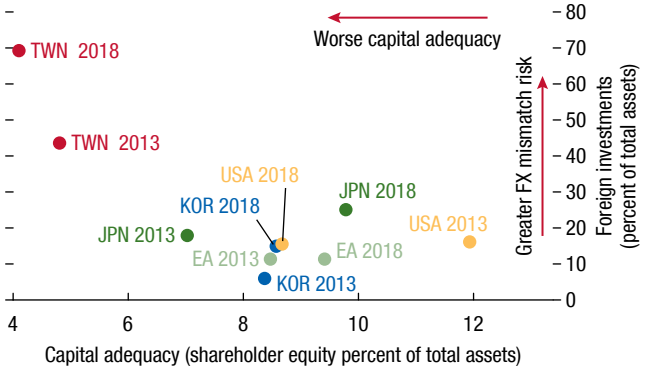
... as well as the attractiveness of foreign corporate bond excess returns, particularly when unhedged.

3. Excess Returns on US Investment-Grade Corporate Bonds over Domestic Sovereign Bonds (Basis points)



Life insurers from Taiwan Province of China have the largest foreign currency exposures and the weakest capital adequacy.

4. Shareholders Equity and Foreign Investment (Percent of assets)



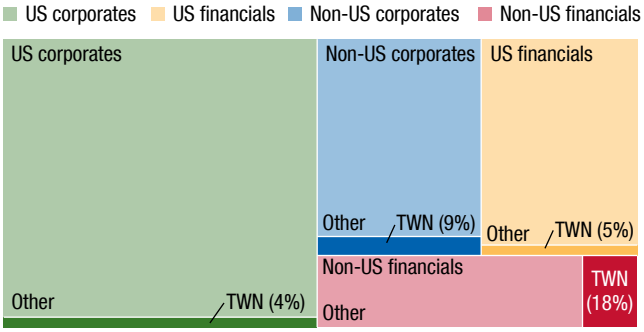
Sources: Bloomberg Finance L.P.; European Insurance and Occupational Pensions Authority; Haver Analytics; ICE Bond Indices; Individual Life Insurer Annual Reports; JPMorgan Chase & Co; Korea Life Insurance Association; Life Insurance Association of Japan; National Association of Insurance Commissioners; Taiwan Insurance Institute; and IMF staff calculations.

Note: For panel 1, the US dollar corporate bond holdings for life insurers in each jurisdiction uses individual annual reports and investor presentations for selected life insurers—from Japan, Republic of Korea, and Taiwan Province of China—to calculate their holdings of US dollar corporate bonds. The share of US dollar credit is calculated using as a proxy the sum of the market capitalization of the US dollar J.P. Morgan US Liquid Index (JULI) and of all US dollar–denominated Formosa bonds outstanding. Formosa bonds are securities issued in Taiwan Province of China but denominated in a currency other than the new Taiwan dollar. For panel 3, hedged yields assume a rolling three-month forward exchange hedge. For panel 4, the latest available foreign investment data for the United States is as of 2017, whereas the 2013 data for the euro area are as of 2016. The relationship between foreign investment and foreign currency mismatches varies by jurisdiction. For example, for Taiwan Province of China, the majority of its foreign investment is denominated in US dollars, and about a quarter of this investment is unhedged. However, for the largest jurisdictions, such as the United States, the majority of foreign investments can be in the domestic currency, which minimizes currency mismatches. Data labels in the figure use International Organization for Standardization (ISO) country codes. EA = euro area; FX = foreign exchange; TWN = Taiwan Province of China.

Figure 3.5. Life Insurers from Taiwan Province of China: Increased Presence in US Dollar Credit and Rate Volatility Markets

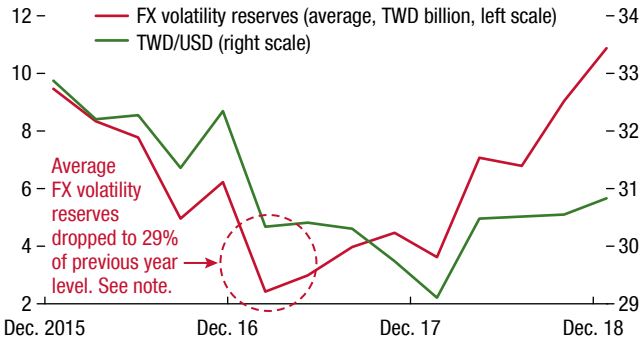
Life insurers from Taiwan Province of China own a growing share of US dollar credit from non-US banks issuers.

1. Life Insurers from Taiwan Province of China: Share of Sectors of US Dollar Credit (Percent)



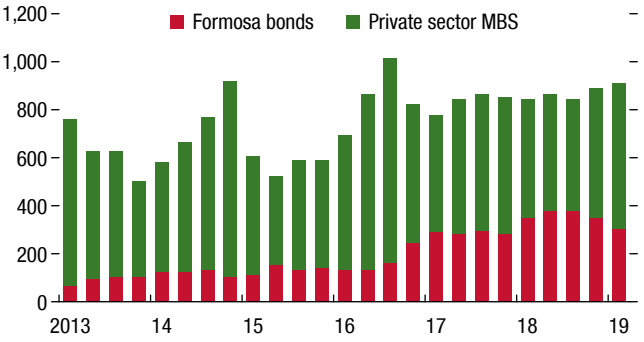
Life insurers from Taiwan Province of China are also vulnerable to a sharp depreciation of the US dollar versus the new Taiwan dollar.

2. Life Insurers from Taiwan Province of China: Foreign Currency Volatility Reserves and New Taiwan Dollar/US Dollar Exchange Rate



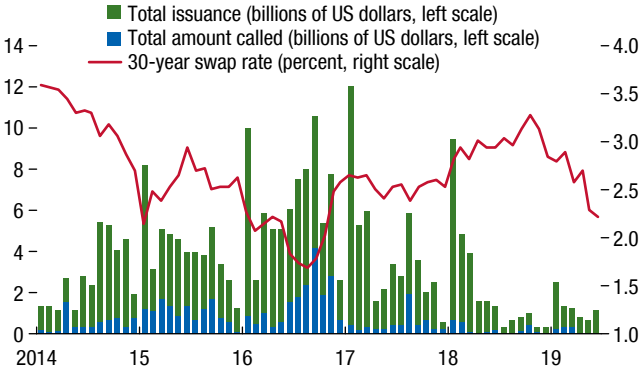
Their large holdings of US dollar callable bonds are associated with large dealer short option exposures ...

3. Estimated Dollar Vega for US Agency Mortgage-Backed Securities versus Formosa Callable Bonds (Billions of US dollars per basis point change in annualized volatility)



... with lower rates increasing the risk of these bonds being called, triggering the unwinding of hedging positions and a volatility spike.

4. Amount of US Dollar Corporate Bonds Called and 30-Year US Dollar Swap Rate (Billions of US dollars; percent)



Sources: Bloomberg Finance L.P.; Individual Life Insurer Annual Reports; JPMorgan Chase Co; Taiwan Insurance Institute; and IMF staff calculations.
Note: Panel 1 adds US dollar Formosa bonds to the different sectors of the US dollar JP Morgan US Liquid Index (JULI) as the proxy for the US dollar credit market as of December 2018. Formosa bonds are securities issued in Taiwan Province of China but denominated in a currency other than the new Taiwan dollar. The US corporates and non-US corporates categories exclude financials. In panel 2, life insurers from Taiwan Province of China set aside foreign exchange reserves to help them weather periods of strong new Taiwan dollar appreciation. However, there is a withdrawal floor where they are stopped from using reserves and therefore currency losses from their US dollar holdings could have an impact on earnings. This floor is the higher of either 20 percent of the previous year-end foreign exchange volatility reserves or 20 percent of their average year-end reserves since 2012. In panel 3, vega is defined as the change in the price of the option given a 1 basis point change in the volatility of the underlying instrument. FX = foreign exchange; MBS = mortgage-backed securities; TWD = new Taiwan dollar; TWN = Taiwan Province of China; USD = US dollar.

For example, further declines in US interest rates or a weaker US dollar vis-à-vis the Taiwan dollar[12] could put pressure on Taiwanese life insurers and potentially lead to broader market spillovers:

- Taiwanese insurers' investment has risen to more than $400 billion, or 7 percent of all corporate and bank bonds outstanding denominated in US dollars. This exposure is concentrated in dollar bonds of non-US issuers, where they hold an estimated 18 percent of bank debt and 9 percent of corporate bonds (Figure 3.5, panel 1). These concentrated holdings make them increasingly vulnerable to

[12]These are examples of specific shocks that could lead to losses. It should be noted that during periods of global risk aversion, the US dollar is likely to appreciate against the Taiwan dollar, which would serve as a natural hedge for Taiwanese life insurers.

losses due to a sharp depreciation of the US dollar (Figure 3.5, panel 2).[13] Currency losses could reduce their demand for new investments or, in the extreme, force them to sell securities to raise capital.

- A further decline in US rates could amplify interest rate volatility, as well as losses for Taiwan Province of China life insurers through their large holdings of US dollar callable bonds. Callable bonds carry an option that allows the issuer to redeem the bond early, which is more likely when interest rates decline. If US interest rates fall to a level that triggers bonds being called, the unwinding of related hedges could further increase interest rate volatility. This, in turn, could induce large losses on the unhedged callable bond holdings, further raising the prospect of spillovers to US dollar credit markets. It is estimated that exposures related to the embedded options in US dollar callable bond holdings amounts to $300 billion, roughly equivalent to half of the exposures from hedging privately held mortgage-backed securities[14] (Figure 3.5, panels 3 and 4).

Policy Action Can Reduce the Buildup of Vulnerabilities

Policymakers can help mitigate the buildup of vulnerabilities through appropriate incentives, minimum solvency or liquidity standards, and enhanced disclosures. In the current lower-for-longer environment the priorities are as follows:

- *Investment funds:* Minimum eligibility criteria (based on credit quality and liquidity) for the inclusion of assets in fixed-income funds' portfolios could be introduced to help lessen credit risks and liquidity mismatches.[15] Requiring funds to better match redemption periods to the liquidity profiles of their portfolios would mitigate the potential for fire sales.[16] Enhanced guidance for frequent and rigorous stress testing and appropriate disclosures of risks would also help ensure a minimum standard for funds' liquidity risk management. For example, appropriate labeling of funds would provide additional transparency on liquidity risks. Harmonized standards for the measurement of leverage would help identify and mitigate related vulnerabilities (see International Organization of Securities Commissions 2018b).
- *Pension funds'* regulation, governance, and disclosure should more explicitly consider risk from illiquid assets and synthetic leverage, for instance by requiring reporting of detailed and standardized calculations of projected liquidity inflows and outflows during periods of stress, as well as exposure to market risks. Authorities should consider limiting risks associated with guaranteed benefits by adopting cost-sharing arrangements that link a portion of pension payouts to market performance.
- *Life insurance companies:* A globally harmonized minimum solvency standard would help reduce vulnerabilities and the potential for weaknesses in one jurisdiction from spilling over to others through international capital markets.[17] The implementation of capital requirements for insurance groups globally is important as it may help prevent regulatory arbitrage (see Chapter 1, Table 1.1). Policies serving as a disincentive to new life insurance products offering guaranteed returns should be considered.

[13]Taiwanese life insurers set aside foreign exchange volatility reserves to help them weather periods of strong Taiwan dollar appreciation. However, there is a withdrawal floor at which they are stopped from using further reserves. This floor is the higher of either 20 percent of the previous year-end foreign exchange volatility reserves or 20 percent of their average year-end reserves since 2012.

[14]Hedging activity of refinancing risk for mortgage-backed securities is known as a major driver of US fixed income markets. For example, Malkhozov and others (2015) find that mortgage duration increases bond excess returns and that mortgage convexity is positively related to increases in bond yield volatility. Cortes (2003) finds that mortgage prepayment hedging is a major driver of US dollar swap spreads.

[15]In the separate case of money market funds, rules on credit quality and liquidity of portfolio assets have been introduced in recent years in the United States (Securities and Exchange Commission's money market funds reform) and Europe (EU regulation on money market funds). See also Table 1.1 in Chapter 1 for the number of macroprudential policy tools in use in various jurisdictions.

[16]Such proposals follow closely the spirit of respective recommendations laid out in International Organization of Securities Commissions (2018a).

[17]Risk assessment in the insurance sector suffers from opaque and heterogeneous financial disclosure and deficiencies in the accounting and regulatory regimes. See the October 2017 *Global Financial Stability Report*.

Box 3.1. Are Fixed-Income Funds Well Prepared to Meet Investor Redemptions?

In the event that investment funds are unable to meet investor redemptions with available liquid assets, the risk of fire sales could increase and this could amplify asset price volatility. Open-ended investment funds tend to offer daily share redemptions for cash. However, during periods of market stress, when investors have more incentives to redeem their shares ahead of others, a fund may not always be able to cover redemption requests with available liquid assets, cash reserves, or credit lines.[1] Such runs could force fund managers to engage in fire sales, further depressing asset prices, inflicting losses on other market participants, and, in the extreme case, increasing the risk for the financial system.

Declines in holdings of liquid assets (Figure 3.1.1, panel 1) raise questions about fixed-income funds' ability to absorb redemption shocks. The liquidity stress scenario presented in this box assesses the resilience of investment funds by comparing their liquid assets with sufficiently severe redemption shocks. Here liquid assets include cash and assets that can be sold quickly, following the principles of the Basel III standard for high-quality liquid assets.[2] The exercise assumes that redemption shocks are equivalent to the worst percentile of funds' monthly asset outflows during 2000–19. If these shocks cannot be absorbed, funds suffer liquidity shortfalls.

Staff liquidity stress scenarios confirm that fixed-income funds are vulnerable to liquidity shocks:

- The total liquidity shortfall of fixed-income funds with $10.5 trillion in assets under management is estimated at $160 billion (as of March 2019). Funds with estimated liquidity shortfalls account for almost one-sixth of all fixed income fund assets and nearly half of all high-yield fund assets (Figure 3.1.1, panel 2).[3]
- Global fixed-income funds have become more vulnerable to liquidity stress in recent years. The average shortfall (calculated as a share of assets of all fixed-income funds) has increased by about one-third over the past two years to about 1.5 percent. In terms of the assets of funds with liquidity shortfalls, however, the average shortfall has remained stable at 10 percent (Figure 3.1.1, panel 3). Moreover, for a weak tail of one-fifth of these funds, the shortfalls exceed 20 percent of assets (Figure 3.1.1, panel 4).
- Larger funds typically face lower redemption stress, allowing them to hold less cash, whereas diversified portfolios provide them with more ample liquidity (Figure 3.1.1, panel 5). Shortfalls of funds in the euro area are higher than those of US-based funds (Figure 3.1.1, panel 6).

This box was prepared by Frank Hespeler.

[1]Alternative means to mitigate redemption pressure can provide relief as well. These include the use of pricing to discourage or delay redemptions and stops or restrictions on redemption, such as the gating of redemptions.

[2]Besides the high-quality liquid assets metric, the test employs an adjusted variant of high-quality liquid assets, the alternative high-quality liquid assets. This metric balances short positions and long positions, which exceed the volume of total assets, by the residual assets available in the portfolio, allowing funds to preserve such positions as long as possible and to thereby maintain their preferred allocation. This is done by liquidity category, starting with the most liquid positions and keeping track of the assets already used for balancing of more liquid positions. Cash positions—which include cash on hand, deposits, and money market assets—are cleaned in the same way. Details on the definition of metrics and the data used are presented in Section 3 of Online Annex 1.1.

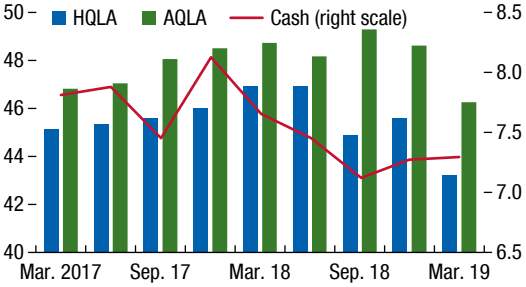
[3]Fixed-income funds include all funds with an explicit investment focus on debt markets, except money market funds. High-yield funds are hence a subset of fixed-income funds.

Box 3.1 *(continued)*

Figure 3.1.1. Liquidity Stress Scenarios for Fixed-Income Funds

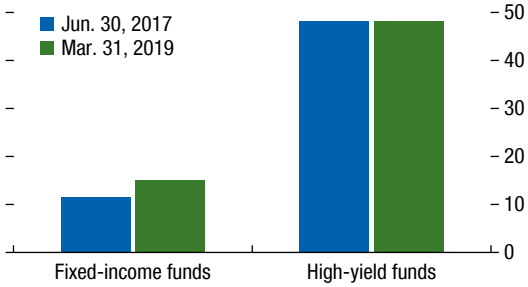
The liquid assets held by fixed-income funds have declined ...

1. Fund Liquidity Indicators
(Percent of assets, both axes)



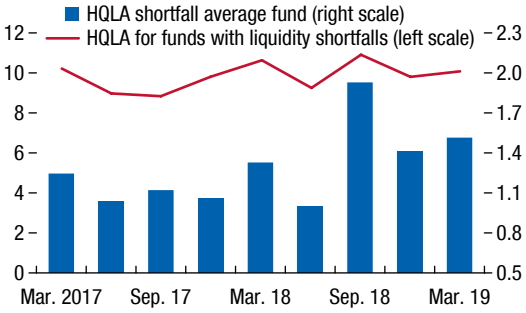
... exposing a larger share of funds to potential liquidity shortfalls in the event of investor redemptions.

2. Asset Share of Funds with HQLA Shortfalls
(Percent of sector's assets)



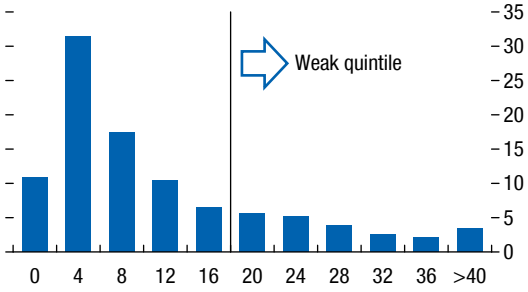
Funds' vulnerabilities have increased over time ...

3. Average Liquidity Shortfalls
(Percent of assets, both axes)



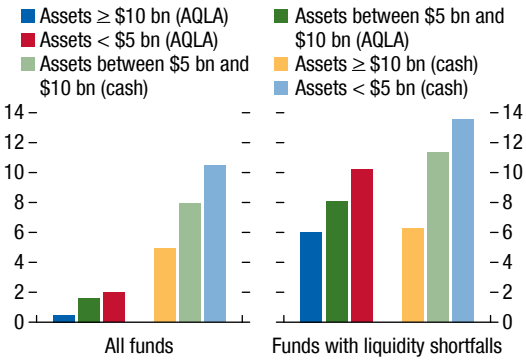
... and some funds are particularly exposed to liquidity shortfalls.

4. Frequency of HQLA Shortfalls
(Shortfall in percent of assets on horizontal axis; percent of assets on vertical axis, as of Mar. 2019)



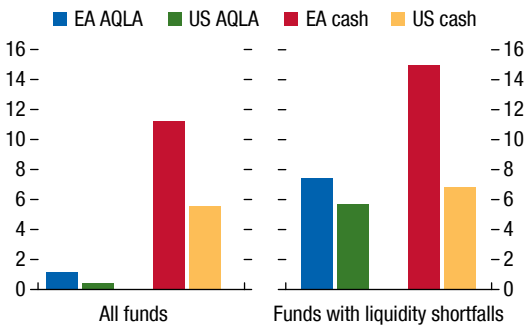
Larger funds are less susceptible to liquidity shortfalls and tend to face smaller shortfalls than smaller funds.

5. Liquidity Shortfalls by Fund Sizes
(Percent of assets, as of March 2019)



Euro area funds are more susceptible to liquidity shortfalls and tend to face larger shortfalls than US funds.

6. Liquidity Shortfalls by Region
(Percent of assets, as of March 2019)



Sources: Morningstar; and IMF staff calculations.
Note: The sample includes fixed-income funds, excluding money market funds, with assets of more than $1 billion. High-yield funds include funds with an investment focus on sovereign, corporate, and/or municipal high-yield debt. The various versions of liquidity buffers (HQLA, AQLA, and cash) are defined in Online Annex 1.1. AQLA = alternative high-quality liquid assets; bn = billion; EA = euro area; HQLA = high-quality liquid assets.

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CHAPTER 4

EMERGING AND FRONTIER MARKETS

MIND THE DEBT

External financing conditions for emerging markets were broadly favorable in 2019, despite the gloomier outlook for trade and global growth. Equity flows have suffered the most from the twists and turns of trade tensions, and a further escalation of tensions remains a serious risk for emerging and frontier markets. So far, falling rates in advanced economies have supported debt portfolio flows to emerging markets and a decline in external credit spreads, which has led to stretched valuations in some cases, particularly for lower-rated issuers. With private and public debt already high in some countries, easy financing conditions may encourage excessive buildup of debt, raising rollover and debt sustainability risks. For example, some overindebted state-owned enterprises (SOEs) may find it hard to maintain market access and service their debt without sovereign support. For frontier market economies, a growing reliance on external debt may increase the risk of debt distress. These risks may materialize in a significant growth slowdown or if an escalation of trade tensions sparks a sharp tightening of financial conditions.

External Factors Have Been the Dominant Drivers of Portfolio Flows

Lower rates and positive investor sentiment have supported asset prices and portfolio flows to emerging and frontier markets in 2019. Debt portfolio inflows rebounded for most of this year, led by strong inflows into hard currency bond markets (Figure 4.1, panels 1 and 2). Market pressures in Argentina have not led to notable spillovers to other lower-rated countries so far (Figure 4.1, panel 3), likely due to the small weight of Argentine bonds in the benchmark bond indices. Concerns about the economic outlook for emerging markets have intensified, however, as reflected in further downward revisions to the IMF 2019 growth forecasts (Figure 4.1, panel 4; Chapter 1). Growth concerns and rising trade tensions have weighed on investor sentiment, resulting in outflows from the local currency bond markets in August.

The key drivers behind the recent rebound in debt portfolio flows to emerging markets were the recovery in risk appetite and the sharp drop in US Treasury yields (Figure 4.1, panel 5).[1] Risk appetite rebounded after the global equity sell-off in late 2018, boosting demand for emerging market bonds by an estimated $25 billion. Ten-year Treasury yields have declined by over 100 basis points so far this year, boosting inflows by some $20 billion. In terms of domestic factors, however, sluggish growth has held back a more vigorous rebound in flows to emerging markets, excluding China.

Model estimates of capital flows-at-risk suggest that medium-term downside risks have moderated relative to the end of 2018, but remain elevated by historical standards (Figure 4.1, panel 6). The reduction in US Treasury yields is the key driver behind reduced downside risks to the debt portfolio flows in the medium term. This benign effect is partially offset by slower growth in emerging market economies and the decline in portfolio flows observed over the past year (captured in the model as the lagged dependent variable).[2]

Easy Financial Conditions Drove the Tightening in Bond Spreads

Emerging market sovereign external credit spreads tightened in 2019 (Figure 4.2, panel 1). Model estimates of credit spreads based on a panel of 65 economies (see Section 1 of Online Annex 1.1) suggest that two-thirds of the spread tightening since 2010—and most of the tightening in 2019—can be attributed to external factors, such as a rise in global risk appetite (Figure 4.2, panel 2).[3]

This chapter was prepared by Evan Papageorgiou (team leader), Dimitris Drakopoulos, Rohit Goel, Robin Koepke, Patrick Schneider, and Jeffrey Williams, under the guidance of Fabio Natalucci and Anna Ilyina.

[1]The underlying model estimates the drivers of quarterly portfolio debt flows to emerging markets, using push and pull factors consistent with the literature (see Koepke 2019 for a literature survey).

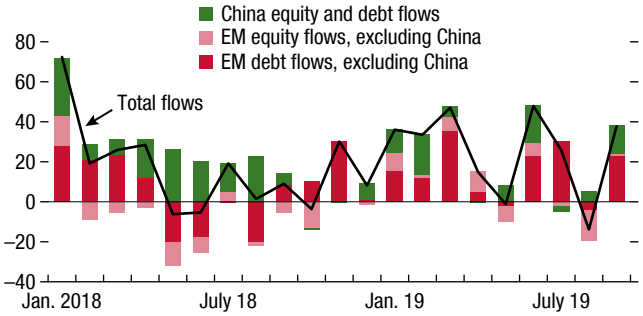
[2]For model details on capital-flows-at-risk, see Chapter 1 and Online Annex 1.1 of the October 2018 *Global Financial Stability Report* (GFSR).

[3]For model details see Section 4 of Online Annex 1.1 and the note of Figure 4.2.

Figure 4.1. Portfolio Flows to Emerging and Frontier Markets

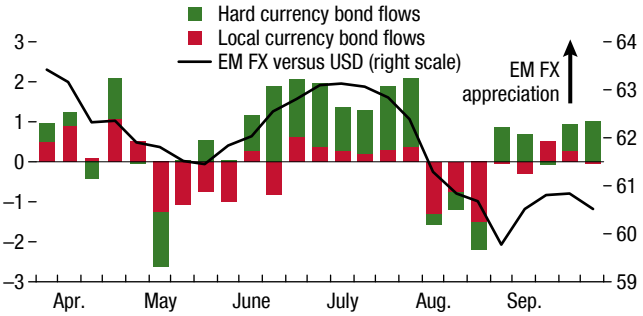
Portfolio flows to EMs have been reacting to the ebbs and flows of trade frictions and to the more dovish monetary policy outlook.

