INTERNATIONAL MONETARY FUND

GLOBAL FINANCIAL STABILITY REPORT

Vulnerabilities in a Maturing Credit Cycle

2019
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Cover and Design: IMF CSF Creative Solutions Division
Composition: AGS, An RR Donnelley Company

Cataloging-in-Publication Data

IMF Library

Names: International Monetary Fund.
Title: Global financial stability report.
Other titles: GFSR | World economic and financial surveys, 0258-7440
Description: Washington, DC : International Monetary Fund, 2002- | Semiannual | Some issues also have thematic titles. | Began with issue for March 2002.
Subjects: LCSH: Capital market—Statistics—Periodicals. | International finance—Forecasting—Periodicals. | Economic stabilization—Periodicals.
Classification: LCC HG4523.G557

ISBN 978-1-49830-210-4 (Paper)
978-1-49830-213-5 (ePub)
978-1-49830-215-9 (Mobi)
978-1-49830-217-3 (PDF)

Disclaimer: The *Global Financial Stability Report* (GFSR) is a survey by the IMF staff published twice a year, in the spring and fall. The report draws out the financial ramifications of economic issues highlighted in the IMF's *World Economic Outlook* (WEO). The report was prepared by IMF staff and has benefited from comments and suggestions from Executive Directors following their discussion of the report on March 21, 2019. The views expressed in this publication are those of the IMF staff and do not necessarily represent the views of the IMF's Executive Directors or their national authorities.

Recommended citation: International Monetary Fund. 2019. *Global Financial Stability Report: Vulnerabilities in a Maturing Credit Cycle.* Washington, DC, April.

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Editor's Note (April 8, 2019)

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

- On page 9 (Figure 1.6), a new legend in panel 2 has been added.
- On page 36 (Figure 1.24), this sentence has been added to the note: "The numbers for China refer to the values of the two bars and the dot."
- On page 38 (Figure 1.25), the reference to "panel 6" was changed to "panel 4" in the note.

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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, 2017–18 or January–June) to indicate the years or months covered, including the beginning and ending years or months;

/ between years or months (for example, 2017/18) 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 risks facing 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 and Anna Ilyina, both Division Chiefs. It benefited from comments and suggestions from the senior staff in the MCM Department.

Individual contributors to the report were Adrian Alter, Prasad Ananthakrishnan, Sergei Antoshin, Magally Bernal, Peter Breuer, John Caparusso, Sally Chen, Shiyuan Chen, Yingyuan Chen, Kevin Chow, Fabio Cortes, Andrea Deghi, Dimitris Drakopoulos, Martin Edmonds, Rohit Goel, Alexei Goumilevski, Tryggvi Gudmundsson, Frank Hespeler, Henry Hoyle, Mohamed Jaber, David Jones, Mitsuru Katagiri, Will Kerry, Oksana Khadarina, Piyusha Khot, Robin Koepke, Elizabeth Mahoney, Sheheryar Malik, Rebecca McCaughrin, Aditya Narain, Evan Papageorgiou, Thomas Piontek, Jochen Schmittmann, Sohaib Shahid, Juan Solé, Ilan Solot, Nico Valckx, Constant Verkoren, Jeffrey Williams, Peichu Xie, Janice Yi Xue, Akihiko Yokoyama, and Xingmi Zheng. Magally Bernal, Monica Devi, and Breanne Rajkumar 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 Sherrie Brown, Christine Ebrahimzadeh, Lucy Scott Morales, Nancy Morrison, Katy Whipple of 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 March 21, 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 March 21, 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

Markets sold off sharply late last year, broadly across asset classes, amid growing signs of a slowing global economy and rising concerns about US-China trade tensions. Against a backdrop of rising downside risks, policymakers across the globe took steps to prevent a sharper deceleration of the economy. Such a forceful response supported market sentiment and triggered a sharp rebound in risk assets. Despite this recent improvement, financial markets remain susceptible to a sudden tightening in financial conditions. Potential triggers include a sharp repricing of risk, an intensification of trade tensions, a further slowdown in global economic activity, or political shocks.