1. Balance of Payments Portfolio Flows to Emerging Markets (Billions of US dollars, monthly data)



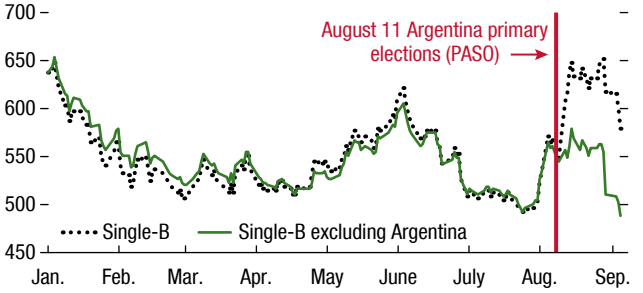
Fund flows into hard currency bonds have benefited the most from the sharp drop in global rates.

2. EPFR Fund Flows to Emerging Markets and Currencies in 2019 (Billions of US dollars; and index)



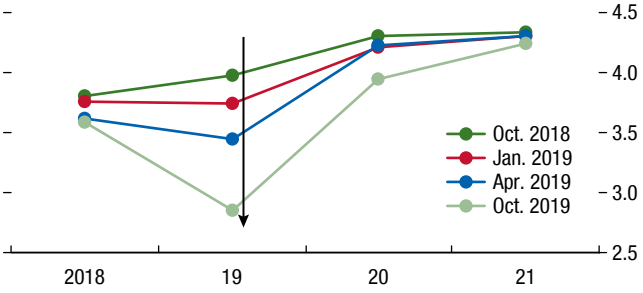
Spillovers from Argentina to other economies were limited.

3. EM Dollar Bond Spreads in 2019 (Basis points; based on the EMBI Global Diversified Index)



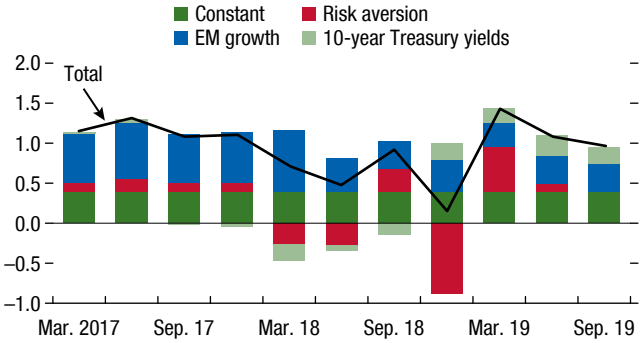
EM growth outlook has deteriorated, weighing on inflows.

4. IMF WEO Growth Forecasts for EMs, excluding China (Percent, year over year)



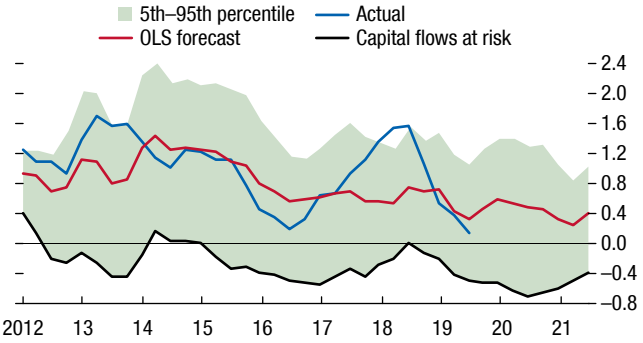
External factors have driven a rebound in flows so far this year.

5. Debt Portfolio Flows to EMs, excluding China: Estimated Contributions of Key Drivers (Percent of EM GDP, excluding China)



Capital flows at risk remain elevated by historical standards, despite some improvement in the medium-term outlook since end-2018.

6. Debt Portfolio Flows to EMs, excluding China: Actual and Estimated Quantiles of Flows in the Medium Term as of Q2:2019 (Four-quarter moving average, percent of EM GDP, excluding China)

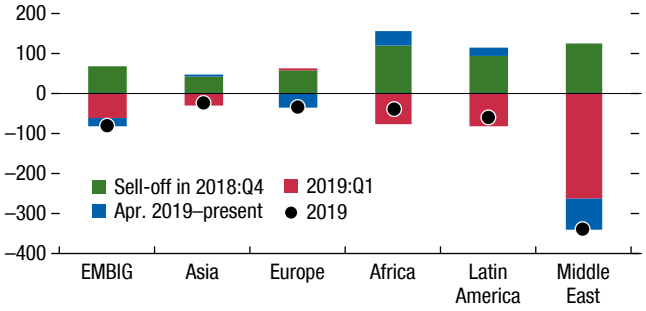


Sources: Bloomberg Finance L.P.; EPFR Global; ICE Bond Indices; IMF, World Economic Outlook database; Institute of International Finance; JPMorgan Chase & Co; and IMF staff calculations.
Note: In panel 5, the measure of risk aversion uses the US BBB-rated corporate bond spread over Treasuries from ICE. EM = emerging market; EMBI = JP Morgan Emerging Markets Bond Index; FX = foreign exchange; OLS = ordinary least squares; USD = US dollar; WEO = *World Economic Outlook*.

Figure 4.2. Emerging Market Hard Currency Bond Markets

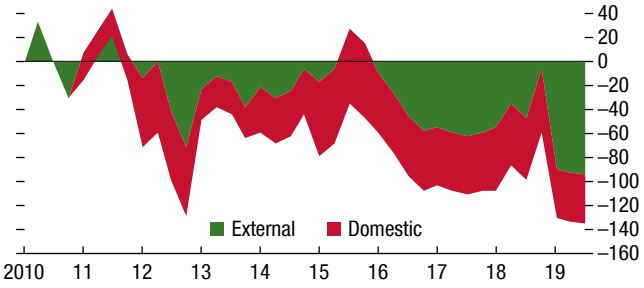
EMBIG spreads have continued to tighten in most EM regions since the beginning of the year ...

1. Change in EMBIG Spreads (Basis points)



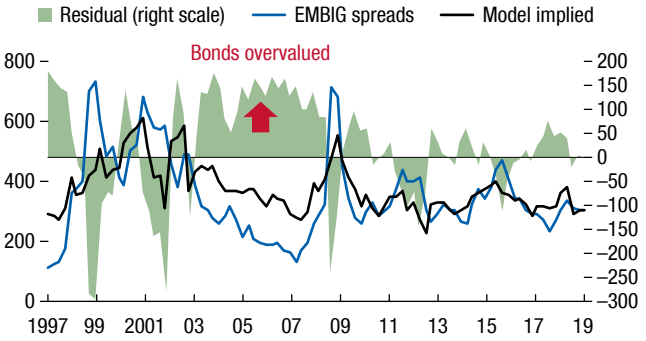
... driven largely by external factors, such as a rebound in global risk appetite in 2019.

2. Cumulative Impact of External and Domestic Drivers of EMBIG Spreads (Basis points)



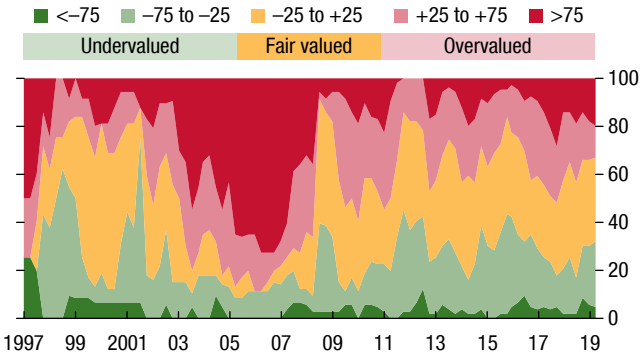
Overall, the EM dollar bond asset class appears to be fair valued ...

3. EMBIG Spreads versus the Fundamental-Implied Spreads (Basis points)



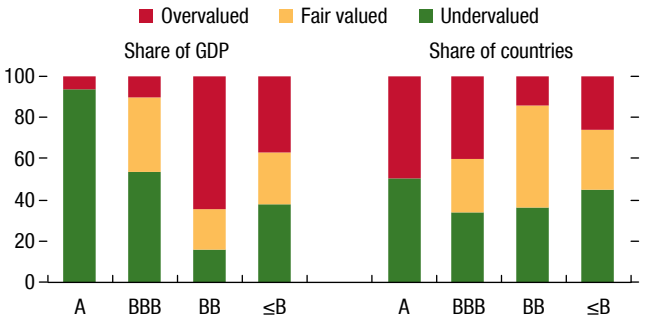
... but nearly one-third of countries are still overvalued.

4. Distribution of Countries on the Valuation Spectrum, across Ratings (Percent; overvaluation is adjusted by the spread level)



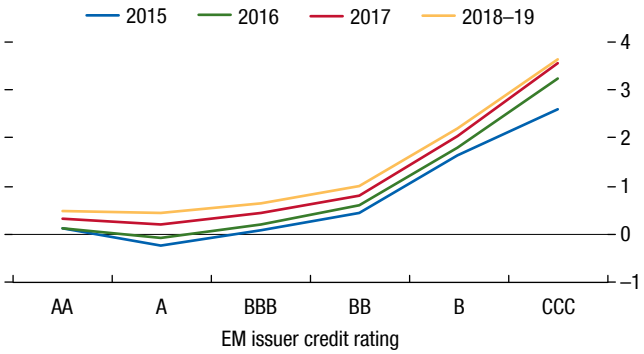
Lower rated issuers generally appear to be more overvalued ...

5. Distribution of Countries on the Valuation Spectrum, across Ratings (Percent)



... and increasingly more sensitive to changes in global risk appetite.

6. Coefficients of the Global Risk-Appetite Variable (US BBB spreads) for Different Rating Buckets, over Time



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, World Economic Outlook database; Institute of International Finance; Moody's; Standard & Poor's; and IMF staff calculations.
Note: The asset valuation model is based on domestic fundamentals and external risk sentiment. Domestic variables include foreign currency reserves, current account balance, external debt, net government bond issuance, real GDP growth, and inflation. External variables include growth forecasts and risk-appetite proxied by the US BBB corporate spread. The proxy for risk appetite sentiment is adjusted by the country rating. See Presbitero and others (2016) for a discussion of related literature. The addition of several new countries from the Middle East to the EMBIG drove the substantial movement in spreads for that region in panel 1.
EM = emerging market; EMBIG = JP Morgan Emerging Markets Bond Index Global.

Credit spreads appear to be broadly in line with fundamentals, on average, but there is considerable overvaluation for some countries. IMF staff analysis suggests that median emerging market bonds are currently fairly valued relative to countries' economic fundamentals and financial conditions (Figure 4.2, panel 3). Nonetheless, there is considerable variation across countries, with bonds in more than one-third of countries estimated to be somewhat or significantly overvalued (Figure 4.2, panel 4).[4] A sudden change in external conditions or other shocks could trigger large price adjustments that could tighten domestic financial conditions, especially in countries with significant vulnerabilities (see Chapter 1 of the October 2018 GFSR).

High-yield issuers appear to be more overvalued than investment-grade issuers. This includes half of the lowest-rated (B and lower) issuers, when weighted by GDP (Figure 4.2, panel 5), compared with only 8 percent of higher-rated (BBB and higher) issuers that are estimated to be overvalued. The overvaluation in lower-rated bonds may partly reflect the search for yield by global investors in the current low-rate global environment, which allowed many new issuers to tap international capital markets. Nonetheless, overvaluation is not unique to the current period and was prevalent in periods before the global financial crisis as well.

The sensitivity of credit spreads to external shocks has also risen. The changing investor base may have played a role, given that the exposure of emerging market economies to potentially "flighty" (Chapter 1 of the October 2018 GFSR) and benchmark-driven (Chapter 1 of the April 2019 GFSR) investors has been growing. A global stress episode could result in a sudden repricing of risk and lead to a swift exodus of such investors, which could cut off market access for lower-rated borrowers. Lower-rated bond issuers are more vulnerable to swings in global investor risk sentiment than higher-rated issuers, as suggested by analysis of spread sensitivity to global risk-aversion shocks (Figure 4.2, panel 6). For example, a 100 basis points increase in US BBB corporate spreads could widen spreads of B-rated emerging market bonds by more than 200 basis points, compared with only 50 basis points for A-rated emerging market issuers. This sensitivity has also been rising, reflecting the growing importance of external factors for emerging markets.

[4]Overvaluation was significantly more pronounced in 2006 and in April 2018 before the emerging market sell-off.

Continued Easy Financing Conditions Encourage More Borrowing

Whereas favorable external conditions have supported domestic financial conditions and provided an opportunity to boost productive capacity, the buildup of external debt has in many cases outpaced exports (Figure 4.3, panel 1). Median external debt has risen from 100 percent of exports in 2008 to 160 percent in 2019 (see also the April 2018 *Fiscal Monitor*). In some countries, this ratio has increased to more than 300 percent. A similar trend is observed in government debt, which is nearing 100 percent of GDP in some countries (Figure 4.3, panel 2). The creditworthiness of nonfinancial firms has been deteriorating (Figure 4.3, panel 3) in the face of rising corporate sector leverage (Figure 4.3, panel 4). Countries that have not addressed vulnerabilities during this favorable period will be at a higher risk of capital flow reversals and higher borrowing costs should global financial conditions suddenly tighten.

Overindebted State-Owned Enterprises Are a Growing Concern

State-owned enterprise (SOE) debt accounts for a significant portion of total emerging market debt securities issued externally. As with other emerging market firms, many SOEs have taken advantage of the easy global financial conditions to significantly increase their debt over the past decade (Figure 4.4, panel 1). The debt issued by fully government-owned SOEs—which are included in the most widely followed emerging market sovereign bond index, the JP Morgan EMBI Global—comprises one-third of the entire emerging market sovereign hard currency bond universe. Further, if all SOEs, including those that are majority-owned by the government, were combined in the emerging market corporate indices they would make up half of corporate debt securities.[5]

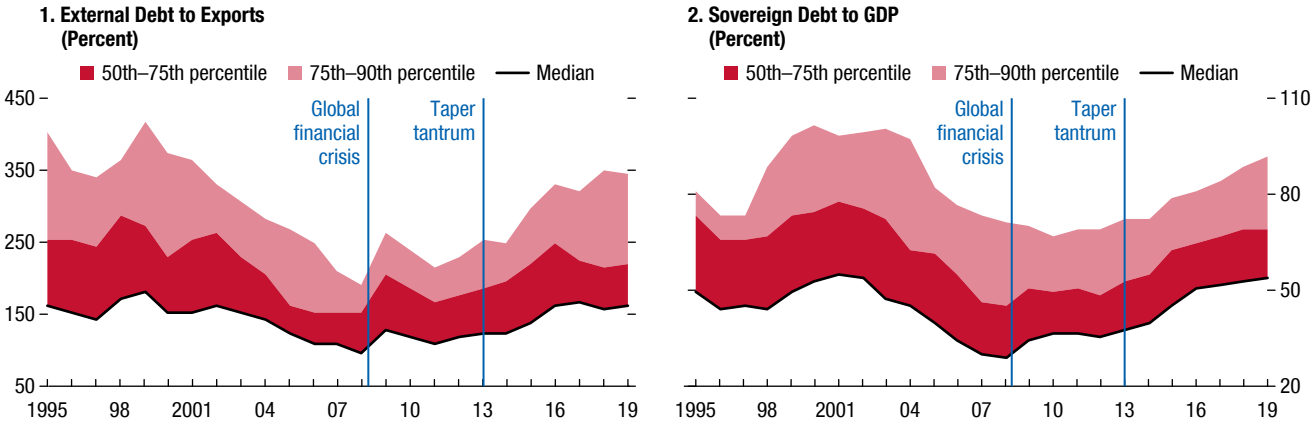
The use of debt appears to have been less productive in many emerging market SOEs that have increased leverage but have become less profitable (Figure 4.4, panel 2). For the most part, large nonfinancial SOEs tend to fall within a few important sectors—mostly oil and gas, utilities, telecommunications, and metals and mining. Leverage has risen most notably in oil and gas SOEs, with consistent increases since the global financial crisis. Before the crisis, emerging market oil and gas SOEs had leverage ratios similar to those of

[5]Section 4 of Online Annex 1.1 lists the SOEs and criteria used for selection of SOEs in this chapter.

Figure 4.3. Rising Debt in Emerging and Frontier Markets

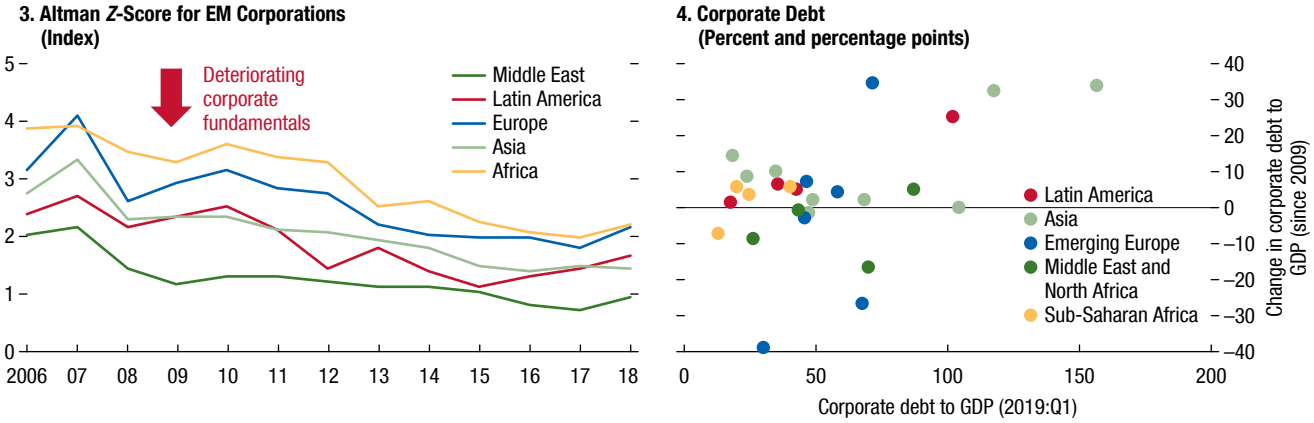
Benign financial conditions have contributed to a sharp rise in the external debt for emerging markets ...

... along with a rise in the sovereign debt.



EM corporate fundamentals have also deteriorated in the last decade.

Corporate debt-to-GDP has risen in many emerging market economies.



Sources: Bloomberg Finance L.P.; IMF, World Economic Outlook database; Institute of International Finance; JPMorgan Chase & Co.; and IMF staff calculations.
Note: Panels 1 and 2 include all the countries with external debt and included in JP Morgan emerging market indices. This sample is similar to the one used in Figure 4.2. In panel 3, the sample includes all the corporations included in the JP Morgan EMBIG Index. In panel 3, the Altman *z*-score gauges a firm's credit strength based on five financial ratios (profitability, leverage, liquidity, solvency, and sales to assets). EM = emerging market; EMBIG = JP Morgan Emerging Markets Bond Index Global.

major private oil and gas firms domiciled in advanced economies. However, whereas the average leverage of these private sector firms has remained stable over the past 15 years, emerging market oil and gas SOE leverage has nearly doubled. Despite the rise in leverage, many SOEs have experienced a sizable reduction in their profitability, with the median return on invested capital falling significantly since the financial crisis.

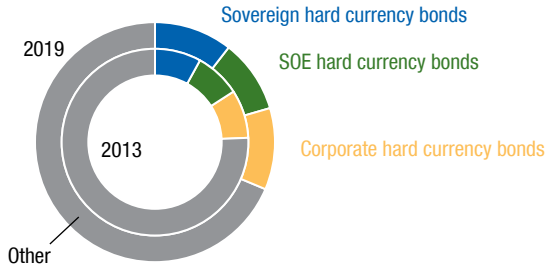
SOEs' rising debt burdens have led to deterioration in their creditworthiness. Since the financial crisis, the average rating of the SOE firms in the sample has deteriorated meaningfully, whereas their sovereign ratings have been on average stable (Figure 4.4, panel 3). Before the crisis, it was not uncommon for major SOEs to carry a better credit rating than their respective sovereigns. Although that is still the case for some firms, for the most part SOEs now generally trade wider than their sovereigns, and in many cases rating agencies assume an implied credit uplift from the sovereign to assign the SOE a higher rating than it would receive on a standalone basis. That said, most SOE spreads still trade very close to those of their sovereign (Figure 4.4, panel 4).

Market access and contingent liabilities of overindebted SOEs represent a growing concern in several emerging markets. Whereas only a few SOEs have an *explicit* guarantee from their sovereigns, investors in SOE debt often assume an *implicit* guarantee due to the importance of these firms to the economy.

Figure 4.4. Emerging Market State-Owned Enterprises

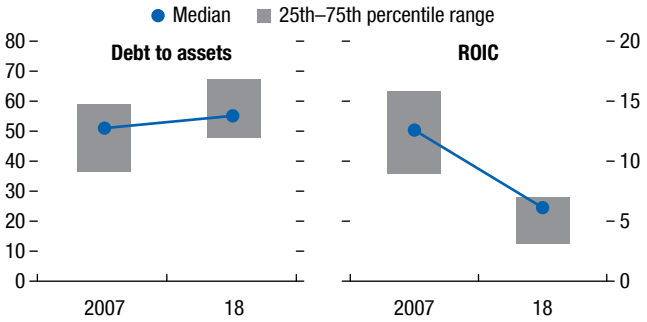
SOEs represent a significant share of all EM debt securities issued externally.

1. Outstanding EM Hard Currency Bonds by Type (As a share of total external debt)



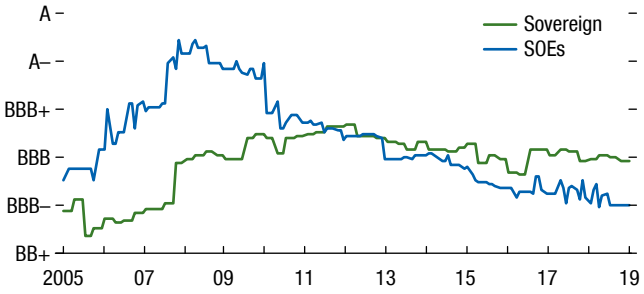
Favorable financing conditions have allowed SOEs to increase their leverage since 2007, but not their profitability.

2. Return on Invested Capital (Net Operating Profit to Invested Capital) and Leverage (Debt to Assets) (Percent)



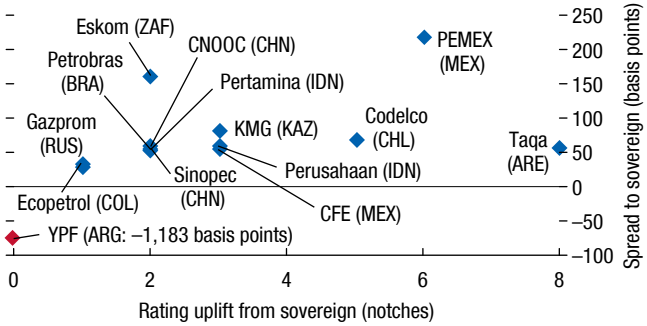
SOE credit ratings have deteriorated since 2007 and are now lower, on average, than the sovereign ratings.

3. Average Ratings of Major SOEs and their Sovereigns



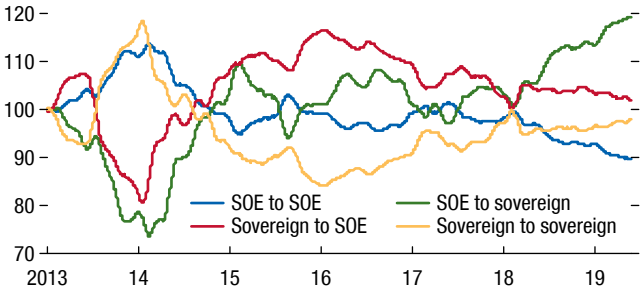
Most SOEs trade close to their sovereign spreads, including several that carry a credit uplift from the implicit guarantee.

4. Spread to Sovereign versus Rating Uplift



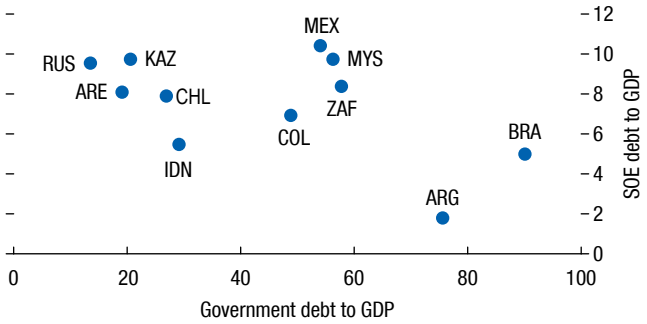
A shock to SOEs could spill over to sovereigns ...

5. Outward Spillovers between SOEs and Sovereigns (Index of outward spillovers, based on bond spreads, Jan. 2013 = 100)



... as some SOE debt is large compared with government debt.

6. Debt of Major SOEs versus Government Debt (Percent, excluding China)



Sources: Bloomberg Finance L.P.; company reports; Fitch; IMF, World Economic Outlook (WEO) database; JPMorgan Chase & Co.; Moody's; S&P Global Market Intelligence; and IMF staff calculations.
Note: For panel 3, the rating is the average among Fitch, Moody's, and S&P. For panel 5, the analysis shows the spillovers of all sovereigns and all SOEs (that is, not only the spillover between sovereigns and their own SOEs) and is based on the Diebold and Yilmaz (2012) methodology. The analysis also shows that some two-thirds of the spillovers from SOEs to sovereign are due to the sovereigns' own SOEs. In panel 6, WEO data are used for the general government debt to GDP. For some countries, such as Mexico, the data already incorporate the debt of entities such as CFE and PEMEX. Data labels in panels 4 and 6 use International Organization for Standardization (ISO) country codes. EM = emerging market; HC = hard currency; ROIC = return on invested capital; SOE = state-owned enterprise.