An abrupt deterioration in financial conditions could unmask financial fragilities that have built during the period of very low interest rates. In this issue of the *Global Financial Stability Report* we are introducing a more structured, systematic approach aimed at monitoring financial vulnerabilities. Using data back to 2000 for 29 systemically important economies that account for a significant share of the global economy, we assess the level of vulnerability across regions and sectors (banks, nonbank financial institutions, sovereigns, firms, and households).

This new framework detects elevated financial vulnerability in several sectors around the world, including sovereigns, firms, and nonbank financial institutions. These vulnerabilities could turn into powerful amplification mechanisms if adverse shocks materialize. For example, the level of corporate debt has been rising around the world, and there is a weak tail of companies with high leverage and weak earnings prospects. There are growing signs that this credit cycle may be maturing, and risks of an economic slowdown are rising. The most highly indebted companies could be vulnerable to such a shock. While fundamentals in emerging markets are stronger and policy frameworks generally more resilient than in the past, some countries have low reserves, high leverage, or high foreign currency exposures that could make them more vulnerable to capital flow pressures. Furthermore, in Europe, fiscal challenges in some countries have reignited worries about the sovereign-bank nexus as a potentially powerful amplification mechanism in economies with more indebted sovereigns. Finally, housing markets in many advanced and emerging markets are at risk.

In sum, these rising financial vulnerabilities point to elevated medium-term risks to financial stability. Policymakers should act now to reduce these vulnerabilities while they can. Countercyclical capital buffers should be activated in countries with rising vulnerabilities, and macroprudential tools should be developed to contain corporate vulnerabilities. Monetary policies should remain data dependent and well communicated to avoid market overreaction and prevent further growth deceleration.

Tobias Adrian
Financial Counsellor

EXECUTIVE SUMMARY

Financial conditions have tightened since the October 2018 *Global Financial Stability Report* (GFSR) but remain relatively accommodative, notably in the United States. After sharp declines in the fourth quarter of 2018, financial markets rebounded strongly in early 2019 on growing optimism about US-China trade negotiations and as major central banks adopted a more patient and flexible approach to monetary policy normalization. Such a dovish shift in the outlook for monetary policy in advanced economies has helped sustain positive market sentiment despite growing signs of weakening global growth (as discussed in the April 2019 *World Economic Outlook)*.

With financial conditions still accommodative, vulnerabilities continue to build. The tightening in financial conditions in the fourth quarter of 2018 was too short-lived to meaningfully slow the buildup of vulnerabilities, leaving medium-term risks to global financial stability broadly unchanged. Financial vulnerabilities are currently elevated in the sovereign, corporate, and nonbank financial sectors in several systemic countries. As the credit cycle matures, corporate sector vulnerabilities—which appear elevated in about 70 percent of systemically important countries (by GDP)—could amplify an economic downturn.

This report presents a new framework for comprehensive assessment of balance sheet vulnerabilities across financial and nonfinancial sectors, and focuses on a number of specific vulnerabilities in advanced and emerging market economies.