Historically, when sovereigns had to step in to support these firms, most were for implicit, rather than explicit, contingent liabilities (IMF 2016a). IMF staff analysis indicates that a widening in spreads in major SOEs can spill over to sovereign spreads (Figure 4.4, panel 5), and these spillovers have been rising in recent years, in contrast to the spillovers from sovereigns to SOEs.

With SOE debt rising, the potential implications of SOE financing challenges have become larger. Should these SOEs encounter financing difficulties and require sovereign support, it could have a significant impact on the government's fiscal position, particularly in countries with high debt (Figure 4.4, panel 6).[6] The composition of the SOE investor base is also an important factor in avoiding loss of market access. Loss of investment-grade rating could potentially have a significantly larger impact on emerging market SOEs than on comparable firms in developed markets because the pool of available high-yield corporate investors is narrower.[7]

Debt Sustainability Remains a Concern for Some Frontier Markets

Frontier issuers have benefited from the more dovish stance of monetary policy globally. Yields on bonds of frontier markets[8] have declined in 2019, recovering from their spike at the end of 2018 (Figure 4.5, panel 1). As in the case of emerging markets, the rally was driven largely by favorable external conditions rather than an improvement in domestic economic fundamentals, as the search for yield has intensified again this year.

Hard currency frontier bond issuance is poised to set a new record in 2019 barring a major shift in the global outlook and risk appetite. After a substantial spread widening and an issuance freeze in the second half of 2018, market access improved substantially in 2019 (Figure 4.5, panel 2). For some issuers, the outstanding debt stock is becoming an increasingly large share of available reserves. Over the past five years, outstanding hard currency debt of frontier markets has tripled to reach more than $200 billion as of mid-2019. The stock of hard currency bonds for the median frontier borrower has now grown to 7 percent of GDP and close to half of their gross reserves, compared with 3 percent of GDP and 20 percent of their reserves in 2014. The weaker upper quartile of frontier issuers, however, have increased their stock of debt to almost 140 percent of reserves.

New sources of financing have changed the composition of external debt and increased debt vulnerabilities. These changes include the following:

- *A rising share of commercial debt (primarily hard currency bonds):* Issuers are increasingly relying on commercial financing from banks, capital markets, and other private lenders (Figure 4.5, panel 3), partly as countries rise on the income scale. Although hard currency bond redemptions are estimated on aggregate to be low over the coming two years (Figure 4.5, panel 4), private external debt servicing costs (including interest payments) are set to continue rising, primarily because of rising debt servicing costs for hard currency bonds (Figure 4.5, panel 5). Over the coming years, several issuers across Africa (Angola, Gabon, Tunisia, Zambia) and Latin America and the Caribbean (Belize, Ecuador, Jamaica) will see future debt service obligations to the private sector rise substantially or remain elevated.
- *Non–Paris Club bilateral loans in lieu of traditional multilateral and Paris Club debt:* Non–Paris Club creditors, including China, have become the dominant source of official bilateral credit for many low-income developing countries (IMF 2018a). The total exposure of some of these creditors does not appear in government debt statistics, given that a large proportion of loans is to SOEs,[9] and only a small share of issuers report debt outside of the central government. Some analysts (Kratz, Feng, and Wright 2019) note that China's approach to debt restructuring has led to a balanced outcome between lenders and borrowers. However, even following restructuring of such non–Paris Club claims, countries are still facing challenging debt dynamics, and the share of countries at high risk of debt distress has continued to increase (see Figure 4.5, panel 6). This highlights the need for enhanced creditor coordination between Paris Club and non–Paris Club creditors to ensure timely and more sustainable outcomes.

[6]The October 2018 *Fiscal Monitor* offers a comprehensive analysis of public sector balance sheets incorporating SOEs.

[7]For example, even though some large emerging market SOE investment-grade issuers are included in global investment-grade bond benchmarks, most global high-yield bond benchmarks do not include emerging market entities fully owned by the state.

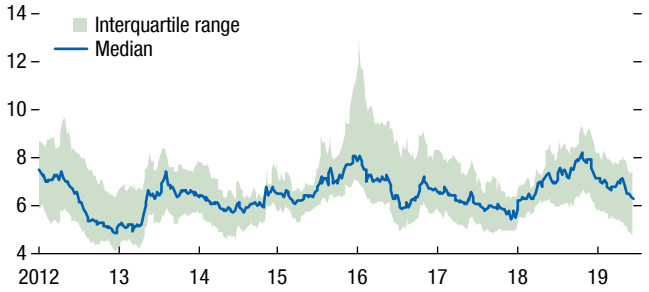
[8]Frontier issuers refer to low-income developing countries with international bond issuance as well as other non-investment-grade, infrequent sovereign bond issuers. Most of them are included in the JP Morgan Next Generation Emerging Markets index.

[9]According to IMF (2018b) three-quarters of low-income developing countries report only debt of the central rather than the general government and fewer than one in 10 countries report nonguaranteed debt of public corporations.

Figure 4.5. Frontier Bond Valuations, Issuance, and Debt Vulnerabilities

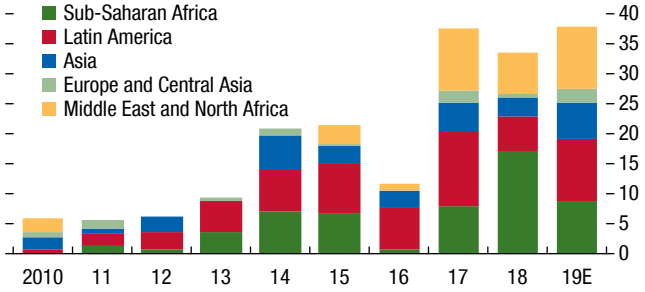
Favorable external conditions have allowed frontier issuers to fund themselves at attractive yields lately.

1. Dollar Bond Yields of Frontier Borrowers (Percent, secondary market)



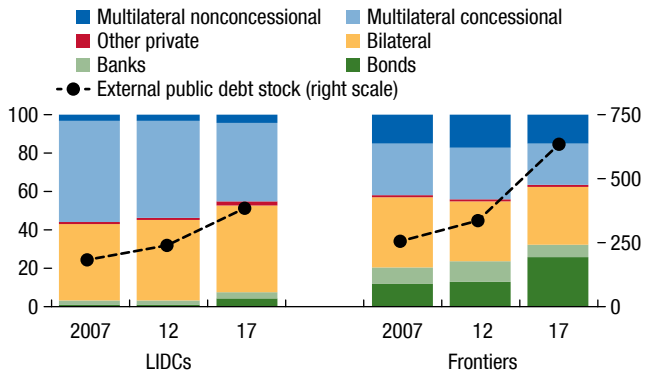
Reliance on hard currency debt issuance is set to reach a new high in 2019.

2. Hard Currency Debt Issuance for Frontiers (Billions of US dollars)



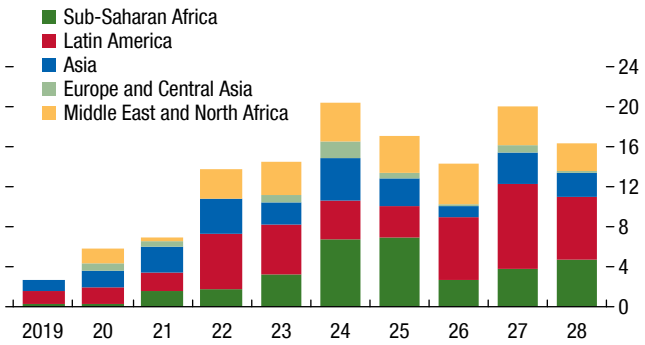
The composition of external debt has shifted toward a higher share for private sector debt, particularly for frontier markets.

3. Composition of External Public Debt of Frontier Markets (Share of total, average percent of GDP, left scale; billions of US dollars, right scale)



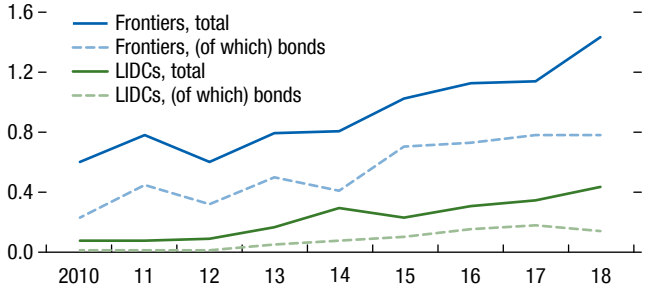
Rollover needs are low for many issuers in the coming years but are set to rise.

4. Hard Currency Debt Redemptions of Frontier Markets (Billions of US dollars)



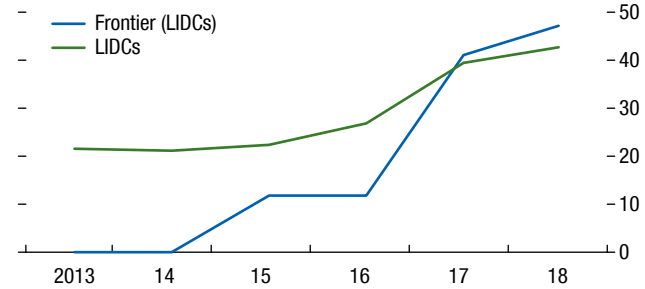
Bonds are driving the increase in private debt servicing costs.

5. External Public Debt Service to the Private Sector (Percent of GDP)



The share of countries at high risk or already in debt distress has increased since 2013.

6. Countries with High Risk of Debt Distress or in Debt Distress (Share of total, percent)



Sources: Bond Radar; World Bank; and IMF staff calculations.
Note: Frontier low-income developing countries (LIDCs) are a subset of frontier market economies that have a risk rating using the Debt Sustainability Framework for Low-Income Countries. About 45 percent of frontier issuers had such a risk rating in the panel 6 example. In panel 2, 2019E is based on market analyst forecasts.

- *A high stock of debt backed by collateral:* Although there is a general lack of data on collateralization practices across countries, recent debt distress cases and new IMF programs (particularly in sub-Saharan Africa) have revealed instances of a high stock of commodity-linked loans from the private sector or through bilateral official lending. Some issuers (such as Ecuador and Egypt) and domestic banks have relied on repurchase agreements from international banks using sovereign debt as collateral at significant haircuts. Such types of arrangements can constrain issuer options in debt restructuring, lower recovery for unsecured creditors, and increase liquidity risks.[10] Vulnerabilities linked to collateralized debt are further compounded by poor debt recording, monitoring, and reporting practices of many issuers (Group of Twenty 2018).

Rising external indebtedness has increased concerns about debt sustainability. The share of low-income developing countries assessed at high risk of debt distress or in debt distress under the IMF's debt sustainability framework (IMF 2018b) has doubled since 2013 to 43 percent (Figure 4.5, panel 6). Even for countries assessed at low or moderate risk of debt distress, debt servicing capacity has deteriorated. Debt sustainability concerns are more acute for frontier issuers, where reliance on external commercial debt and overall public indebtedness have risen even faster. For example, median public debt for low-income developing countries has risen by 13 percentage points of GDP since 2013 to about 46 percent of GDP in 2018. For frontier issuers, median debt has risen by close to 20 percentage points of GDP to about 55 percent.

Policies to Contain Excessive Buildup of Debt

The authorities in emerging market economies should maintain strong policy and institutional frameworks and rebuild policy space, where possible, to guard against rising global policy uncertainty and escalating trade tensions (see recommendations in Chapter 1 as well as Chapter 1 of the October 2018 and April 2019 GFSRs).

Easy external financing conditions could be a mixed blessing unless borrowers in emerging and frontier markets make financing decisions that are grounded in medium-term debt management strategies. These decisions must be based on an assessment of costs and risks, and borrowed funds must be used efficiently to increase productive capacity. Issuers should avoid instruments with features that may aggravate financing constraints under downside scenarios. To further increase resilience to external shocks, policymakers should continue developing local bond markets and promoting a stable local investor base (IMF and World Bank 2016; October 2018 GFSR).

Given the growing debt of *state-owned enterprises*, countries should seek to improve their profitability, efficiency, and governance. SOEs should rely on well-designed business plans that set credible operational and financial targets. Government guarantees on new and existing debt for systemically important firms should be linked to credible business plans. New investment plans should be subject to full cost-benefit and feasibility analysis. Some overindebted or inefficient SOEs may benefit from enhanced cooperation with private firms to improve efficiency and gain access to new sources of financing. Finally, transparency and debt monitoring can be strengthened with more detailed disclosure of fiscal spending and guarantees related to SOEs, in line with IMF initiatives (Group of Twenty 2018; IMF 2014, 2016b, 2019).

For *frontier markets*, containing debt-related vulnerabilities should be their top policy priority. Countries with elevated debt sustainability risks should limit increases in nonconcessional external indebtedness to investment projects with credibly high rates of return. Safeguards can also be put in place to match the debt service profile with investment returns, and by including contingency features to deal with shocks. Countries also need to strengthen efforts to mobilize domestic resources, improve the efficiency of public expenditures, and strengthen management of public investment. Furthermore, to ensure that risks are detected and addressed in a timely manner, efforts should be made to strengthen public debt recording, monitoring, and reporting, and to build capacity to manage public debt. Finally, issuers should take advantage of the favorable external conditions to reduce their reliance on collateralized debt.

Creditors should emphasize timely resolution of debt distress cases underpinned by efficient creditor coordination processes to minimize the costs for both the issuer and creditors. Non–Paris Club creditors should consider the benefits of adopting sustainable lending rules, such as those endorsed by the Group of Twenty.

[10]For example, some of these loans require margin calls or have early termination clauses linked to the value of collateral.

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CHAPTER 5

BANKS' DOLLAR FUNDING

A SOURCE OF FINANCIAL VULNERABILITY

In the run-up to the global financial crisis, lending in US dollars by global banks headquartered outside the United States (global non-US banks), together with their reliance on short-term and volatile wholesale funding, became crucial transmission mechanisms for shocks that originated in the major funding markets for US dollars. Whereas regulation following the crisis has improved the resilience of banking sectors in many dimensions, these mechanisms remain a source of vulnerability for the global financial system. This chapter constructs three measures to gauge the degree of US dollar funding fragility of global non-US banks and describes their evolution in recent years. Empirical results show that an increase in US dollar funding costs leads to financial stress in the economies that are home to global non-US banks and to spillovers through a cutback in loans to recipient economies, those that borrow US dollars. US dollar funding fragility and the share of US dollar assets to total assets amplify these negative effects. However, some policy-related factors can mitigate them, such as swap line arrangements between central banks and international reserve holdings by home economy central banks. Furthermore, this chapter finds that emerging markets that are recipient economies are particularly susceptible to declines in US dollar cross-border lending because they have limited ability to turn to other sources of US dollar borrowing or to replace dollars with other currencies. These results highlight the importance of controlling vulnerabilities arising from the US dollar funding of non-US banks. The US dollar funding fragility measures constructed in this chapter can help improve their monitoring.

The authors of this chapter are Adolfo Barajas (team lead), John Caparusso, Yingyuan Chen, Jannic Cutura, Andrea Deghi, Zhi Ken Gan, Oksana Khadarina, Dulani Seneviratne, Peichu Xie, Yizhi Xu, and Xinze Juno Yao, with contributions from Martin Edmonds, Mindaugas Leika, and Laura Valderrama, under the guidance of Fabio Natalucci, Claudio Raddatz, and Jerome Vandenbussche. Monica Devi and Breanne Rajkumar provided editorial assistance, and Victoria Ivashina served as an expert advisor.

Introduction

The US dollar historically has played a prominent role in global trade and financial flows.[1] In the run-up to the global financial crisis, European banks accumulated sizable US dollar assets, which were financed mainly in short-term wholesale funding markets such as repo, commercial paper, and certificates of deposits (McGuire and von Peter 2012). These markets became impaired in 2007–08, as heightened uncertainty led banks in the United States to hoard liquid assets and made them reluctant to lend to other financial institutions. Facing this withdrawal of US dollar funding, non-US banks were forced to finance their US dollar assets by tapping the foreign exchange swap market, where funding in other currencies can be turned into US dollar funding through the use of derivatives, further propagating financial stress through this market (Baba and Packer 2009). The freeze-up of US dollar wholesale funding markets required a global policy response and international provision of dollar liquidity via central bank swap lines, where the US Federal Reserve provided US dollars to some non-US central banks.

A decade later, the US dollar still plays a key role in international banking, and non-US banks, especially those from advanced economies, remain significant intermediaries of US dollar transactions in global financial markets.[2] Spurred by often higher returns in US dollar–denominated assets in relation to assets in other currencies, along with a preference by many corporate borrowers worldwide for financing in US dollars, non-US banks continued to expand their international US dollar lending during the past decade. US dollar–denominated assets of non-US banks amount to more than $12 trillion, compared with $10 trillion just before the onset of the crisis (Figure 5.1, panel 1). Among the major providers of US dollar credit, European banks were severely hit by both the global

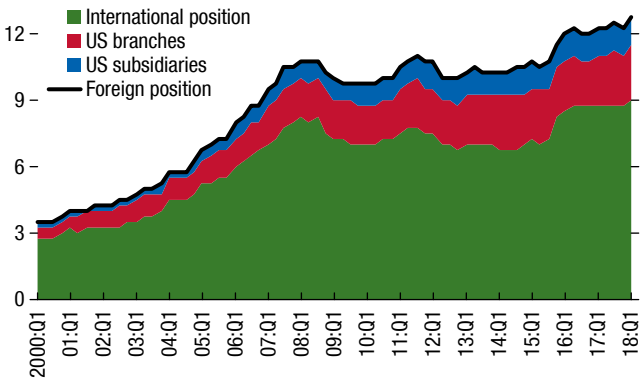
[1]See Gopinath and Stein (2018) for a theory about how a currency becomes dominant.

[2]Maturity mismatch in other currencies may also be a source of stress, but this chapter focuses on the US dollar, given its prominence in the global economy.

Figure 5.1. Trends in US Dollar Activities of Non-US Banks

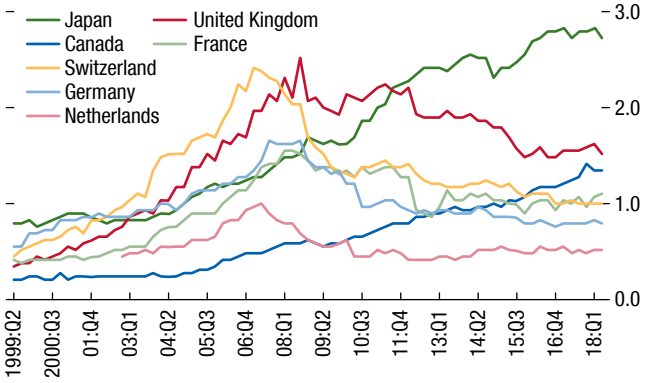
On average, non-US banks have been steadily increasing their US dollar activities, including through US branches and subsidiaries.

1. Non-US Banks' US Dollar-Denominated Claims (Trillions of US dollars)



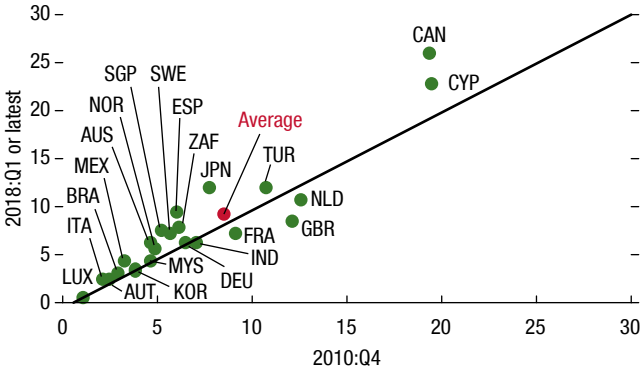
The shares of Japanese and Canadian banks in total US dollar bank intermediation have increased significantly over the past 10 years, whereas those of European banks have shrunk.

2. Non-US Banks' US Dollar-Denominated Claims (Trillions of US dollars; excluding intragroup claims)



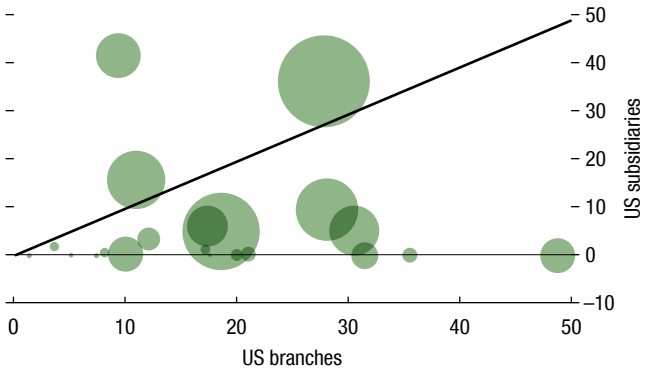
The share of US dollar activities in the total banking system balance sheet is substantial and has been increasing in many economies.

3. Share of US Dollar–Denominated Claims of Non-US Banks (Percent of total banking system assets)



Reliance on US branches and subsidiaries varies across home economies of non-US banks.

4. Non-US Banks' Relative Share of US Branches and Subsidiaries in Total US Dollar–Denominated Claims, Latest Available (Percent of foreign position; bubble size = total assets)



Sources: Bank for International Settlements, locational banking statistics (nationality basis); Federal Financial Institutions Examination Council; S&P Global, Market Intelligence; and IMF staff calculations.
Note: Foreign position consists of international position as defined by the Bank for International Settlements plus the positions in US branches and subsidiaries (see Online Annex 5.3 for further clarification). The measure of US dollar-denominated claims, based on BIS data and represented in all four panels, may be larger in some cases than the trust-account-adjusted measure (see Saito, Hiyama, and Shiotani, 2018). Diagonal lines in panels 3 and 4 are 45-degree lines. Data labels in panel 3 use International Organization for Standardization (ISO) country codes.

financial crisis and the euro area crisis, and their share of US dollar assets has declined as they have reduced the level of their debt (deleveraged). At the same time, Japanese banks (which picked up some of the slack in Asia) and Canadian banks (which expanded in the United States) have greatly increased their US dollar–denominated claims (Figure 5.1, panel 2).

US dollar intermediation, whereby global non-US banks borrow and lend US dollars on a global scale, provides several benefits, including efficient allocation of liquidity on a global scale and facilitation of financing flows to emerging markets. However, participation of non-US banks in this process is also a potential source of risk in global financial markets because their stable US dollar deposits outside the United States are insufficient to fund all their global US dollar credit. Whereas non-US banks can tap stable US dollar deposit funding through their US subsidiaries, US regulation confines the use of these funds to US activities, so they cannot be deployed at

a global level. Other sources of US dollar funding, obtained through US branches and in international markets, can be deployed outside the United States but are mostly wholesale, short term, and volatile, and are subject to sizable refinancing risk, especially in times of stress. Finally, non-US banks rely on foreign exchange swaps, which also tend to be short term and volatile. Because foreign exchange swaps are usually costlier than other sources of funding, they are the "marginal" source of US dollar funding, used to fill remaining gaps that cannot be quickly met through other sources. Analysis in Chapter 1 of the April 2018 *Global Financial Stability Report* (GFSR) identified structural liquidity mismatches associated with these institutions' US dollar balance sheets and concluded that vulnerabilities remain, despite steps to address them.

Since the global financial crisis, some US dollar funding markets have changed significantly. Reliance on foreign exchange swaps continues, even though there is evidence that structural changes in this market have made funding more prone to instability. The role of nonbanks is also increasing. For instance, the share of major banks providing foreign exchange derivatives to Japanese financial institutions has declined, whereas nonbanks, whose commitment to stay in the market during stress periods is untested at this point, are playing a larger role (Nakaso 2017). Despite their well-documented benefits for financial resilience (see Chapter 2 of the October 2018 GFSR), some aspects of the postcrisis regulatory reforms may have had unintentional effects in US dollar funding markets. The global capital and liquidity requirements and specific regulations at the individual jurisdiction level may have tightened the supply of US dollar funding to non-US banks (Du, Tepper, and Verdelhan 2018; Iida, Kimura, and Sudo 2018). For example, the 2016 money market mutual fund reform in the United States, which aimed to reduce vulnerability in these types of vehicles, has reduced access to US dollar funding for non-US banks. This development has increased reliance on foreign exchange swaps, despite a rise in offshore US dollar deposits (Aldasoro and others 2017). Finally, supervisory and regulatory tightening may have further complicated cross-border liquidity management at global financial institutions.[3]

[3]See Online Annex 5.1.

These structural changes have resulted in higher costs across wholesale US dollar funding markets, most noticeably in the foreign exchange swap market. Although the supply of US dollars in recent years has been ample, stress in US dollar funding markets could reemerge. This would depend critically on the interest rate path differential between the United States and other regions, the process of monetary policy "normalization" at major central banks, and the fiscal outlook in the United States and associated supply of US Treasury securities.

Altogether, this suggests that the cost of US dollar funding for non-US global banks could become more volatile and perhaps more sensitive to changes in US monetary conditions and global risk appetite. These banks' greater US dollar funding fragility—as reflected in greater liquidity and maturity mismatches between their US dollar assets and liabilities or greater reliance on volatile short-term sources of funding—could therefore be a financial vulnerability and could amplify the effects of shocks to US funding costs on banks' financial stress and the global credit supply.

Against this backdrop, this chapter sets out to investigate the extent to which conditions in US dollar funding markets can be a source of financial stress and disruption of international capital flows. The chapter describes the major trends in the past two decades in the size and composition of US dollar balance sheets of non-US global banks and in their costs of US dollar funding. It explores how US dollar funding fragility of these institutions can exacerbate the adverse effects of tightening funding conditions and tracks several indicators constructed to measure this fragility. It then presents econometric analysis focusing on three main issues: (1) how the cost of US dollar funding responds to different drivers of supply and demand identified in the literature, (2) how tighter US dollar funding conditions may generate financial stress in the home economies of non-US global banks (henceforth *home economies*), and (3) to what extent this tightening could also lead to cutbacks in the cross-border supply of US dollar–denominated lending from home economies to jurisdictions that receive cross-border credit flows from global non-US banks (henceforth *recipient economies*). For all three issues, the econometric analysis highlights the amplifying or mitigating role of US dollar funding fragility and macroeconomic conditions, as well as policy-related factors. The econometric approach followed is described in detail in Online Annex 5.2.

How Have US Dollar Activities and US Dollar Funding Fragility Evolved since the Global Financial Crisis?

Focusing on a sample of 26 advanced economies and emerging markets that are home to major global non-US banks, this section shows that US dollar activities of non-US banks have remained substantial since the global financial crisis, both in aggregate and as a share of the banking sectors of the home economies. The aggregate gap between US dollar assets and liabilities has expanded, although not uniformly across economies, and with some decline in more recent years. Whereas the liquidity and stable funding measures in US dollars constructed for a subset of advanced economies have increased moderately, there is evidence that in many of these economies, the liquidity in US dollars of their banking system falls well below the overall liquidity measure calculated across all currencies.

US dollar assets of global non-US banks have been trending upward since the global financial crisis, increasing from $9.7 trillion in 2012 to $12.4 trillion by early 2018 (Figure 5.1, panel 1).[4] The economic composition of these claims has also changed, with some European economies reducing their share while other economies, such as Canada and Japan, have been expanding their shares noticeably (Figure 5.1, panel 2). Furthermore, the magnitude of US dollar positions relative to total banking system assets—across all currencies—is comparable to its precrisis level, and there are indications of a resurgence in activities after a postcrisis decline. In some economies, the share of US dollar claims has increased since 2010 (Figure 5.1, panel 3).

Not all of these US dollar assets constitute cross-border activities, as a significant portion is located in branches and subsidiaries in the United States. Their shares in the aggregate have remained relatively stable over time (Figure 5.1, panel 1). For individual home economies, positions held at US branches are often quite substantial. Their share surpasses 10 percent in 15 of the 26 economies examined and is as high as 40 to 50 percent for some economies. On the other hand, positions at US subsidiaries, which cannot be used to fund global US dollar activities, tend to be much smaller, except in a handful of cases (Figure 5.1, panel 4).

Turning to US dollar funding exposure and vulnerability, several main indicators are constructed to reflect the potential fragility of non-US banks in the face of shocks to US dollar funding sources. The first is the *cross-currency funding gap*, defined as the difference between US dollar–denominated assets and liabilities. This gap, expressed as a ratio to US dollar assets, yields the *cross-currency funding ratio*. This ratio approximates the extent to which non-US banks must resort to the foreign exchange swap market to obtain marginal funding for their US dollar positions.[5]

After falling from a mid-2008 peak of $1 trillion (or 10 percent of US dollar assets), the cross-currency funding gap has been increasing in recent years, exceeding $1.4 trillion; this corresponds to a cross-currency funding ratio of 13 percent of US dollar assets (Figure 5.2, panel 1). Thus, increasing US dollar activity has gone hand in hand with a widening gap between US dollar–denominated assets and liabilities, potentially making home economies more vulnerable to shocks arising in US dollar funding markets. Of the 26 economies, 17 had positive funding gaps as of the first quarter of 2018, and almost all had experienced an increase in their gap since 2012.[6]

Beyond the aggregate funding gap, liquidity and maturity characteristics of both US dollar–denominated assets and liabilities shed further light on the degree of exposure and sensitivity of non-US banks to tighter funding conditions. Two additional indicators are constructed for this purpose, in the spirit

[4]These 26 economies also have sufficiently long time series of the relevant data and have US dollar operations considered to be of domestic systemic importance. For the list of economies, see Online Annex 5.3. Non-US banks' US dollar balance sheet aggregates constructed for this chapter encompass several definitions. First is the "international position" as defined by the Bank for International Settlements, which includes cross-border positions plus those in branches outside the United States. Adding US-based branches results in the "international position plus branches." Adding subsidiaries in the United States yields the "foreign position" shown in Figure 5.1, panel 1. The econometric analysis in this chapter is conducted primarily using international position plus branches, with exercises using foreign position as robustness checks.

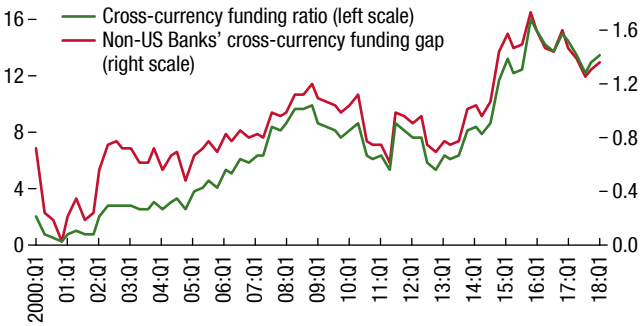
[5]This measure has previously been used as a proxy for the demand for foreign exchange swaps (Eguren-Martin, Busch, and Reinhardt 2018). Whereas the aim of the analysis is to provide measures of US dollar funding fragility that are comparable across time and economies, the trust-account-corrected cross-currency funding ratio may be smaller in some cases than the measure used here, which relies on Bank for International Settlements data (see Saito, Hiyama, and Shiotani 2018).

[6]In economies with positive cross-currency funding gaps, in the first quarter of 2018 the gaps totaled $1.8 trillion—18 percent of US dollar–denominated assets. The bulk of the drop in the gap since early 2016 is attributable to Japan. Trends in non-US banks' US dollar funding have also been documented by Aldasoro and Ehlers (2018).

Figure 5.2. US Dollar Funding Fragility of Non-US Banks

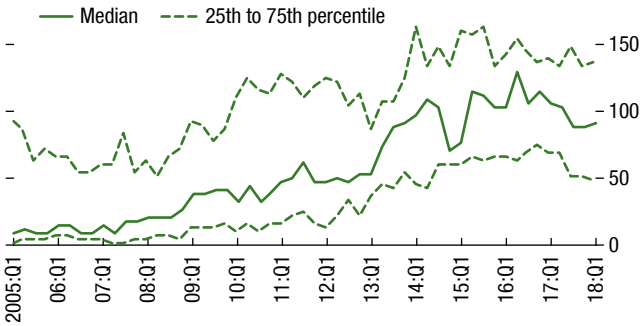
The funding gap between US dollar claims and liabilities has been expanding.

1. Non-US Banks' US Dollar Cross-Currency Funding
(Left scale = percent; right scale = trillions of US dollars)



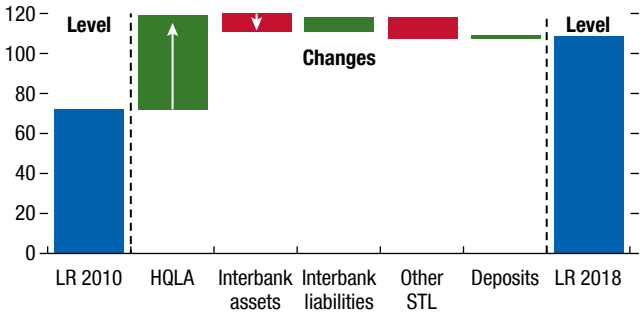
US dollar liquidity has been improving ...

2. Non-US Banks' US Dollar Liquidity Ratio
(Percent)



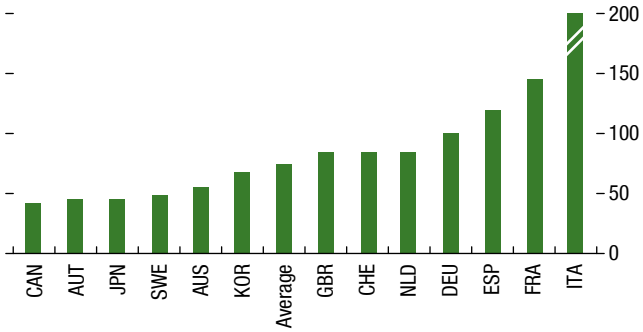
... mostly because of an increase in US dollar high-quality liquid assets ...

3. Decomposition of the change in Non-US Banks' US Dollar Liquidity Ratio
(Percent; computed at the aggregate level)



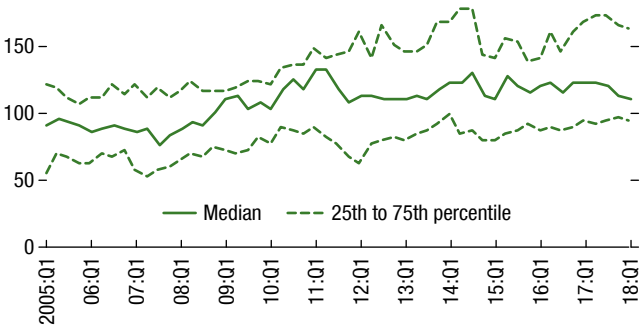
... but US dollar liquidity is well below overall liquidity levels across all currencies.

4. Non-US Banks' US Dollar Liquidity Ratio Compared with All-Currency Liquidity Ratio
(Percent)



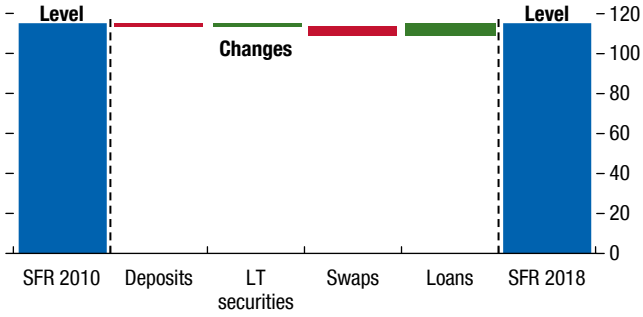
The US dollar stable funding ratio has largely remained constant ...

5. Non-US Banks' US Dollar Stable Funding Ratio
(Percent)



... with little change among components.

6. Decomposition of Non-US Banks' US Dollar Stable Funding Ratio
(Percent, computed at aggregate level)



Sources: Bank for International Settlements, locational banking statistics (nationality basis); Federal Financial Institutions Examination Council; S&P Global, Market Intelligence; and IMF staff calculations.
Note: All panels correspond to the international position plus US branches of the non-US banks. Latest available calculations were as of 2018:Q1 at the time the analysis was conducted. Panel 1 shows the difference between US dollar assets and liabilities, both in trillions of dollars and as a percentage of US dollar assets. Panels 2 through 6 are based on a subset of 14 economies because of data limitations. Panels 3 and 6 were computed using the sample-wide aggregate values; the changes are in percent. Data labels in panel 4 use International Organization for Standardization (ISO) country codes. HQLA = high-quality liquid assets; LR = liquidity ratio; LT = long-term; SFR = stable funding ratio; STL = short-term liabilities.

of the regulatory liquidity ratios introduced in the wake of the global financial crisis. A *US dollar liquidity ratio* focuses on the ability of banks to withstand rapid withdrawals of US dollar funding by liquidating a portion of their US dollar assets. It is constructed analogously to the regulatory liquidity coverage ratio and looks at holdings of US dollar high-quality liquid assets—those considered highly liquid even in a stress scenario and ideally eligible as collateral for central bank lending—and US dollar net cash outflows likely during a one-month stress scenario.[7]

US dollar liquidity of non-US banks has been increasing steadily since the global financial crisis (Figure 5.2, panel 2), primarily reflecting an increase in US dollar high-quality liquid assets (Figure 5.2, panel 3). Virtually all 14 economies for which this measure is constructed registered notable increases between 2008 and 2018, with a small drop since 2016 attributable to a few European economies and Japan. However, US dollar liquidity still remains below the overall liquidity of their balance sheets as measured by an all-currencies liquidity ratio (Figure 5.2, panel 4). This has been confirmed with more detailed analysis of liquidity in the context of recent assessments under the Financial Sector Assessment Program (see Online Box 5.1).

The stability of US dollar funding has generally remained constant in recent years. A *US dollar stable funding ratio*—constructed in the spirit of the net stable funding ratio generally computed for the entire balance sheet—reflects banks' ability to fund their US dollar assets over a longer time horizon using stable sources of funding, in part to ensure the continuity of credit and the preservation of business relationships. The US dollar stable funding ratio has improved only moderately since the global financial crisis, with little change among components (Figure 5.2, panels 5 and 6).

How Are US Dollar Funding Costs Measured and What Drives Them?

This section introduces the cross-currency basis as the measure of US dollar funding costs for non-US banks and describes how it evolved before, during, and after the global financial crisis. Analysis of the drivers of the cross-currency basis shows that changes in macroeconomic conditions in either the United States or in home economies could lead to future stress in US dollar funding markets.

Whereas the four indicators—the cross-currency funding gap, the cross-currency funding ratio, the liquidity ratio, and the stable funding ratio—are useful indicators of the vulnerability of banks to shocks in their US dollar funding, the shocks themselves can be approximated to a large degree by changes to the US dollar cross-currency basis (see definition in the next paragraph). When non-US banks acquire dollar assets, they aim to match the currency exposure of their liability side to avoid foreign exchange risk.[8] As the previous section explained, however, their on-balance-sheet US dollar assets often exceed their US dollar liabilities, leaving a gap in funding that the banks attempt to close through foreign exchange swaps; that is, synthetic US dollar funding. Understanding the determinants of the costs of US dollar funding is essential because such conditions affect bank profitability, capital requirements, banks' ability to provide US dollar credit, and ultimately financial stability risks.

The *US dollar cross-currency basis* is calculated as the difference between the cost of funding US dollars directly from the cash market and the synthetic US dollar interest rate obtained when funding in a different currency and swapping that currency into US dollars.[9] A positive (negative) currency basis implies that the direct dollar cost is higher (lower) than the synthetic one.[10] Although there are different interest rate indicators that reflect US dollar funding costs for non-US banks, as explained previously, the

[7]The liquidity ratio should not be interpreted in strictly the same way as the liquidity coverage ratio: for example, a level below 100 percent does not necessarily represent insufficient liquidity, nor should the liquidity ratio be compared with existing data on regulatory ratios. Details of the construction are in Online Annex 5.3.

[8]Since the release of the Basel Committee proposal on market risks (Basel Committee on Banking Supervision 1996), the net open foreign exchange positions of banks in advanced economies have been treated as other market risks, subject to capital requirements. In addition, many emerging market economies place explicit limits on this exposure (Hofstetter, López, and Urrutia 2018).

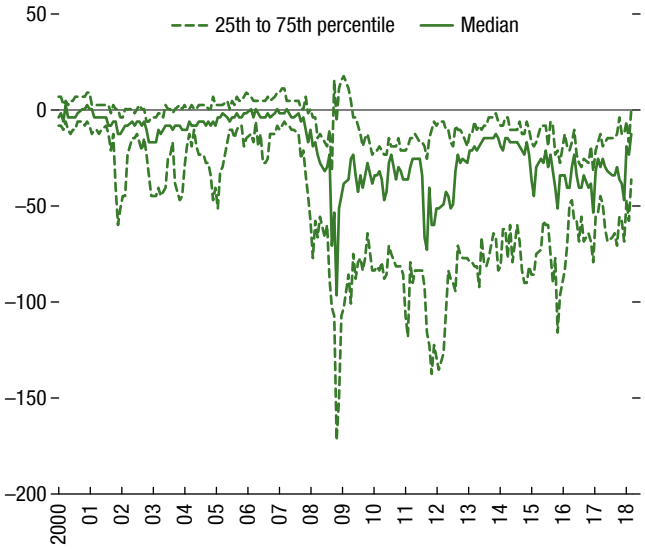
[9]Funding costs in each currency are measured using the relevant London interbank offered rate at one- and three-month "tenors," or maturity periods.

[10]Throughout the chapter, reference to an "increase in US dollar funding cost" means widening of the cross-currency basis; that is, it becomes more negative. An exception is Australia, which has a persistently positive cross-currency basis.

Figure 5.3. The Cross-Currency Basis

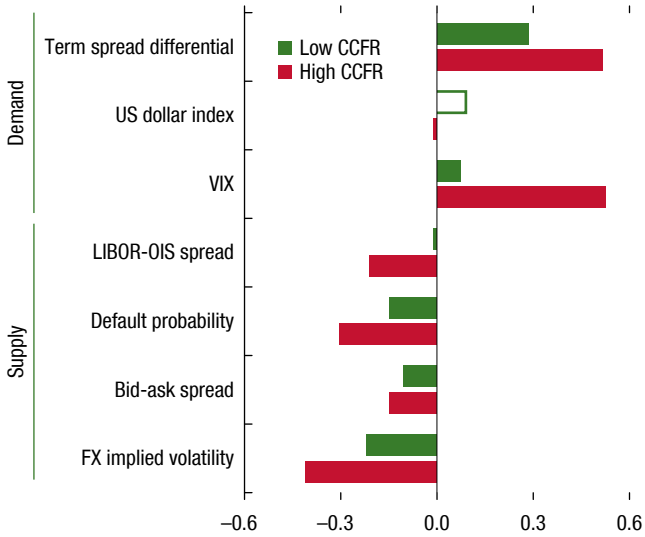
US dollar funding costs increased notably after the financial crisis, and a negative basis has persisted during the postcrisis period.

1. Three-Month Cross-Currency Basis (Basis points, monthly average)



The effect of the drivers of the cross-currency basis is amplified by US dollar funding fragility.

2. Interaction Effects of the Cross-Currency Funding Ratio and Drivers of the Cross-Currency Basis (Standardized coefficients)



Source: IMF staff calculations.
Note: Panel 1 shows monthly averages of the three-month LIBOR cross-currency basis, measured in selected currencies. Panel 2 reports the aggregate impact of the basis determinants with the interaction of the "low" ("high") level of the CCFR; that is, when the CCFR is at the first (fourth) quintile. The sample period is January 1, 2000, to March 1, 2018. Currencies in the panel 2 sample are the Australian dollar, British pound, Canadian dollar, euro, Hong Kong dollar, Japanese yen, Indian rupee, Malaysian ringgit, Swiss franc, and Swedish krone. The euro area CCFR is computed as the average across the euro area economies in the sample. Solid colored bars denote significance levels at 10 percent or higher. Empty bars indicate the absence of statistical significance. Default probability is measured as the average expected default frequency of home economies' listed banks. CCFR = cross-currency funding ratio; FX = foreign exchange; LIBOR = London interbank offered rate; OIS = overnight interest swap; VIX = Chicago Board Options Exchange Volatility Index.

cross-currency basis is a good indicator of US dollar funding conditions at the margin.[11]

Before the global financial crisis, the cross-currency basis was close to zero across many currencies (Figure 5.3, panel 1), consistent with so-called covered interest parity whereby differences between the cost of direct and synthetic US dollar funding are very small and short-lived, as they are eventually eliminated through the action of market participants. However, since the global financial crisis, covered interest parity has failed to materialize. During the global financial crisis and the European sovereign debt crisis, because of impaired interbank markets and limited arbitrage activity, the US dollar cross-currency bases became large and negative for many currencies. In response to the US dollar funding difficulties, swap lines were introduced between the Federal Reserve and several central banks. These arrangements lessened strains in markets and significantly diminished the dollar shortage, leading to a narrowing of the cross-currency basis (Goldberg, Kennedy, and Miu 2011; McGuire and von Peter 2012). Deviations in covered interest parity have nonetheless persisted, and the cross-currency bases have not entirely reverted to zero.[12]

The literature has shown that both demand- and supply-side factors influence changes in the

[11]Anecdotal evidence from market participants suggests the existence of a pecking order of US dollar funding sources. In the short term, banks generally seek the least costly source of wholesale funding. Synthetic funding is usually the costliest and therefore the marginal source of US dollar funds. Consistently, analysis of detailed data on US dollar money market funding of non-US banks provides evidence that a widening of the basis is also associated with an increase in total direct funding costs. Further details of this analysis are contained in Online Annex 5.1.

[12]Several explanations of these deviations have been proposed by Avdjiev and others (2018); Baba, Packer, and Nagano (2008); Borio and others (2018); Du, Tepper, and Verdelhan (2018); Iida, Kimura, and Sudo (2018); and Sushko and others (2016).

cross-currency basis.[13] It widens in response to supply-side-related factors such as heightened risks in interbank funding markets—the spread between the London interbank offered rate and the overnight index swap rate—and high transaction costs (bid-ask spread), as well as demand-side forces such as the risk of default of the banking sector in the home economy and the home economy interest margin relative to that in the United States. For example, a narrower home economy interest margin relative to that in the United States increases the incentive for holding US dollar–denominated investments funded in US dollars, thus adding demand pressure for synthetic US dollar funding and widening the cross-currency basis. Market sentiment in the United States also plays a role: rising risk aversion in the United States—proxied by an increase in the Chicago Board Options Exchange Volatility Index—dampens demand for risky investments denominated in US dollars, thereby alleviating pressure on the cross-currency basis.

The cross-currency funding ratio can amplify the effects of the preceding factors. That is, when needs for US dollar funding are particularly strong—the cross-currency funding ratio is large—non-US banks[14] become more vulnerable to strains in the foreign exchange market and to the financial conditions of suppliers of foreign exchange swaps.[15] Therefore, shocks to US dollar funding markets have a stronger impact on the cross-currency basis.[16] For example, for a given increase in the implied volatility of its exchange rate, an economy with a high cross-currency funding ratio (at the fourth quintile) will experience a larger widening (on the order of 50 percent) of its currency's cross-currency basis relative to one with a low cross-currency funding ratio (at the first quintile) (Figure 5.3, panel 2).

Financial regulatory reforms following the global financial crisis appear also to have influenced the basis. Since January 2015, when European banks were first required to report quarter-end leverage ratios, the resulting seasonal spikes in the cost of balance sheet expansion have spilled over to global US dollar funding markets, causing jumps in the cross-currency basis around quarter ends (Figure 5.4, panel 1). Pressure to quickly adjust balance sheets to comply with regulatory capital ratios before reporting dates is stronger for the one-month than the three-month cross-currency basis, because three-month swaps appear on balance sheets at the end of the quarter regardless of when they are initiated.

Other key regulatory changes appear to have coincided with a strengthening of the relationship between the cross-currency funding ratio and the basis. Among these changes, the 2016 US money market mutual fund reform seems to be associated with the sharpest widening observed (Figure 5.4, panel 2). The draining of funds out of prime institutional money market funds, which were important lenders in the wholesale dollar funding market,[17] led non-US banks to increase their use of synthetic dollar funding, resulting in a significant strengthening of the relationship. The introduction of the liquidity coverage ratio had a similar effect, because of the constraints on US banks to supply foreign exchange swaps.[18]

Changes in macroeconomic conditions in the United States and worldwide could contribute to a wider basis in the home economies of non-US banks. Increased fiscal pressure and/or an eventual widening of the interest rate gap between the United States and other major economies could tilt the term spread differential toward greater demand for US dollar–denominated assets, thereby widening the basis. US dollar appreciation, by weakening

[13]The distinction between supply and demand factors is based on Ivashina, Scharfstein, and Stein (2015).

[14]Although nonbank institutions also drive demand for foreign exchange hedging, because of data constraints this chapter focuses on the banking sector.

[15]Whereas the analysis treats the cross-country funding ratio mainly as an independent driver of the basis, there could be some degree of interdependence between these variables. By using an unrestricted panel vector autoregression framework that treats the variables as endogenous and interdependent, impulse response functions were estimated, and they corroborate the finding that the basis responds to shocks to the cross-country funding ratio.

[16]Cerutti, Obstfeld, and Zhou (2019) point out that there is considerable heterogeneity in the determinants of the cross-currency basis across economies and time. The analysis in this chapter takes a more general perspective on drivers of the cross-currency basis and focuses on one source of heterogeneity: the cross-currency funding gap.

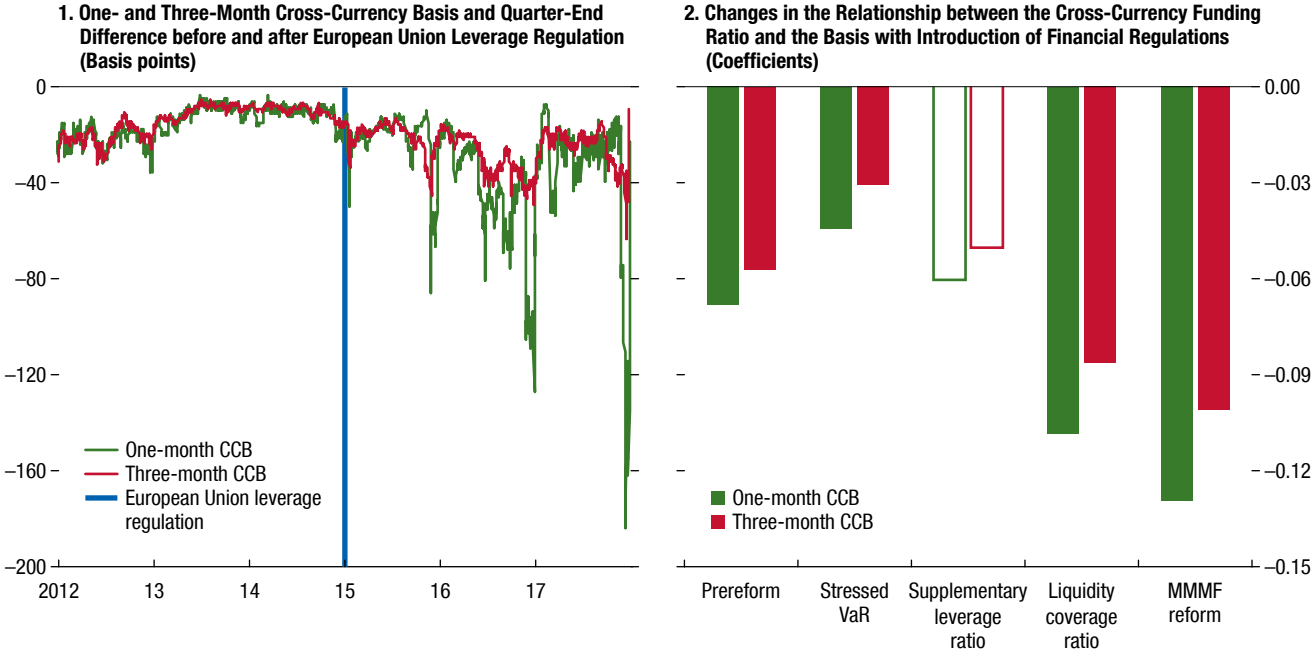
[17]It is possible that the effect of the globally important systemic bank capital surcharge and resolution funding requirements, both phased in since 2016, is also captured here. Resolution funding requirements have required subsidiaries to hold their own liquidity to meet resolution funding requirements without recourse to the governments in a situation of near failure.

[18]See Du, Tepper, and Verdelhan (2018).

Figure 5.4. Financial Regulations and the Cross-Currency Basis

The cross-currency basis widens, particularly at the end of quarters after the introduction of European leverage regulation.

Since the global financial crisis, introduction of bank regulations has at times been followed by a strengthening of the association between the cross-currency funding ratio and the cross-currency basis.



Source: IMF staff calculations.
Note: Panel 1 depicts the average one-month and three-month cross-currency basis and indicates the introduction of the European Union leverage regulation on January 1, 2015. Panel 2 depicts the change in the association between the cross-currency funding ratio and the cross-currency basis following the introduction of various financial regulations in the United States: stressed VaR (2013), supplementary leverage ratio (2014), liquidity coverage ratio (2015), and money market mutual fund reform (2016). Currencies in the sample are the Australian dollar, British pound, Canadian dollar, euro, Japanese yen, Swedish krona, and Swiss franc. In panel 2, solid colored bars denote statistical significance at the 10 percent level or higher. Empty bars denote absence of statistical significance at the 10 percent level. CCB = cross-currency basis; MMMF = money market mutual fund; VaR = value at risk.

balance sheets of net US dollars borrowers, could indirectly increase credit risk of the global non-US banks, adding pressure to their currency bases.[19] In addition, an expected increase in the supply of US Treasuries could put pressure on the spread between the London interbank offered rate and the overnight index swap, further straining US dollar funding conditions. Increased global uncertainty, reflected in elevated implied foreign exchange volatility in home economies, could widen the basis as well. Finally, sluggishness in domestic real activity could have repercussions on banking system health, exerting additional pressure on the basis.

[19]See also Avdjiev and others (forthcoming); and Bruno and Shin (2015).

What Are the Implications of Tightening US Dollar Funding Conditions on Financial Stress and Cross-Border Lending?

This section analyzes whether rising US dollar funding costs may hurt profitability of global non-US banks, resulting in financial stress in the home economy via increased probability of banking system default or tighter domestic financial conditions. Non-US banks may also be forced to shrink their balance sheets by cutting back on US dollar cross-border lending, thus generating spillovers beyond the home economy. The ability of these recipient economies—many of which are emerging markets—to substitute for the cutback is also investigated. Finally, an additional spillover is explored: increases in US dollar funding costs could ultimately induce financial stress on recipient economy banking systems.

A tightening of US dollar funding conditions is associated with greater financial stress in home economies of non-US banks engaging in global US dollar intermediation. Regression analysis shows that the probability of banking sector default increases when US dollar funding costs rise, as proxied by the widening of the cross-currency basis.[20,21] Starting from stable US dollar funding conditions, a 50 basis point increase—equivalent to the average quarterly change in the cross-currency basis at the onset of the global financial crisis—is associated with a 0.22 standard deviation increase (equivalent to a 7½ percent increase) in the probability of banking sector default and an additional tightening by 0.29 standard deviation in domestic financial conditions (Figure 5.5, panel 1).[22] Furthermore, the relationship appears to be nonlinear; that is, it is much stronger for large increases in the basis and is most prominent during two stressful episodes: the global financial crisis and the 2011 US money market fund run on European banks, as suggested by Ivashina, Scharfstein, and Stein (2015) and Du, Tepper, and Verdelhan (2018).

Increases in US dollar funding costs for lenders can also spill over and cause financial stress in recipient economies—those that receive cross-border credit flows from global non-US banks. Regression analysis shows that the probability of default of the recipient's banking sector is adversely affected by shocks to US dollar funding costs. For instance, a 50 basis point increase in the funding costs of a recipient economy's main lenders results in a 0.1 standard deviation increase in the probability of default of its banking sector (a 3.3 percent increase) (Figure 5.5, panel 2). This spillover is quantitatively stronger and is statistically significant for economies that borrow US dollars more heavily: that is, the top 10 US dollar cross-border recipients.[23]

Beyond financial stress spillovers, cross-border lending is the main channel through which an increase in US dollar funding costs is transmitted from lenders to recipient economies. A 50 basis point annual cumulative increase in US dollar funding costs is associated with a reduction in US dollar cross-border lending by 5.3 percent (Figure 5.6, panel 1). This reduction is larger when the lender is an emerging market, amounting to a 7.1 percent decrease for all recipients and a 9.3 percent decrease in lending to other emerging markets. Emerging market recipients are more susceptible in general to cutbacks in cross-border lending when US dollar funding conditions tighten. An increase in US dollar funding costs by 50 basis points affects US dollar lending to emerging market recipients by about –6.6 percent, twice the effect on advanced economy recipients.

Recipient economies seem to have limited ability to turn to other sources of US dollar borrowing or replace dollars with other currencies when facing cutbacks from one or more of their main US dollar lenders. As discussed previously, when a lender economy faces an increase in US dollar funding costs, its cross-border US dollar lending to all recipient economies is reduced. Additional results show that an average recipient can compensate for only about half of this cutback by increasing its US dollar borrowing from other lenders (Figure 5.6, panel 2). Such substitution is much weaker for emerging market recipients, with only one-quarter of the loss being compensated (Figure 5.6, panel 3). Furthermore, when US dollar

[20]The "probability of default" of the banking sector is defined as the logarithm of the one-year-ahead probability of default for all publicly listed banks, which is compiled by the Risk Management Institute. It also includes dead firms, which helps reduce survivorship bias.

[21]These results could be affected by reverse causality, whereby the estimated impact of widening of the basis on home economy default probability is driven by the reverse relationship, from probability of default to the basis. Nonetheless, additional evidence suggests that the relationship documented in this section is not driven entirely by this reverse phenomenon. For further details, see Online Annex 5.2. Furthermore, this chapter focuses on the amplification or mitigation effects that arise through US dollar funding fragility or other factors, reported in the next section. These effects are unlikely to be affected by reverse causality.

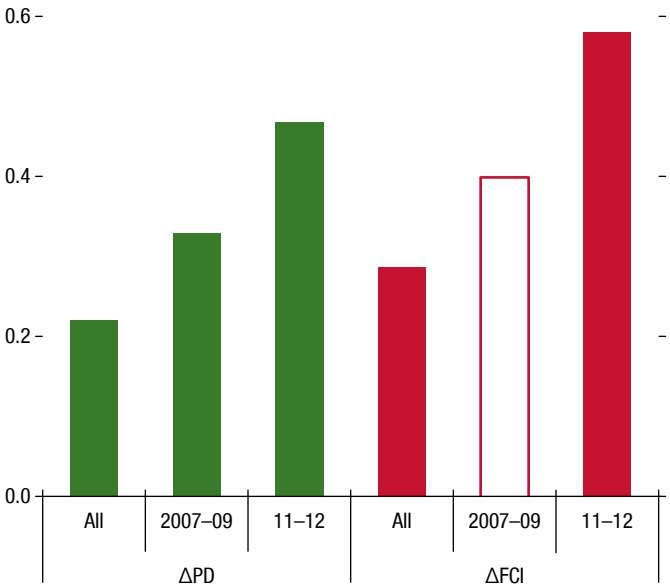
[22]The econometric specifications for home economy risk analyze the relationship between the quarterly change in the probability of default of the banking sector (or the financial conditions index) and the quarterly change in US dollar funding costs. To keep the language simple, henceforth the chapter uses the term "increase" rather than term "increase in the quarterly change" when summarizing the findings. In addition, to facilitate the comparison and interpretation of the size of the coefficients, both the quarterly change in the probability of default and the financial conditions index are standardized to unit variance with sample-average standard deviation. (For the quarterly change in the probability of default, an increase by one standard deviation is equivalent to an increase by 33 percent.)

[23]The list of top cross-border borrowers is determined by the share of US dollar cross-border lending of a recipient economy's banking sector relative to total bank credit to the recipient economy's private sector in the full sample period.

Figure 5.5. US Dollar Funding and Financial Stress
(Standard deviation of the financial stress measure)

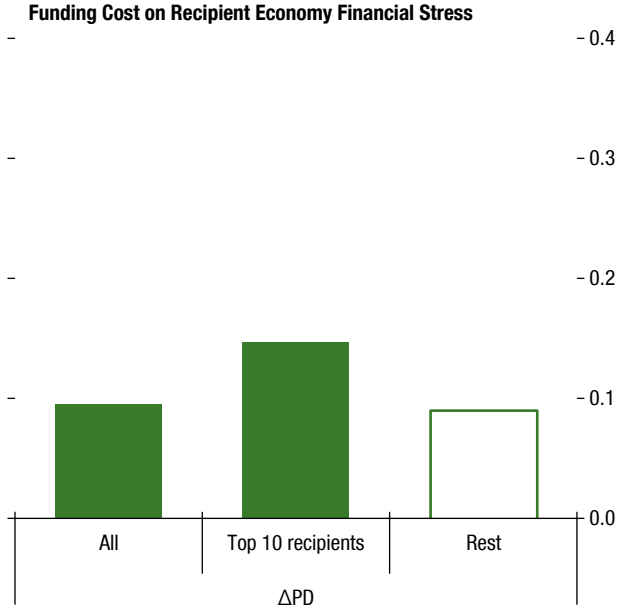
The association between financial stress in the home economy and US dollar funding costs was most prominent during the global financial crisis and the European sovereign debt crisis episode.

1. US Dollar Funding Cost and Home Economy Financial Stress



Tightening US dollar funding conditions for lenders can spill over into recipient economy financial stress, especially for the lenders' main borrowers.

2. Effect of a 50 Basis Point Increase in Home Economy US Dollar Funding Cost on Recipient Economy Financial Stress



Source: IMF staff calculations.
Note: Panel 1 shows the association of the change in the probability of default (ΔPD) or financial conditions (ΔFCI) of the home economy banking sector with a contemporaneous increase in the change of the US dollar funding cost by 50 basis points, comparing this association for the entire sample period and by different subperiods (2007–09, 2011–12). Panel 2 shows the association between a 50 basis point increase in the funding costs of a recipient economy's main lenders and increases in the probability of default of its banking sector. We compare this association across all recipients economies, top 10 main recipients economies, and the rest (all recipient economies excluding top 10 main recipient economies). Solid colored bars indicate that the associations are statistically significant at the 10 percent level or higher. Empty bars indicate the absence of statistical significance. Standard errors are clustered at the economy level in all regressions.

funding conditions tighten across a recipient economy's foreign lending partners, the economy cannot make up for the resulting decline in US dollar loans by borrowing more US dollars domestically: an increase in the weighted average of cross-border lenders' US dollar funding costs leads to a compensation of only 20 percent of US dollar credit by local banks. Neither is it possible to compensate for the decline with increased cross-border borrowing in other currencies; in fact, rather than compensate for the initial cutback, borrowing in other currencies falls as well, by one-third of the initial cutback. These same calculations for emerging market recipients show even less ability to compensate for declines in US dollar cross-border lending by resorting to other foreign lenders in US dollars, local US dollar credit, or cross-border credit in other currencies (Figure 5.6, panel 3).

US Dollar Activities and Funding Fragility May Act as Amplifiers of Shocks to US Dollar Funding Costs

This section explores the role played by the home economy's exposure to US dollar activities and associated US dollar funding fragility in amplifying the relationship between increases in US dollar funding costs and financial stress in home economies and cross-border lending.

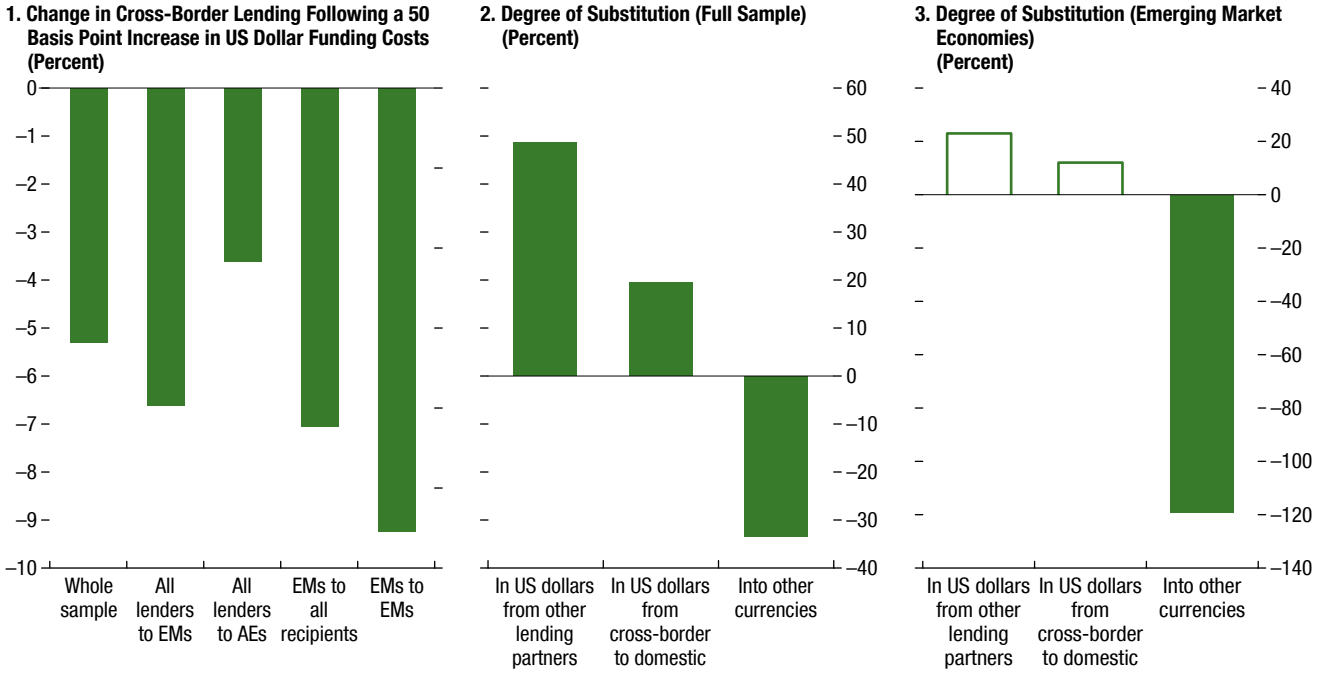
An increase in US dollar funding costs has a greater adverse impact on financial stress in economies where the importance of banks' US dollar activities (as captured by the share of US dollar assets to total assets) is greater. For instance, when this share is historically low (at the first quintile), the impact of a 50 basis point increase in US dollar funding costs on the probability of default of the banking sector in the home economy

Figure 5.6. Spillovers from US Dollar Funding Costs in Home Economies to Recipients of Cross-Border US Dollar Lending

US dollar funding shocks lead to a cutback in US dollar cross-border lending, particularly for emerging market lenders and recipients.

For the full sample of recipient economies, there are substitution possibilities for US dollar lending, but not into other currencies ...

... and negligible substitution possibilities for emerging market recipients.



Source: IMF staff calculations.
Note: Panel 1 shows the cutback of cross-border US dollar lending associated with a 50 basis point increase in US dollar funding costs, for different subgroups of lenders and recipients. Panels 2 (whole sample) and 3 (emerging markets) show the degree of substitution into other lending partners, from cross-border to domestic US dollar credit, and into other currencies. The degree of substitution is defined as the ratio of the increase in lending from either (1) other lending partners, (2) domestic US dollar credit, or (3) other currency cross-border credit, to the cutback in US dollar cross-border borrowing following a year-on-year shock to one lending partner's US dollar funding costs for (1), or to a weighted average of all lending partners' US dollar funding costs for (2) and (3). Dark solid colored bars indicate the associations are statistically significant at the 10 percent level or higher. Empty bars indicate that the coefficient used to compute the degree of substitution is not significant at the 10 percent level. Standard errors are clustered at the economy level in all regressions. AEs = advanced economies; EMs = emerging market economies.

is negligible and statistically insignificant, whereas the impact increases to 0.32 standard deviations (an 11 percent increase) when the asset share is high (at the fourth quintile) (Figure 5.7, panel 1). Qualitatively similar results are found for domestic financial conditions.

The fragility of US dollar funding also amplifies the effect of shocks to US dollar funding costs on domestic financial stress. In particular, the amplification arises only when the cross-currency funding gap is positive—reflecting positive demand for foreign exchange swaps to cover US dollar funding needs. The impact of a 50 basis point increase in US dollar funding costs on the probability of default of the banking sector in the home economy is statistically insignificant if the cross-currency funding gap ratio is low (at the first quintile) but increases to 0.41 standard deviations (a 14 percent increase) if the cross-currency funding gap ratio is high (at the fourth quintile) (Figure 5.7, panel 2).[24]

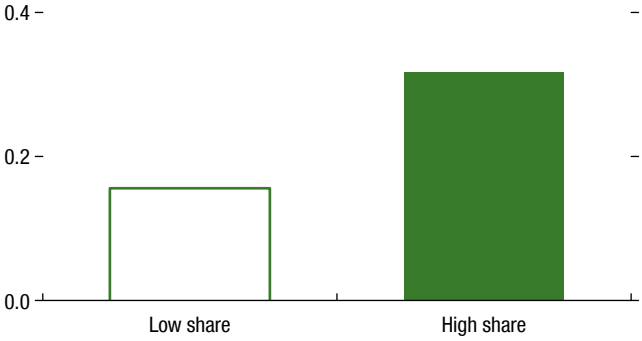
Other measures of US dollar funding fragility (such as indicators of weaknesses in liquid assets and stability of funding) also amplify the impact of a change in

[24]The average quarterly increase in the probability of default of the banking sector for this sample of economies was 34 percent at the peak of the global financial crisis. The amplification effect of the cross-currency funding ratio, at 14 percent, is therefore equivalent to about two-fifths of this increase, an economically significant amount. The econometric results also hold if the cross-currency funding gap is scaled by total assets, which combines the extent of US dollar liquidity needs with the share of US dollar activities on the balance sheet, albeit only when using the probability of default as a measure of financial stress.

Figure 5.7. Amplification Effects of US Dollar Activities and US Dollar Funding Fragility

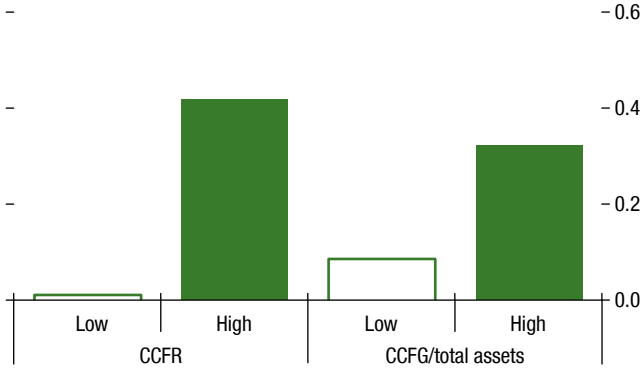
Increases in US dollar funding costs affect home economy financial stress only if the share of US dollar activity is large.

1. US Dollar Funding Conditions, Share of US Dollar Business, and Home Economy Financial Stress
(Standard deviation of home economy probability of default)



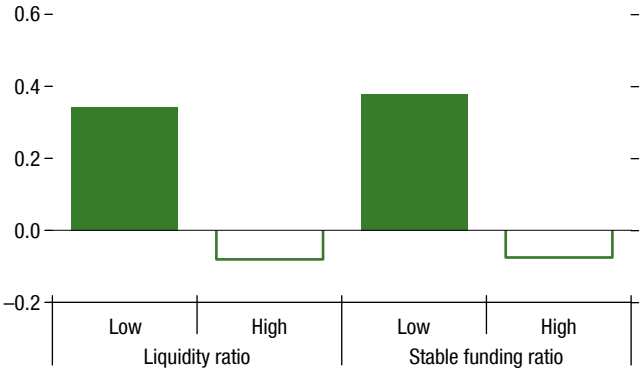
The cross-currency funding gap amplifies shocks in US dollar funding costs.

2. Amplification Effect of the Cross-Currency Funding Gap
(Standard deviation of home economy probability of default)



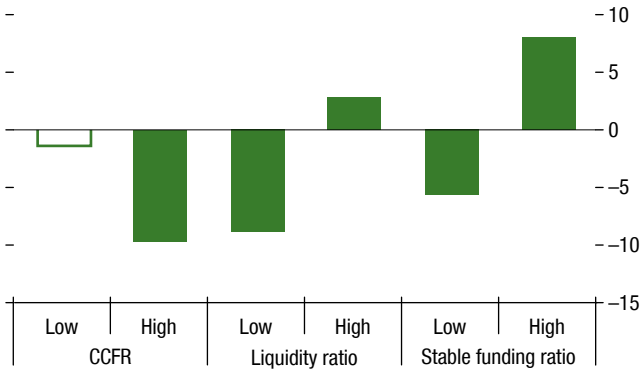
Shortages in US dollar liquidity and stable funding also amplify the relationship between US dollar funding costs and home economy financial stress.

3. Effect of the US Dollar Liquidity and Stable Funding Ratios
(Standard deviation of home economy probability of default)



When US dollar funding conditions tighten, greater US dollar funding fragility in the home economy results in sharper cutbacks in cross-border lending.

4. Amplification Effect of US Dollar Funding Fragility on Cross-Border Lending
(Percent)



Source: IMF staff calculations.
Note: This figure shows the association between a 50 basis point increase in US dollar funding costs and the change in the probability of default of the home economy banking sector, and with US dollar cross-border lending. Panel 1 compares the effect on probability of default when the share of US dollar business in quarter $t-1$ to quarter $t-4$ is low vs. high relative to the full-sample distribution of US dollar assets to total assets. Panel 2 compares this effect when the cross-currency funding ratio (CCFR) or the ratio of cross-currency funding gap (CCFG) to US dollar assets in quarter $t-1$ to quarter $t-4$ is low vs. high relative to the distribution when the CCFG is positive. Panel 3 compares the effect when the US dollar liquidity ratio, or US dollar stable funding ratio in quarter $t-1$ to quarter $t-4$ is low vs. high relative to the historical distribution for each economy. Panel 4 compares the association between US dollar funding cost shocks on cross-border US dollar lending between economy-quarter observations whose US dollar funding fragility measures are high and low by historical standards within an economy. In all panels, high levels are defined as being at the top quintile, and low levels are defined as being in the bottom quintile. The dark bars indicate significance at the 10 percent level. The empty bars indicate the absence of statistical significance at the 10 percent level. Standard errors are clustered at the economy level in all regressions.

US dollar funding costs on domestic financial stress. As with the cross-currency funding ratio, the impact from US dollar funding conditions does not arise unless either US dollar liquid assets or stable funding is relatively low by historical standards.[25] In particular, a 50 basis point increase in US dollar funding conditions raises the probability of default of the banking sector in the home economy by 0.33 standard deviations (a 10 percent increase) if the US dollar liquidity ratio is low (at the first quintile), whereas the impact becomes statistically insignificant if the US dollar liquidity ratio of the home economy's banking sector is high (at the fourth quintile) (Figure 5.7, panel 3). Furthermore, effects are similar for the US dollar stable funding ratio. Additional analysis finds that the impact on domestic financial conditions is qualitatively similar, and the magnitude is slightly larger.

US dollar funding fragility also amplifies the effect of a shock to US dollar funding costs on cross-border lending. The analysis shows that the adverse impact of funding costs on cross-border lending is greater when the cross-currency funding ratio is larger. Likewise, when liquidity is weaker or funding less stable by historical standards—the liquidity ratio and stable funding ratio are smaller—the adverse impact is amplified (Figure 5.7, panel 4).[26] With an additional 50 basis point increase in the one-quarter-ahead US dollar funding cost, economies experiencing more fragile US dollar funding relative to their own historical levels tend to cut back their cross-border lending by a greater amount.

There is evidence that the mix between subsidiaries and branches in the United States makes a difference in the transmission of stress from heightened US dollar funding costs to the home economy. Subsidiaries tend to be locally capitalized, deposit funded, and supervised, whereas branches have no local capital, rely on uninsured wholesale funding, and are supervised primarily by their home regulators. Results confirm that dollar liquidity held at US subsidiaries cannot be easily transferred to the parent, therefore playing little role in mitigating stress induced by tightening US dollar funding conditions. Indeed, having a high US dollar liquidity ratio in US subsidiaries does not significantly mitigate the effect of an increase in US dollar funding costs on home economy financial stress (Figure 5.8, panel 1).

Similarly, the subsidiary-branch mix of foreign banks in the home economy plays a role as well. Results show that a high share of foreign subsidiaries residing in the home economy does not have a significant amplification effect because their behavior is not appreciably different from that of domestic banks (Figure 5.8, panel 2). In contrast, foreign branches tend to exacerbate stresses. Home economies with substantial foreign branch presence are estimated to experience a large (0.64 standard deviations, or 21 percent) and statistically significant increase in financial system stress in response to tightening US dollar funding (Figure 5.8, panel 2). This observation, which might be a motivating factor for the de facto tightening of branch supervision across many economies, is consistent with the literature on shock transmission through the bank channel and banks' legal entity architecture (see Chapter 1 of the April 2018 GFSR; Cetorelli and Goldberg 2012; Fiechter and others 2011; Fillat, Garetto, and Smith 2018; Hoggarth, Hooley, and Korniyenko 2013).

Other Factors, Some Policy Related, May Play a Mitigating Role

Just as US dollar funding fragility can amplify the transmission of US dollar funding strains, a number of other factors can play a mitigating role. These include the health of the home economy banking sector and other factors, related to policy, such as the existence of swap lines or central banks' international reserve holdings. This section explores these effects, as well as possible direct effects of swap lines on the cross-currency basis.

The condition of the domestic banking sector can mitigate the association between US dollar funding costs and home economy financial stress. Larger capital buffers, stronger overall liquidity, and higher profitability (return on assets) of banking systems in home jurisdictions are all associated with weaker transmission of shocks in US dollar funding costs to financial stability. For instance, the impact of an increase in US dollar funding conditions by 50 basis points on the probability of default of the banking sector in the home economy is 0.40 standard deviations (14 percentage

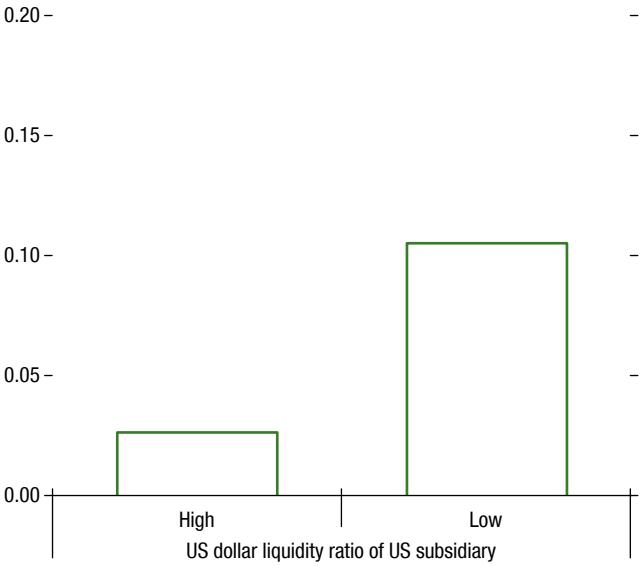
[25]Throughout the analysis, the percentiles of the US dollar liquidity ratio, the stable funding ratio, and a simple version of the liquidity ratio—the ratio of US dollar high-quality liquid assets to US dollar assets—are constructed within each economy.

[26]When the analysis is repeated with foreign position measures of funding fragilities, the results are unchanged.

Figure 5.8. US Dollar Funding Conditions, Home Economy Financial Stress, and the Subsidiary-Branch Mix
(Standard deviation of change in home economy probability of default)

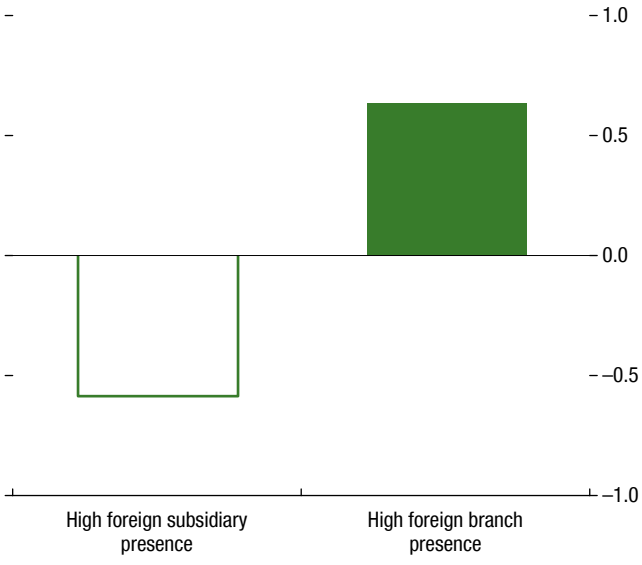
In a situation of tightening US dollar funding conditions, US dollar liquidity in US subsidiaries of non-US banks does not significantly relieve home economy financial stress.

1. US Dollar Funding Conditions, US Subsidiaries of Non-US Banks, and Financial Stress



Foreign bank presence in the home economy through subsidiaries has little effect, but through branches it exacerbates the effect of funding cost increases on financial stress.

2. US Dollar Funding Conditions, Foreign Banking Presence, and Financial Stress



Source: IMF staff calculations.
Note: This figure shows the impact of a 50 basis point increase in the quarterly change in US dollar funding conditions on the probability of default in the home economies of non-US banks. Panel 1 compares the effect when the US dollar liquidity ratio of US subsidiaries of non-US banks is high (at the fourth quintile) vs. low (at the first quintile). Panel 2 shows the effect when foreign subsidiary presence is high (at the fourth quintile) or when foreign branch presence is high (at the fourth quintile). The solid bar indicates that the association is statistically significant at the 10 percent level or higher. Empty bars indicate the absence of statistical significance at the 10 percent level. Standard errors are clustered at the economy level in all regressions.

points) if the capital ratio is low by historical standards (at the first quintile), but decreases to 0.25 standard deviations (an 8 percent increase) if the capital ratio is high (at the fourth quintile) (Figure 5.9, panel 1). Greater overall liquidity (measured by the ratio of cash to assets)[27] and profitability (higher return on assets) show similar benefits. Qualitatively similar effects are found with respect to the impact on domestic financial conditions. Having large capital buffers and/or high profitability can somewhat offset the adverse effect of US dollar funding fragility.[28]

Strong bank health also mitigates the effect of US dollar funding shocks on cross-border lending. For instance, following a 50 basis point increase in funding costs, economies whose banking system average capital ratio is at the lowest quintile of its historical level cut their US dollar cross-border lending by 4.7 percent more than those whose capital is at the fourth quintile (Figure 5.9, panel 2).

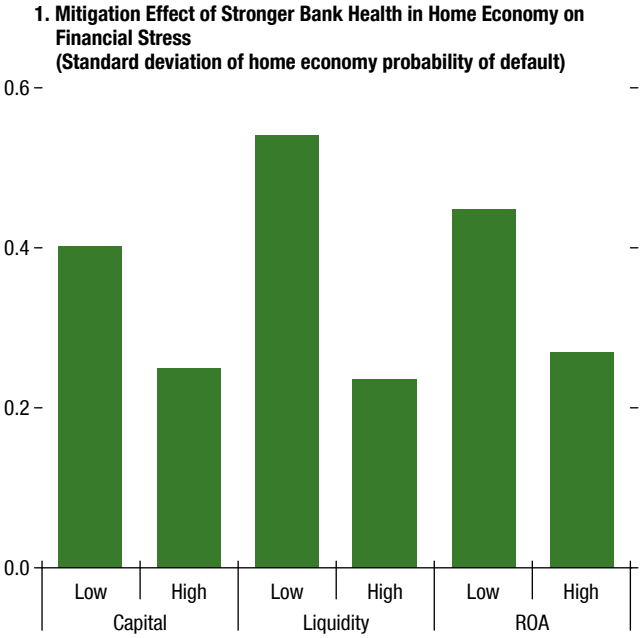
Central bank swap arrangements with the Federal Reserve can play an important role in alleviating US dollar funding pressures. Because these arrangements limit the deviation from covered interest parity by offering an alternative source of US dollar funding, they tend to curb funding risk. These swap arrangements became prominent during the global financial crisis, starting with the European

[27]The results may give the impression that overall liquidity management, as reflected in high liquidity ratios across all currencies, could substitute for US dollar liquidity management. However, more detailed analysis in recent Financial Sector Assessment Programs has concluded that currency-specific liquidity management is also crucial (see Online Box 5.1).

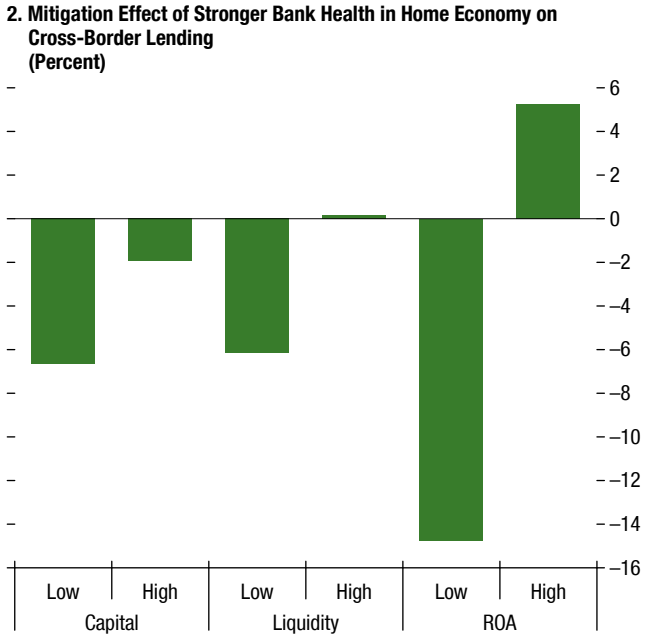
[28]High capital (at the fourth quintile) can partially offset the amplification effects of low liquidity ratios (at the first quintile) for the probability of default. Similar results were obtained for the comparison between return on assets and liquidity ratios.

Figure 5.9. The Mitigating Effect of Home Economy Bank Health

The health of the home economy banking system can help mitigate the financial stress brought on by tightening US dollar funding conditions ...



... and it can help cushion the induced cutback in US dollar cross-border lending.



Source: IMF staff calculations.
Note: This figure shows the association between a 50 basis point increase in the change in US dollar funding costs and the change in the probability of default (panel 1) and on US dollar cross-border lending (panel 2). The figure compares these associations when the capital asset ratio (capital), cash assets ratio (liquidity), and ROA in quarter $t-1$ to quarter $t-4$ is at the bottom (low) and the top (high) quintiles of the full-sample distribution. The colored bars indicate significance at the 10 percent level. Standard errors are clustered at the economy level in all regressions. ROA = return on assets.

Central Bank and the Swiss National Bank, which first established temporary US dollar liquidity swap arrangements with the US Federal Reserve in December 2007. The number of central banks engaging in temporary US dollar liquidity swap arrangements peaked at 14 in October 2008, before stabilizing to five major advanced economy central banks in May 2010 with full allotment: that is, without a prespecified limit.

Evidence of the impact of swap lines is given by an event study surrounding the Federal Reserve's unexpected announcement on November 30, 2011, that it would lower the swap line rate by 0.5 percent (Bahaj and Reis 2019). After the announcement, daily cross-currency bases narrowed noticeably, but primarily for currencies with swap arrangements (Figure 5.10, panel 1). For currencies with swap lines, the basis became less negative on average, and the most negative values disappeared, whereas for currencies without swap lines the changes in the basis were much less pronounced.

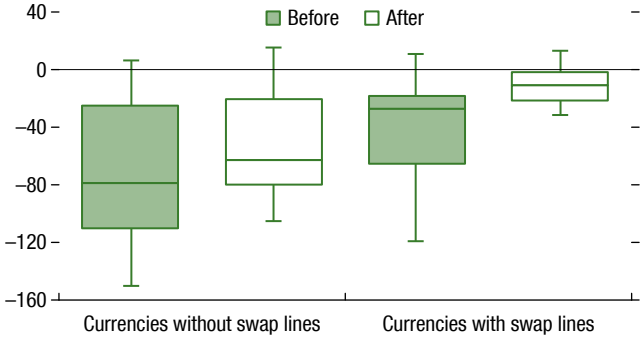
Swap line arrangements with the Federal Reserve also mitigate the consequences of increases in US dollar funding costs. Regression analysis finds that in economies with these arrangements there was no statistically significant association between the change in US dollar funding conditions and a change in domestic financial stress. However, without the swap line arrangement, the association was statistically significant (Figure 5.10, panel 2). The results for both the probability of default of the banking sector and domestic financial conditions are qualitatively similar.

Central banks' international reserve holdings can also play a mitigating role when non-US banks face US dollar liquidity tightening, for two main

Figure 5.10. Mitigating Effects of US Dollar Swap Lines and International Reserve Holdings by Home Economy Central Banks

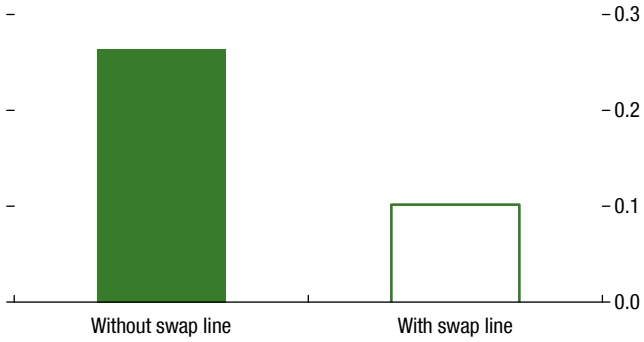
The change in the swap line rate resulted in narrower CCBs, but primarily for currencies with swap lines.

1. Three-Month Cross-Currency Basis Distribution after Swap Line Rate Ceiling Change
(Basis points, showing tick marks for minimum and maximum values, horizontal lines for the median, and boxes encompassing the 25th to the 75th percentiles)



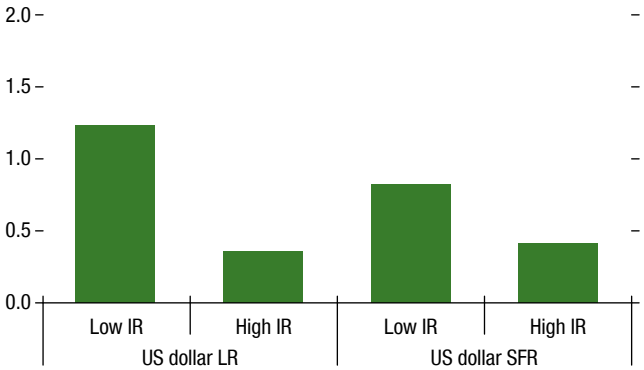
US dollar swap arrangements mitigate the impact of increases in US dollar funding costs on home economy financial stress ...

2. Mitigation Effect of Central Bank Swap Line Arrangements on Home Economy Financial Stress
(Standard deviation of home economy probability of default)



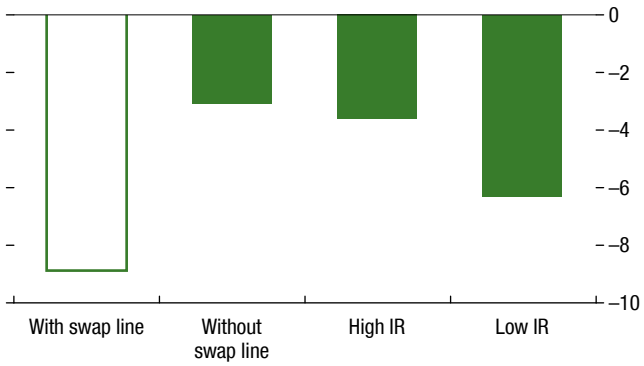
... as do non-US central banks' international reserve holdings.

3. Mitigation Effect of International Reserve Holdings by Non-US Central Banks through US Dollar Funding Fragility on Home Economy Financial Stress
(Standard deviation of home economy probability of default)



US dollar swap line arrangements and international reserve holdings also help cushion cutbacks in cross-border lending.

4. Mitigation Effect of Central Bank Swap Arrangements and International Reserve Holdings on Cross-Border Lending
(Percent)



Source: IMF staff calculations.
Note: Panel 1 shows the box-and-whisker plots of daily three-month CCBs before and after the implementation of lower swap line rates for currencies with and without access to swap lines. The presample and postsample periods are from November 1, 2011, to November 30, 2011, and January 1, 2012, to January 31, 2012, respectively. Currencies with swap lines include the British pound, Canadian dollar, euro, Japanese yen, and Swiss franc. Currencies without access to swap lines include the Australian dollar, Danish krone, Norwegian krone, and Swedish krona. Panel 2 shows the association between a 50 basis point increase in US dollar funding costs and the change in the home economy probability of default, comparing the presence and absence of a swap line arrangement. Panel 3 shows the transmission effect of US dollar funding fragility—the LR or SFR evaluated at their median—on the change in the probability of default when the home central bank's international reserve holdings are low (at the bottom quintile) vs. high (at the top quintile) by historical standards. Standard errors are clustered at the economy level in all regressions. Panel 4 shows the association of a 50 basis point increase in US dollar funding cost shocks with cross-border US dollar lending for economies with vs. without swap line arrangements and for economies with high vs. low central bank international reserve holdings. Economies that have high international reserves are those whose international reserves-to-GDP ratio is higher than the top quintile of historical levels. The solid green and red bars indicate that the association is statistically significant at the 10 percent level or higher. Empty bars indicate the absence of statistical significance at the 10 percent level. CCB = cross-currency basis; IR = international reserves; LR = liquidity ratio; SFR = stable funding ratio.

reasons.[29] First, non-US central banks can use international reserves (largely denominated in US dollars) to provide contingent US dollar liquidity to the domestic financial system. Second, external providers of US dollar liquidity might be more willing to provide liquidity to an economy that is backed by a central bank with deep pockets. Although previous analysis showed that lack of liquidity in US dollars held by banks—reflected by a low US dollar liquidity ratio—can amplify the impact of funding costs on financial stress, this amplification is appreciably smaller in an economy with high holdings of international reserves. With US dollar liquidity at its historical median, a 50 basis point increase in US dollar funding costs results in a 0.38 standard deviation increase in an economy with high reserve holdings (at the fourth quintile), compared with a 1.22 standard deviation increase when reserve holdings are low (at the first quintile) (Figure 5.10, panel 3). Additional analysis finds that this difference also holds for domestic financial conditions, though the magnitude is slightly larger.

Swap lines and US dollar reserve holdings play a similar role in mitigating the impact on cross-border lending. Facing similar funding cost increases, economies with a swap line arrangement do not reduce lending significantly, whereas those without a swap line arrangement with the Federal Reserve provide about 3.2 percent less cross-border US dollar lending. In economies with high international reserves (top quintile in the entire sample), cutbacks in lending are about 40 percent less than in those with low (bottom quintile) reserve holdings (Figure 5.10, panel 4).

[29]Several IMF country reports obtain similar results from analysis of systemic foreign currency liquidity. For instance, Sweden's central bank, the Riksbank, boosted international reserves by about one-third in 2013 to ensure ready access, and the Sweden 2013 Article IV consultations with the IMF—during which IMF staff teams assess the macroeconomic and financial sector outlook and discuss policies in these areas with the relevant officials in the country—recommended sharing some of the fiscal costs with the banks to create proper incentives to manage these risks at the bank level. The Mauritius 2015 Article IV consultations and Financial Sector Assessment Program suggested that the reserve adequacy metric should take into account the deposits of the so-called global business companies held in domestic banks and the liquid foreign currency assets of domestic banks (IMF 2016).

Policy Implications

As in recent decades, the US dollar will likely maintain a predominant role in global trade and finance in the coming years, and non-US banks will continue to be key providers of US dollar intermediation. This chapter focuses on the liquidity risk that this activity entails and finds that, despite postcrisis regulatory reforms, US dollar liquidity conditions remain a source of vulnerability for non-US banks in terms of both financial stress in the economies that are home to these institutions and potential spillovers to those that are recipients of cross-border US dollar loans.

The findings have a number of policy implications:

- Despite the benefits of reducing the vulnerability of the financial system, some postcrisis regulatory reforms may have had unintended consequences in global US dollar funding markets. This is not to suggest that the regulatory reforms should be rolled back. In fact, this chapter shows that having healthy capital buffers and overall liquidity in home economy banking systems can mitigate the destabilizing effects of increased US dollar exposure and funding fragility. However, the findings of the chapter suggest that trade-offs should be considered between risk abatement and reduction in financial intermediation activity, as well as between public provision of liquidity buffers and ex ante incentives to take excessive risk (moral hazard).
- Regulators should monitor the US dollar funding fragility of local banks and develop or enhance as needed currency-specific liquidity risk frameworks, including stress tests, emergency funding strategies, and resolution planning. The cross-currency funding ratio, liquidity ratio, and stable funding ratio measures used in this chapter could be useful monitoring tools. This is particularly true for economies exposed to or borrowing from non-US global banks, given possible spillovers from tighter US dollar liquidity conditions.
- The analysis points to the benefits of access to US dollar liquidity during periods of stress, both for the economies that are home to banks that intermediate US dollars globally and for recipient economies. International reserves can play a stabilizing role in the event of stress in US funding markets. This is a dimension that should be considered in assessing reserve adequacy. Furthermore, access to US dollar liquidity through swap lines at times of strain can contribute to stability, including through a signaling effect. Finally, there is a case for a stronger global financial safety net, including through adequate IMF resources, such as those provided through flexible credit lines.

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CHAPTER 6

SUSTAINABLE FINANCE

Nothing is as powerful as an idea whose time has come.
– Victor Hugo

LOOKING FARTHER

Sustainable finance incorporates a large array of environmental, social, and governance (ESG) principles that are becoming increasingly important for borrowers and investors. ESG issues may have material impact on corporate performance and may give rise to financial stability risks via exposure of banks and insurers and large losses from climate change. The integration of ESG factors into firms' business models—prompted by regulators, businesses' own interest, or by investors—may help mitigate these risks. Despite the lack of consistent evidence of outperformance of sustainable investing strategies, investor interest in ESG factors has continued to rise in recent years. However, ESG-related disclosure remains fragmented and sparse, partly due to associated costs, the often voluntary nature of disclosure, and lack of standardization. Policymakers have a role to play in developing standards, fostering disclosure and transparency, and promoting integration of sustainability considerations into investments and business decisions.

What Is Sustainable Finance?

Sustainable finance is defined as the incorporation of environmental, social, and governance (ESG) principles into business decisions, economic development, and investment strategies. It is well established that sustainable finance can generate public good externalities (Principles for Responsible Investment 2017; Schoenmaker 2017; United Nations 2016) where actions on an extensive set of issues (Figure 6.1, panel 1) generate positive impacts on society. Efforts to promote ESG considerations in finance started some 30 years ago and have accelerated more recently (Figure 6.1, panel 2).

There is an economic case for sustainable finance. Firms engage in "good" corporate behavior that has operational and disclosure costs but provides benefits to society for several reasons (Benabou and Tirole 2010). Firms may choose to invest in ESG projects in response to evolving investor or consumer preferences, a choice that could lower costs of capital or improve profit margins. Business investment in ESG may lead to a more motivated workforce (Edmans 2010), greater trust between firms and stakeholders (Lins, Servaes, and Tamayo 2017), or less firm-level tail risk from carbon emissions (Ilhan, Sautner, and Vilkov 2019). And firms may choose to become more ESG-friendly because of policy-driven actions, such as the cost of meeting forthcoming regulatory requirements that would make delayed compliance expensive. In the long term, ESG factors may prove important to firms' ability to navigate ESG-related risks and generate revenue while also benefiting society ("doing well by doing good"). There is still a question of whether these reasons are sufficient to ensure that all relevant externalities are fully reflected in firms' ESG considerations. For investors, the provision of information on how firms are incorporating ESG principles is a necessary step to incentivize firms to change, but generally this does not yet seem to be sufficient for adequate differentiation, as discussed below. Therefore, policy action is still needed to incentivize firms to carry out investment or make other changes in their business practices that would help reduce negative externalities, especially from climate-change-related risks (see also the October 2019 *Fiscal Monitor* for climate change policies).

The authors of this chapter are Han Teng Chua, Martin Edmonds, Sanjay Hazarika, Andy Jobst, Piyusha Khot, Evan Papageorgiou (team lead), Jochen Schmittmann, and Felix Suntheim, under the guidance of Fabio Natalucci and Anna Ilyina. Magally Bernal provided editorial assistance.

Figure 6.1. Taxonomy of Environmental, Social, and Governance Issues and Relevant Stakeholders and Initiatives

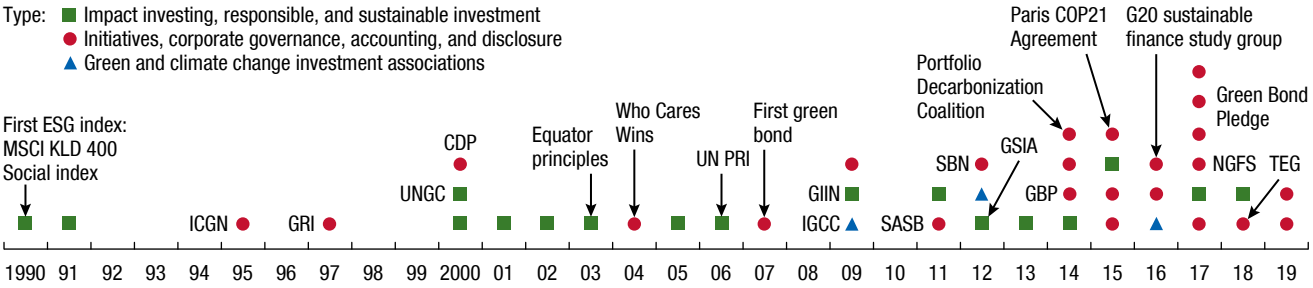
The scope of ESG factors is very wide.

1. Selected ESG Issues

Key Pillars	Key Themes	Key Issues	
Environment	Climate change	Carbon footprint	Vulnerabilities from climate change events
	Natural resources	Energy efficiency Sourcing of raw materials	Water efficiency Usage of land
	Pollution and waste	Toxic emissions Wastewater management Hazardous materials management	Air quality Electronic waste management
	Opportunities and policy	Renewable energy Clean technology	Green buildings Environmental and biodiversity targets and investment
Social	Human capital	Workplace health and safety Development opportunities	Employee engagement, diversity, and inclusion Labor practices (e.g., wages, working conditions)
	Product responsibility	Product safety and quality Selling practices and product labeling	Customer privacy and data security Access to products
	Relations	Community Government	Civil society
Governance	Corporate governance	Board structure and accountability Accounting and disclosure practices	Executive compensation and management effectiveness Ownership and shareholder rights
	Corporate behavior	Management of corruption Systemic risk management Earnings quality	Competitive behavior Management of business environment (e.g., legal, regulations) Transparency on tax and related-party transactions

A major boost came with the launch of the Who Cares Wins initiative by the UN Global Compact in 2004. Sustainable investing in equities started in earnest with the launch of the UN Principles of Responsible Investment in 2006, and the issuance of green label bonds by multilateral development organizations in 2007 catalyzed growth for fixed income. Investors have also started to reassess their investment policies in light of growing awareness about climate change risks since the Paris COP21 and the 2015 UN Sustainable Development Goals; most countries have committed to emission mitigation.

2. Evolution of Selected ESG Finance Associations, Standards, and Codes



Sources: MSCI; Sustainability Accounting Standards Board; Refinitiv Datastream; WhoCaresWins; World Bank; and IMF staff.
Note: For more information see also World Bank (2018) and the International Capital Markets Association. CDP = Carbon Disclosure Project; COP21 = 21st Conference of the Parties; ESG = environmental, social, and governance; GIIN = Global Impact Investing Network; GBP = Green Bond Principles; GRI = Global Reporting Initiative; GSIA = Global Sustainable Investment Alliance; ICGN = International Corporate Governance Network; IGCC = Investor Group on Climate Change; NGFS = Network for Greening the Financial System; SASB = Sustainability Accounting Standards Board; SBN = Sustainable Banking Network; TEG = EU Technical Experts Group on Sustainable Finance; UNGC = UN Global Compact; UN PRI = UN Principles for Responsible Investment.

Does Sustainable Finance Matter for Financial Performance and Stability?

ESG issues can have a material impact on firms' corporate performance and risk profile, and on the stability of the financial system. Governance failures at banks and corporations contributed to past financial crises,[1] including the Asian and the global financial crises. Social risks in the form of inequality may contribute to financial instability by triggering a political response of easier credit standards to support consumption despite stagnant incomes for middle- and lower-income groups (Rajan 2010). Environmental risk exposures can lead to large losses for firms,[2] and climate change may entail losses for financial institutions, asset owners, and firms. The integration of ESG factors into firms' business models—prompted either by regulators or by investors—may help mitigate these risks.

Climate change features prominently among ESG issues. Whereas sustainable finance spans a wide range of issues, awareness of climate-related financial risks has grown in recent years. Two channels have been identified (Figure 6.2, panel 1):[3]

- *Physical risks* that arise from damage to property, land, and infrastructure from catastrophic weather-related events and broader climate trends; and
- *Transition risks* that arise from changes in the price of stranded assets and broader economic disruption because of evolving climate policy, technology, and market sentiment during the adjustment to a lower-carbon economy.

The potential impact of climate risks is large, nonlinear, and hard to estimate. Losses from climate-related risks affect the financial system directly, through price impairment, reduced collateral values, and underwriting losses, and indirectly, through lower economic growth and tighter financial conditions. Insurance claims from natural losses have already quadrupled since the 1980s (Figure 6.2, panel 2). As a result, insurance in exposed areas is costlier, and large, correlated natural disasters could lead to stress on insurers in the future. Financial risks from climate change are extremely difficult to quantify, but most studies point to very large economic and financial costs.[4] Risks are not linear, and the catastrophic tail risks are not negligible. In the transition to a cleaner-energy economy, a sudden reassessment of valuations in exposed sectors could occur to the extent that asset prices do not fully internalize the risks posed by climate change. In addition, the far-reaching scope of climate change across sectors and countries adds to the systemic nature of risks. Climate change mitigation costs per unit of emission are likely to fall on industrialized economies under "common but different responsibilities" given that most future low-cost mitigation opportunities are in large emerging market economies (October 2019 *Fiscal Monitor*; De Cian and others 2016). Lower- and middle-income countries are very vulnerable, partly reflecting geography, dependence on agriculture, and lack of resources for climate change adaptation (IMF 2019).

A growing awareness of ESG risks more broadly will likely raise the costs of noncompliance with ESG standards. Legal risks for investors and companies stem from parties who have suffered climate-related losses seeking compensation from those they hold responsible.[5] Failure to disclose the risks posed to business models and portfolios by climate change and other ESG risks is another liability for investors. As ESG investment strategies are more widely adopted, issuers will be exposed to investor decisions on ESG guidelines.[6] For example, a growing number of asset owners have pledged to divest from fossil fuels (Figure 6.2, panel 3), and major banks and insurers have committed to curtailing financing or insuring the sector. In combination with regulatory actions, large-scale divestments can have a significant effect

[1]Chapter 3 of the October 2014 *Global Financial Stability Report* (GFSR) found that weak bank governance leads to excessive risk taking, which contributed to the global financial crisis. Chapter 3 of the October 2016 GFSR highlighted that stronger corporate governance and investor protection frameworks enhanced emerging market economies' resilience to global financial shocks.

[2]Examples of environmental risk exposures that have led to large losses and bankruptcies include corporate liabilities related to asbestos, toxic spills in the mining industry, and chemical plant explosions.

[3]For a discussion of financial stability risks from climate change see Carney (2015); IMF (2016); European Systemic Risk Board (2016); Bank of England Prudential Regulatory Authority (2018); European Central Bank (2019); Lane (2019); and Network for Greening the Financial System (2019).

[4]Burke, Hsiang, and Miguel (2015) suggest that average global incomes may be reduced by up to a quarter by 2100. For financial losses, the Cambridge Centre for Risk Studies (2015) estimates losses in trillions of dollars, and the Economist Intelligence Unit (2015) estimates that the value of typical equity portfolios could decline by half. A group of large listed companies expects climate change costs to rise to $1 trillion (CDP 2019).

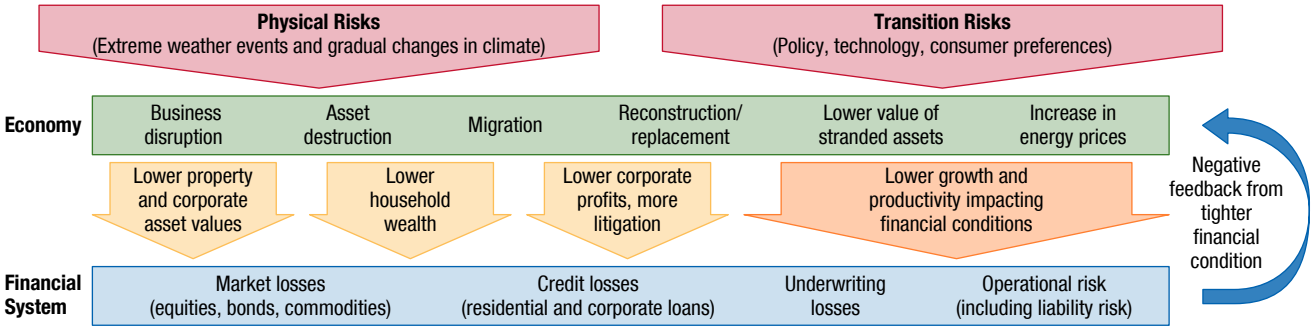
[5]For example, there is a growing number of lawsuits in the United States brought by local authorities against fossil fuel companies, seeking compensation for the costs of climate adaptation.

[6]Large shifts in investment portfolios due to changes in ESG guidelines could pose risks through disorderly price corrections similar to shifts in traditional benchmark-driven investment (see April 2019 GFSR for benchmark-driven investing).

Figure 6.2. Financial Stability Risks from Climate Change

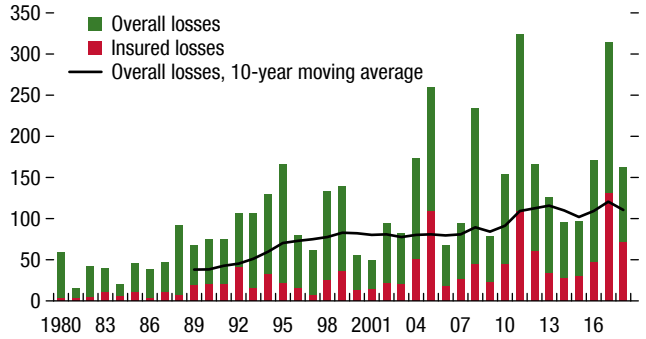
Extreme weather events, gradual changes in climate, and disruptions associated with the transition to a low carbon economy can affect asset prices and financial stability.

1. Physical and Transition Risks from Climate Change (adapted from NGFS)



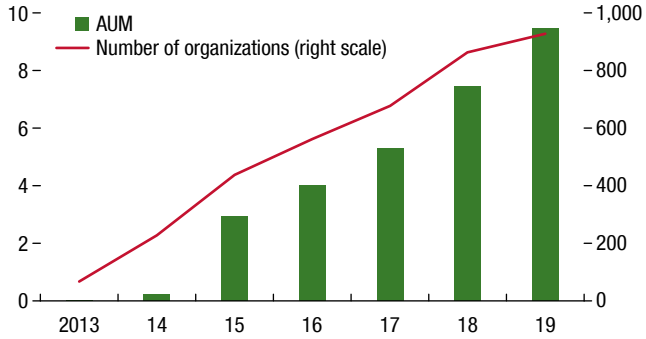
Losses from natural disasters have increased in recent decades ...

2. Overall and Insured Losses for Relevant Natural Loss Events Worldwide 1980–2018 (Billions of 2018 US dollars)



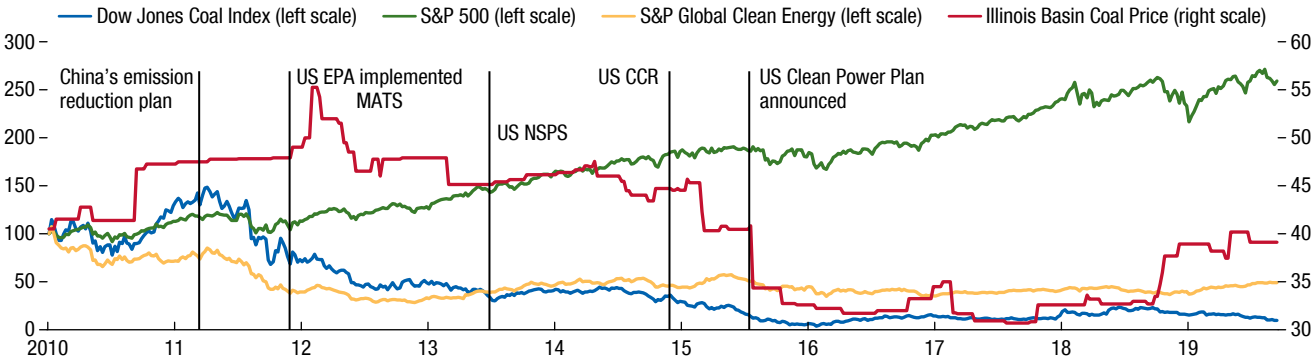
... and an increasing number of institutional investors are divesting from fossil fuel activities.

3. Institutional Investor Fossil Fuel Divestment Pledges (Cumulative; left scale: trillions of US dollars; right scale: number of organizations)



Transition risks are already materializing in the coal sector.

4. US Coal Sector Valuations and Regulatory Announcements (Left scale: Indexes normalized end-2010 = 100; right scale: US dollars per short ton)



Sources: 350.org; Bank of England; Bloomberg Finance L.P.; Münchener Rückversicherungs-Gesellschaft; NatCatSERVICE; Network for Greening the Financial System; and IMF staff calculations.
Note: In panel 3, 2019 data are until July 2019. AUM = assets under management; CCR = disposal of coal combustion residuals from electric utilities; EPA = Environmental Protection Agency; MATS = mercury and air toxics standards; NGFS = Network for Greening the Financial System; NSPS = new source performance standards for power plants.

on exposed sectors such as coal by making capital and insurance more difficult and costlier to obtain (Figure 6.2, panel 4). Sovereigns are also at risk from ESG noncompliance, with rating agencies and large investors increasingly incorporating ESG considerations into their sovereign credit assessments.[7]

Is There a Case for ESG-Linked Portfolio Investment?

Portfolio investors are increasingly focusing on ESG considerations. This practice started in equity investments by investors seeking long-term value-creating information or trying to avoid specific risk exposures (such as tobacco and munitions) that might cause reputational damage. Application of ESG factors to fixed income assets (Figure 6.3, panel 1) followed with self-declaration and labeling by issuers (as in the case of green bonds). Labeled bonds usually carry a certification process for their use of proceeds with periodic validation, but investors generally rely on voluntary disclosures. Further incorporation of ESG factors is taking place through ratings where credit rating and other agencies attempt to support their credit risk assessment with nonfinancial material information arising from sustainability considerations and, generally, apply these considerations to a broader set of issuers (not necessarily labeled bond issuers). ESG application to private markets is aided by a longer time horizon and greater scope for investor activism. The lack of consistent definitions makes it difficult to pinpoint the global asset size related to ESG, with estimates ranging from $3 trillion (J.P. Morgan 2019) to $31 trillion (Global Sustainable Investment Alliance 2019).

Impact and underperformance concerns have led the evolution of ESG strategies from exclusions to more selective inclusion and investor activism. Initially, sustainable investing was primarily about *negative screening* strategies that excluded firms or entire sectors from investment portfolios. Over time, concerns about risk management, benchmark underperformance, and a need to demonstrate material ultimate impact have given rise to strategies based on *positive screening* for companies with good ESG performance (best-in-class, improvement), companies that fulfill certain minimum standards or norms (norm-based screening), or sectors that are considered sustainable (sustainability-themed investments).

[7]Asset managers such as PIMCO and Blackrock have incorporated ESG principles in their investment assessment.

Increasingly, ESG information is explicitly and systematically integrated into all investment analysis and investment decisions (Figure 6.3, panel 2).

Sustainable investing started in equities, but greater recognition of the importance of ESG standards and official sector sponsorship is boosting sustainable fixed income. ESG integration grew earlier in equities (Figure 6.4) because of considerations about risk and reward, time horizon, and engagement rights. Sustainable fixed income investing is benefiting from growing recognition that ESG issues present material credit risk. Bond development has been aided by issuance by multilaterals (International Bank for Reconstruction and Development, European Investment Bank); development of standards by China, the European Commission, the United Nations, and the United Kingdom, among others; and greater incorporation of ESG factors in credit ratings (Figure 6.5, panel 1). Labeled bonds—primarily green bonds at this point—are a fast-growing and important segment. Strong investor demand spurred strong issuance by European investment-grade and, more recently, Chinese issuers, growing the stock to an estimated $590 billion in August 2019 from $78 billion in 2015 (Figure 6.5, panels 2–4). Nonetheless, there is little evidence that issuers achieve lower costs through green bonds than conventional bonds, likely reflecting the identical credit risk profile. Secondary market liquidity appears to be slightly worse for green bonds than for comparable conventional bonds, reflecting the large role of buy-and-hold investors (Figure 6.5, panels 5 and 6).

For investors, the willingness to invest sustainably coexists with performance considerations. There is no conclusive evidence in the literature that sustainable funds consistently out- or underperform conventional funds.[8] Restricted investment can reduce diversification benefits and limit investment opportunities, leading

[8]For example, Renneboog, Ter Horst, and Zhang (2008) find that risk-adjusted returns of sustainable and responsible investment funds are not statistically different from conventional funds. More recently Nofsinger and Varma (2014) found that ESG funds outperform during crises but underperform during normal periods. On the other hand, Khan, Serafeim, and Yoon (2016) find that firms with good sustainability ratings outperform those with poor ratings in some areas. Papaioannou and Rentsendorj (2015) show that the Norway Government Pension Fund Global's long-term returns are well within its set objectives, notwithstanding its close adherence to ESG principles. The lack of conclusive evidence on the performance of ESG funds and assets likely reflects a combination of factors, including varying definitions of material ESG factors and ESG investment approaches (studies are not comparable), data inconsistencies and short time series, and the long-term nature of some ESG issues.

Figure 6.3. Sustainable Investment Strategies across Asset Classes

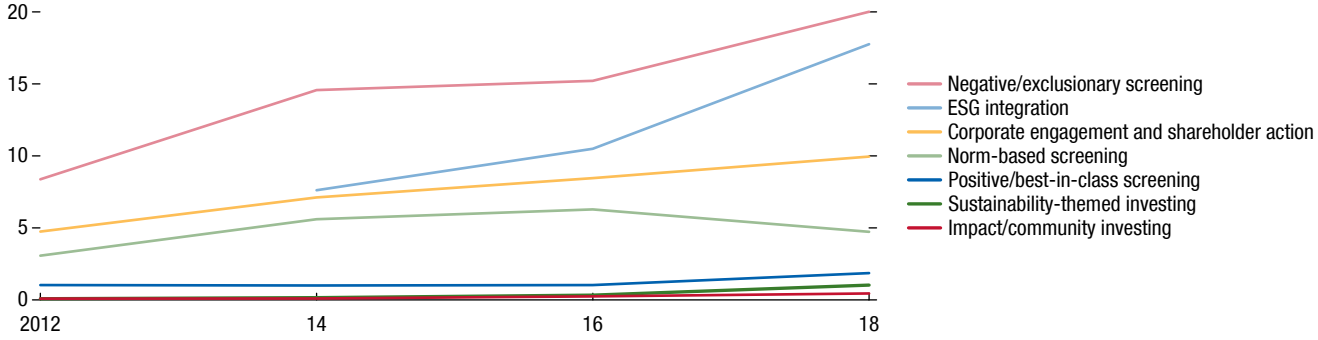
ESG is not an asset class but a multidimensional assessment system that can be applied to any asset class.

1. Application of ESG Factors Across Asset Classes

Asset Class	Breakdown	Examples
Equities	—	ESG can be adopted in traditional equities through a number of strategies. The most prominent has been negative (exclusionary) screening over the years, but it has moved to others such as engagement and positive (best-in-class) screening.
Debt Fixed Income	Traditional corporate bonds	Incorporating material ESG criteria into corporate credit analysis to better identify credit risk.
	Traditional sovereign bonds	Integrating ESG factors, together with traditional analysis that focuses on financial and macroeconomic variables to identify sovereign credit risks. PIMCO has adopted this approach since 2011 in its sovereign ratings model.
	ESG money market funds	Applying ESG factors to the investment of money market instruments. BlackRock, for example, launched an environmentally focused money market fund in April 2019.
	Green bonds	Specific bonds that are labeled green, with proceeds used for funding new and existing projects with environmental benefits.
	Social bonds	Bonds that raise funds for new and existing projects that create positive social outcomes.
	Sustainability bonds	Bonds with proceeds that are used to finance or refinance a combination of green and social projects.
	Green mortgage-backed securities (MBS)	Green MBS securitize numerous mortgages that go toward financing green properties, in the case of Fannie Mae, which is the largest issuer of green MBS.
Debt Bank Loans	Green loans	Loans that have proceeds used to finance or refinance green projects, including other related and supporting expenditures such as R&D. Their size is 70–80 percent smaller than green bonds, but they have been growing fast in 2018–19.
	Sustainability-linked loans	Loan instruments and/or contingent facilities such as guarantees or letters of credit that incentivize the borrower to meet predetermined sustainability performance goals.
Alternative Investment	Green real estate investment trusts (REIT) Private equity (PE) and venture capital (VC)	REITs with a portfolio exposure to properties that are environmentally certified. Private funds that, for example, back startups in areas such as energy, mobility, and buildings.

The initial foray into responsible investment strategies was primarily about negative screening strategies that excluded firms or entire sectors from investment portfolios, often on ethical or religious grounds (for example, tobacco, alcohol, munitions, and gaming). Impact investing, a relatively small but growing part of the market, aims at making a measurable impact on specific societal issues.

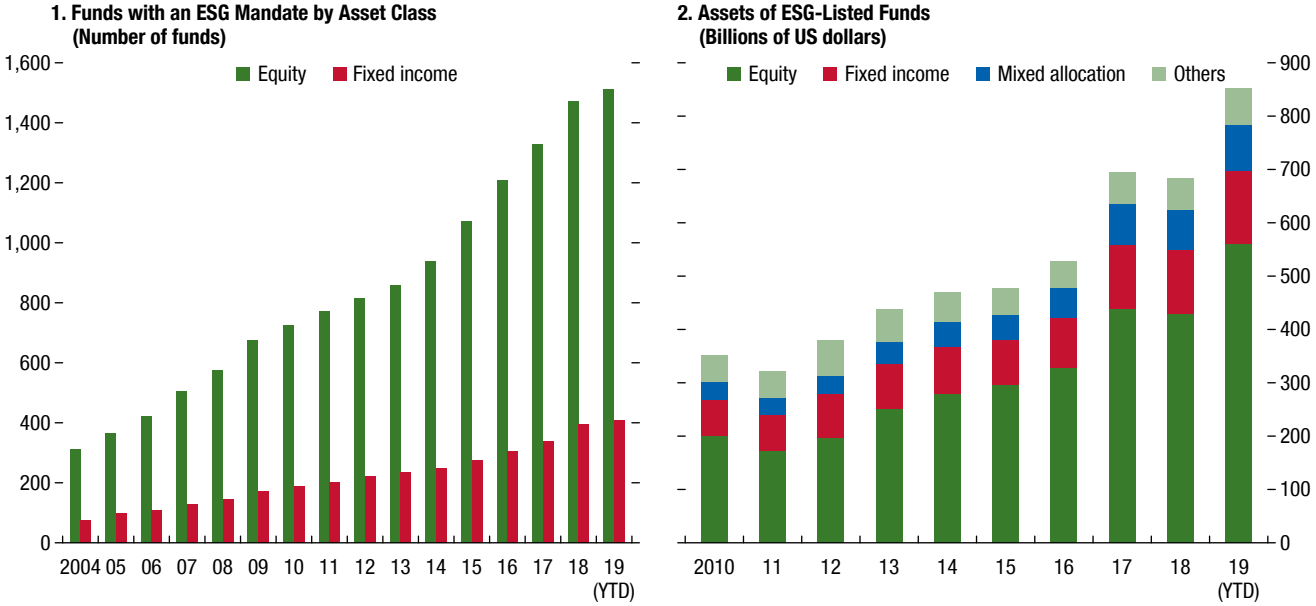
2. Net Asset Value of Funds by Investment Strategy
(Trillions of US dollars)



Sources: Global Sustainable Investment Report; and IMF staff calculations.
Note: In panel 1, Fannie Mae is the first issuer of green mortgage-backed securities through the Fannie Mae Multifamily Green Bond Framework. Several banks have issued loans with rates tied to the borrowers' sustainability performance to incentivize ESG performance (for example, if the sustainability rating of the borrower improves, the interest rate on the loan declines). ESG = environmental, social, and governance; R&D = research and development.

Figure 6.4. Growth of ESG-Dedicated Funds

ESG funds are still small compared with mainstream investment funds, controlling some $850 billion in assets (less than 2 percent of the total investment fund universe), but are rising fast. Equity funds traditionally had a much faster adoption rate of ESG factors than fixed income. ESG equity funds have reached $560 billion in 2019.



Sources: Bloomberg Finance L.P.; JPMorgan Chase & Co.; and IMF staff calculations.
Note: In panels 1 and 2, 2019 data are as of September 2019. ESG = environmental, social, and governance; YTD = year to date.

to underperformance. For example, restrictions could result in more volatile portfolios (Figure 6.6, panel 1). But ESG factors may allow asset managers to identify companies with higher long-term-value creation (Eccles, Ioannou, and Serafeim 2014) and avoid assets with mispriced costs from extreme events like climate change. IMF staff analysis suggests that the performance of sustainable and conventional funds is comparable (Figure 6.6, panel 2). In the absence of clear evidence of underperformance of ESG funds, investors have justified allocation to ESG funds on the basis of similar fees between ESG and regular funds (Figure 6.6, panel 3). Nonetheless, anecdotal evidence suggests that fees of sustainable active management funds are often higher than those of other active funds, posing a hurdle for wider adoption, especially by public pension funds.

What Are the Challenges Faced by ESG Investors and Issuers?

The lack of consistent methodologies and reporting standards, and mixed evidence of performance make it challenging for investors to incorporate ESG principles into their investment process.[9] Corporate reporting is largely voluntary and inconsistent, and particularly sparse with respect to environmental and social dimensions, even though ESG disclosure has been improving over time (Figure 6.7, panels 1 and 2). Third-party providers of ESG scores aim to provide standardized assessments, but there are concerns about the opaqueness of methodologies and informational materiality. ESG scores across providers are also often inconsistent, and there seems to be little correlation between the informational content of ESG scores and investor perception of a firm's enterprise value (Figure 6.7, panels 3 and 4).

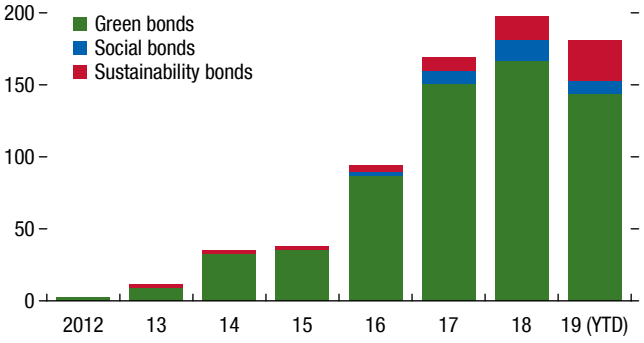
False claims of ESG compliance of assets and funds, so-called greenwashing, may give rise to reputational risk. Investment fund classifications can be inconsistent. For example, only 37 percent of Lipper ethical funds also carry a "sustainable" designation by Bloomberg. More broadly, there is uncertainty when it comes to measuring ESG impact: activist,

[9]Investor surveys show that data comparability across firms and time, data quality, and timeliness are concerns (Amel-Zadeh and Serafeim 2018).

Figure 6.5. Developments in Global Sustainable Debt Markets

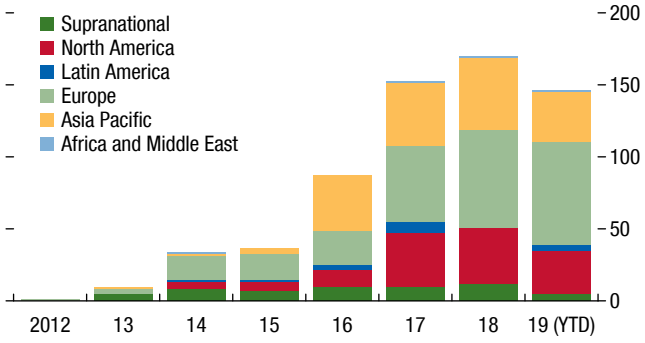
Global sustainability-linked bond issuance has been led by green bonds.

1. Sustainability-Linked Bond Issuance
(Billions of US dollars)



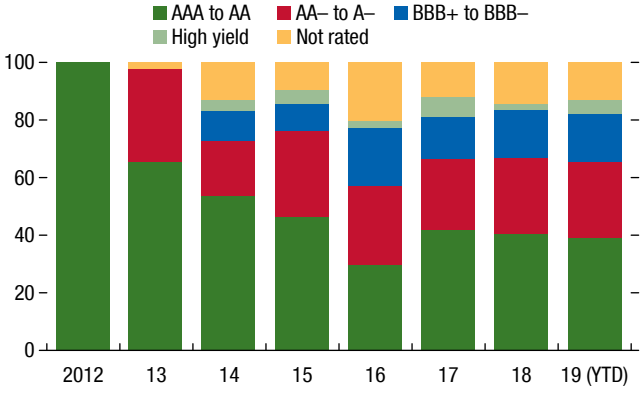
Europe has driven global issuance, but the Asia-Pacific region is catching up rapidly because of China.

2. Green Bond Issuance by Region
(Billions of US dollars)



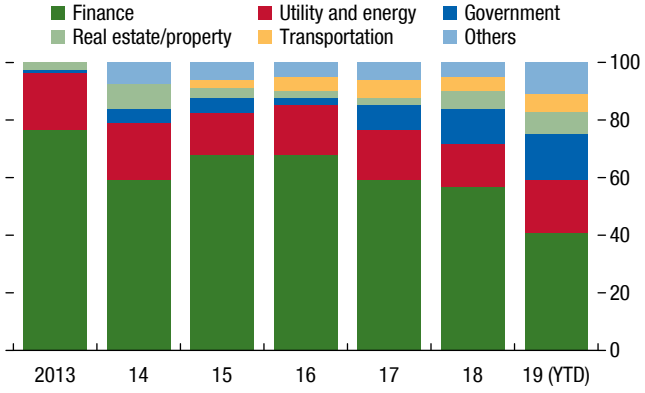
Credit quality has become more diverse, but most green bonds are highly rated, with a small fraction below investment grade.

3. Green Bond Issuance by Credit Rating
(Percent of total)



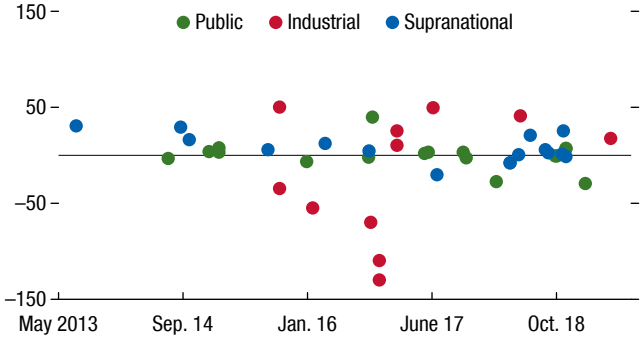
Issuers of green bonds tend to be concentrated in a few sectors.

4. Green Bond Issuance by Sector
(Percent of total)



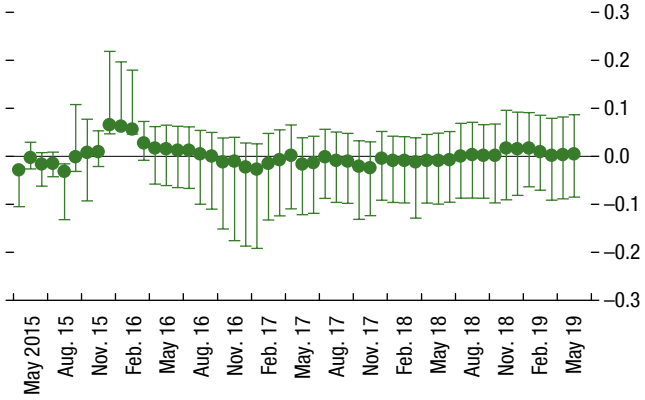
There is no consistent premium or discount at issuance between green and non-green bonds by the same issuer ...

5. Green Bonds—Spread at Issuance
(Mean spread over benchmark curve of green bonds relative to comparator bonds, basis points)



... but secondary market liquidity is slightly worse, possibly driven by the nature of the buy-and-hold investor base.

6. Green Bonds—Secondary Market Liquidity
(Bid-ask spread of green bond relative to comparator bonds in basis points, mean, minimum, maximum)

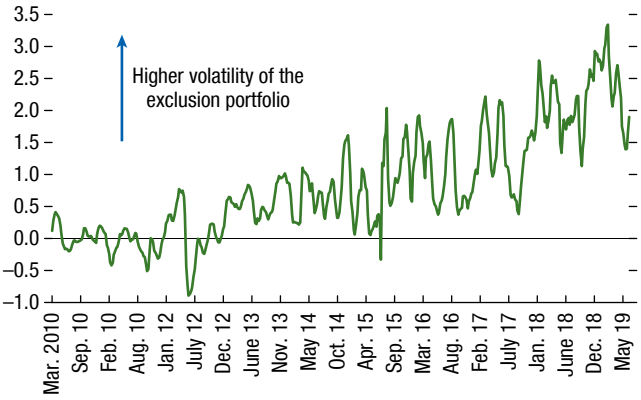


Sources: Bloomberg Finance L.P.; Dealogic; Fannie Mae; Refinitiv Datastream; and IMF staff calculations.
Note: 2019 year-to-date (YTD) data are until August 2019. In panel 1, sustainability-linked bonds are a broader classification that includes green, social, and sustainability bonds. See Figure 6.3, panel 1, for further explanation of each type of bond. Green bond issuance globally reached $168.4 billion in 2018. In panel 2, green bond issuance by Africa and the Middle East was only $97 million in 2018; it was $600 million for the first eight months of 2019. In panel 3, AAA rated bonds accounted for an average of 30 percent of overall issuance from 2015 to 2018. In panel 4, "Finance" includes development banks and other financial institutions.

Figure 6.6. Environmental, Social, and Governance Fund Performance

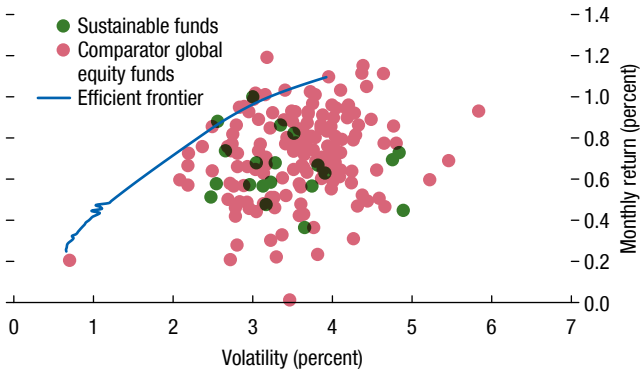
Simple exclusion rules can increase the volatility of equity portfolios.

1. Difference in Standard Deviation between S&P 500 Excluding Sectors with Large Carbon Emissions and S&P 500 (Difference in rolling standard deviation)



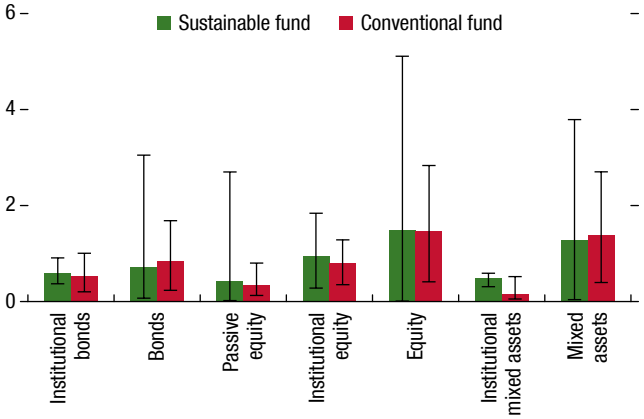
There is no consistent evidence that sustainable funds regularly over- or underperform ...

2. Sustainable Funds: Risk-Return Profile (Efficient frontier based on sustainable funds and comparator global equity funds)



... but, at least, fees of sustainable funds are comparable to those of their conventional peers for some retail funds.

3. Fees of Retail Sustainable Funds (Expense ratio in percent; markers: minimum, mean, maximum)



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

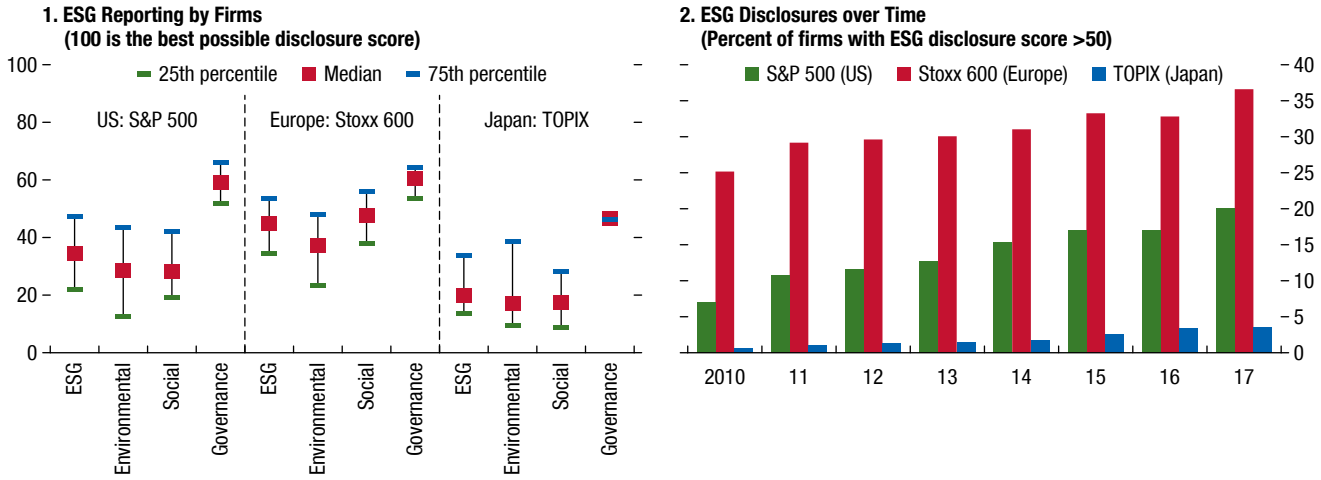
engagement, or positive screening approaches potentially have a greater impact than negative screening but measuring ESG effects remains challenging. Indices that track assets based on ESG criteria have opened the market to passive investors, but further fund and asset standardization may be needed to match investor expectations regarding ESG compliance. Prima facie, passive investing is not conducive to sustainable investing, given the need for greater engagement with issuers and higher analytical burden and cost, and may prove less effective in generating impact.

Issuers of ESG-compliant assets face challenges as well. Although firms can benefit from integrating ESG factors into their business models, they also face difficulties in realizing immediate gains, in part due to the long-term nature of the positive externality. Other obstacles include the currently high cost of ESG reporting, expensive and complicated external review procedures, and a lack of eligible assets. The complexity and unclear definitions of the E, the S, and the G affect issuers as well through exposure to reputational risk.

Figure 6.7. Challenges in Environmental, Social, and Governance Investments

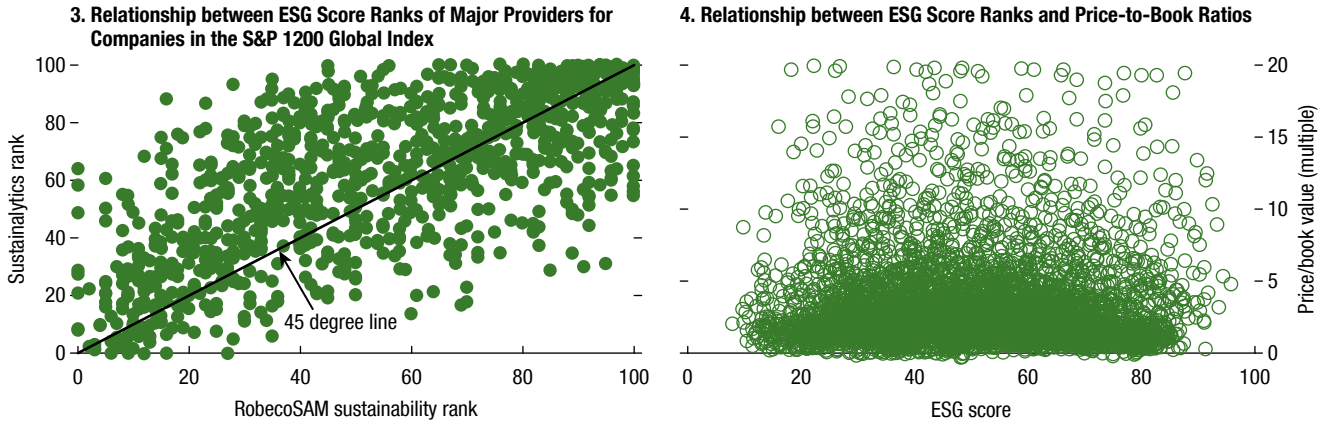
Corporate reporting on ESG factors is limited and lacks standardization ...

... despite improved ESG disclosures in recent years.



ESG scoring methodologies vary, partially reflecting the lack of a generally accepted ESG taxonomy ...

... and are further complicated by little apparent correlation between ESG scores and corporate valuations.



Sources: Bloomberg Finance L.P.; Refinitiv Datastream; RobecoSAM; Sustainalytics; and IMF staff calculations.
Note: In panel 4, the data are for all companies with Refinitiv Datastream ESG ratings. ESG = environmental, social, and governance.

Policies to Foster Further Development of Sustainable Finance

The development of sustainable finance has been driven by a combination of market forces and policymaker actions aimed to improve disclosure, data, and risk analytics. Closing data gaps will be crucial for investors and issuers to efficiently price externalities, mitigate risks, and reward long-term benefits from sustainability. More and better data can also help inform public policy if the outcome of market-based mechanisms is not sufficient in the face of significant negative externalities.

To encourage further growth in sustainable finance, progress is needed in the following areas:

- Standardization of ESG investment terminology, product definitions, and clarifications of what constitutes E, S, and G could support market development, address greenwashing concerns, and reduce reputational risk. Work is underway to develop an ESG taxonomy in the European Union by the European Commission (on a recommendation by the EU Technical Expert Group on Sustainable Finance 2019b), and various jurisdictions have either published or are developing green bond standards.

- Consistent corporate ESG reporting would incentivize acquisition of ESG data and assessment of financial materiality by investors.[10] Consideration could be given to mandatory minimum ESG disclosure requirements, especially of financially material information, taking into account costs and complexities of new regulations and reporting requirements. ESG disclosure and reporting requirements for asset managers could help investors better assess ESG risk exposures. Better ESG data would also aid regulators in financial stability analysis.
- Clarification of the role of ESG factors in prudent investment governance by regulators would help reduce uncertainty regarding fiduciary duties among some investors. Reconciling fiduciary responsibility with long-term goals through clear metrics can provide clearer objectives to asset managers, institutional investors, and service providers, such as credit rating agencies and pension funds' investment consultants ("gatekeepers").

Regulators and central banks can further support the development of ESG-related markets by fostering awareness and offering intellectual leadership in assessing ESG risks. Policymakers should incorporate ESG principles, and climate-related financial risks in particular, into financial stability monitoring and assessment and into microsupervision (such as stress testing). They could consider incentives to jump-start green finance markets (such as Singapore's sustainable bond grant program[11] and expansion of collateral by the People's Bank of China for a lending facility to include green bonds).

Credit rating agencies and ESG data providers can further integrate material ESG information into credit ratings and other scores, aggregate relevant information, and design reliable metrics for ESG benchmarks.[12] Credit agencies have taken significant steps in incorporating ESG principles into their assessment of credit of issuers. Third-party verifiers play an important role in certifying the compliance of sustainable investment products with ESG criteria. EU regulation on integrating sustainability risks in credit rating agencies is underway, and regulators should consider developing standards and accountability for third-party verifiers and auditors.

The IMF will continue to incorporate ESG-related considerations, in particular related to climate change, when critical to the macroeconomy. The IMF is incorporating climate change into multilateral (October 2019 *Fiscal Monitor*) and bilateral surveillance (through analysis in Article IV consultations and in Financial Sector Assessment Programs, including in stress tests). To better understand the long-term consequences of ESG-related risk factors, including but not limited to climate change, additional research is planned in the April 2020 GFSR.

Multilateral cooperation can help bridge gaps in supervisory capacity on ESG issues. To the extent that data gaps are identified relating to disclosure at the national level, countries should also seek to remediate them. In the area of standards and taxonomies, multilateral cooperation is important to avoid fragmentation of sustainable asset markets.

More fundamentally, although finance can help mobilize funding to achieve sustainability goals and ensure that risks are appropriately priced, policies and regulations are needed to set price signals for markets. In this regard, fiscal measures, including pricing of externalities such as carbon emissions and phasing out fuel subsidies (see Chapter 2 of the October 2019 *Fiscal Monitor*), as well as structural policies supporting investment in climate infrastructure (Jobst and Pazarbasioglu 2019), are particularly important to encourage more sustainable approaches by consumers and businesses.

[10]Initiatives such as the Sustainability Accounting Standards Board, Task Force on Climate-Related Financial Disclosures, and Global Reporting Initiative aim to fill this gap. In 2019 the Principles for Responsible Investment incorporated mandatory climate risk reporting. A new European Union disclosure regulation aims to mandate disclosure requirements.

[11]Under this program, the Monetary Authority of Singapore awards grants to first-time and repeat issuers of labeled bonds to cover costs incurred for independent external review or rating of issues.

[12]Governance-related factors have traditionally featured in credit ratings. More recently, credit rating agencies are expanding the scope of ESG information that enters ratings, with due attention to materiality. The European Union via its green bond standards is seeking to clarify the responsibility of third-party verifiers of emissions (see EU Technical Expert Group on Sustainable Finance 2019a).

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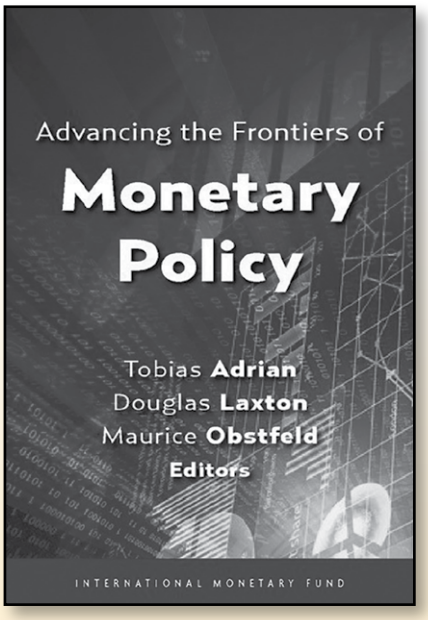

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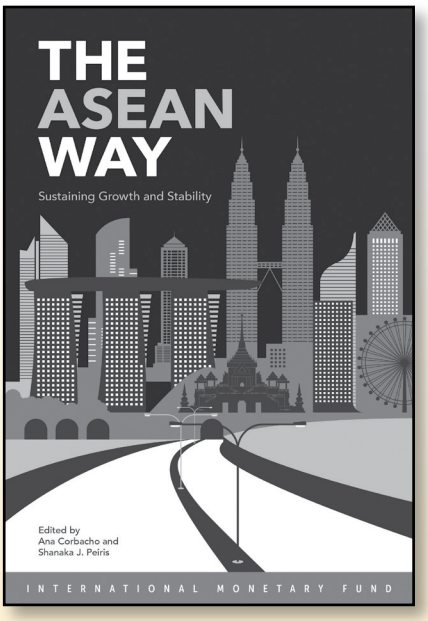

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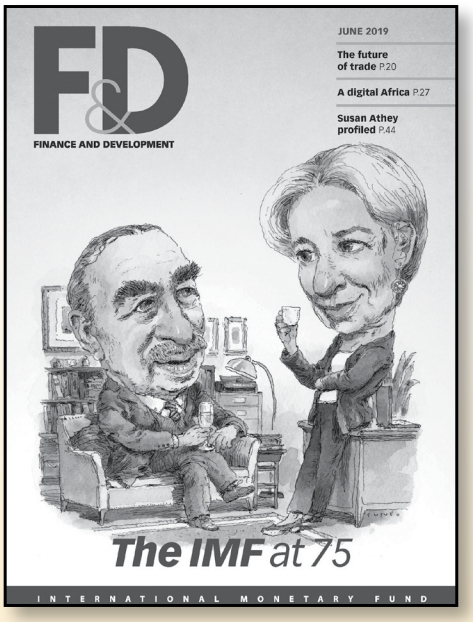

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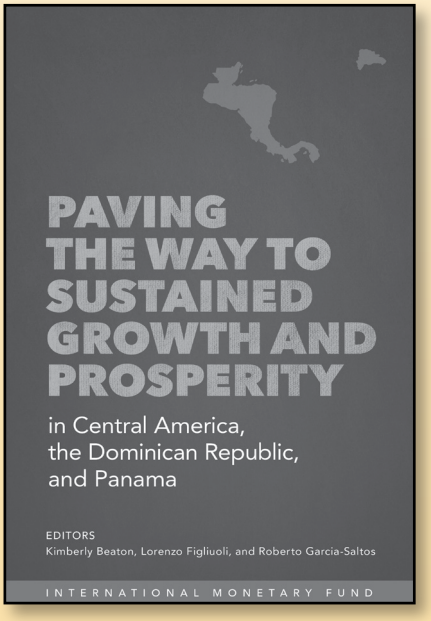

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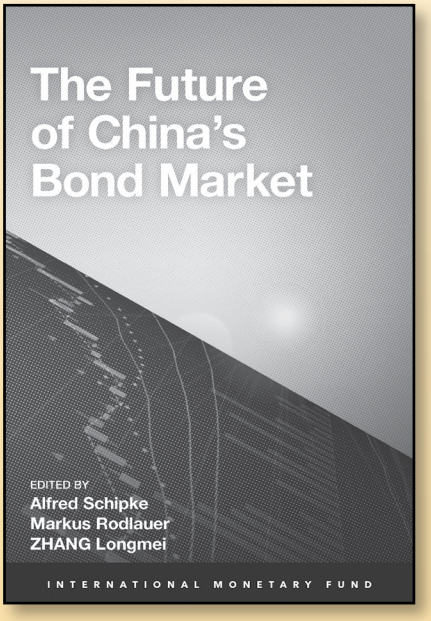

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