- *Corporate sector debt in advanced economies:* Debt-service capacity has improved in most advanced economies, and balance sheets appear strong enough to sustain a *moderate* economic slowdown or a *gradual* tightening of financial conditions. However, overall debt and financial risk taking have increased, and the creditworthiness of some borrowers has deteriorated. As a result, the stock of lower-rated investment-grade (BBB) bonds has quadrupled, and the stock of speculative-grade credits has almost doubled in the United States and the euro area since the crisis. Therefore, a *significant* economic downturn or *sharp* tightening of financial conditions could lead to a notable repricing of credit risk and could strain the debt-service capacity of indebted firms. If monetary and financial conditions remain easy, debt will likely rise further in the absence of policy action, raising the specter of a deeper downturn in the future.
- *The sovereign–financial sector nexus in the euro area:* Fiscal challenges in Italy have rekindled worries about the sovereign–financial sector nexus. Bank capital ratios are now higher in the euro area. But potential losses on nonperforming loans and mark-to-market declines in the value of government bonds could result in a significant hit to capital for some banks. Insurance companies could also become entangled in the nexus, given their significant holdings of sovereign, bank, and corporate bonds. There is a risk that strains in the financial sector could yet again be passed on to companies and households, hurting economic growth.
- *China's financial imbalances and potential spillovers:* Financial vulnerabilities in China remain high, and the authorities face a difficult trade-off between supporting near-term growth, countering adverse external shocks, and containing leverage through regulatory tightening. Small and medium-size banks remain weak, weighing on financing conditions for smaller firms. Yet further monetary and credit easing may increase vulnerabilities, as continued credit growth could slow or impede bank balance sheet repair and exacerbate existing biases in credit allocation. Meanwhile, China's importance for other emerging markets will continue to increase with its inclusion in benchmark indices; portfolio flows to China are expected to rise by as much as $150 billion by 2020 as a result of its inclusion in a global bond index.
- *Volatile portfolio flows to emerging markets:* Portfolio flows to emerging markets are increasingly influenced by benchmark-driven investors. The amount of funds benchmarked against widely followed emerging market bond indices has quadrupled in the past 10 years to $800 billion. Estimates also suggest that 70 percent of country allocations of investment funds are influenced by benchmark indi-

ces. Given that benchmark-driven investors are more sensitive to changes in global financial conditions than other investors, the benefits of index membership may be tempered by financial stability risks for some countries. As these investors become a larger share of portfolio flows, external shocks may propagate to medium-size emerging and frontier market economies faster than in the past.

- *House prices at risk (HaR):* The recent rapid increase in house prices in many countries has raised concerns about the possibility of a price correction. A new house prices-at-risk framework, presented in Chapter 2 of this report, is used to quantify downside risks to house price growth. Lower house price momentum, overvaluation, excessive credit growth, and tighter financial conditions help predict downside risks to house prices up to three years ahead. In turn, the measure of house prices at risk helps forecast downside risks to GDP growth and predict financial crises. The most recent data point to increased downside risks to house prices over the next one to three years in some countries.

Looking ahead, there is a risk that positive investor sentiment could deteriorate abruptly, leading to a sharp tightening of financial conditions. This will have a larger effect on economies with weaker fundamentals, greater financial vulnerabilities, and less policy space to respond to shocks. Possible triggers include the following:

- A *sharper-than-expected growth slowdown* could lead to tighter financial conditions as risk asset prices fall, reflecting a weaker outlook for corporate earnings, even as policies turn more accommodative.
- *An unexpected shift to a less dovish outlook for monetary policy* in advanced economies could trigger a repricing in markets, especially if investors realize that they have taken too benign a view on the monetary policy stance.
- *Political and policy risks,* such as an escalation of trade tensions or a no-deal Brexit, could affect market sentiment and lead to a spike in risk aversion.

Amid rising downside risks to global growth, policymakers should aim to avoid a sharper economic slowdown, while keeping financial vulnerabilities in check:

- Policymakers should clearly communicate any reassessment of the *monetary policy* stance that reflects either changes in the economic outlook or risks surrounding the outlook. This will help avoid unnecessary swings in financial markets or unduly compressed market volatility.
- In countries with high or rising financial vulnerabilities, policymakers should proactively *deploy prudential tools or expand their macroprudential toolkits* where needed. These countries would benefit from activating or tightening broad-based macroprudential measures, such as countercyclical capital buffers, to increase the financial system's resilience. Efforts should also focus on developing prudential tools to address rising corporate debt from nonbank financial intermediaries and maturity and liquidity mismatches in the nonbank sector. Regulators should also ensure that more comprehensive stress tests (that include macro-financial feedback effects) are conducted for banks and nonbank lenders.
- *Measures to repair public and private balance sheets* should be stepped up. A gradual fiscal adjustment is needed to reduce elevated risks, based on policies that will support medium-term growth. Efforts to tackle nonperforming loans on euro area bank balance sheets should continue. Given concerns about the sovereign–financial sector nexus, consideration could be given to mitigating concentration risk in banks' sovereign exposures.
- Emerging market economies should ensure resilience against *foreign portfolio outflows* by reducing excessive external liabilities, cutting reliance on short-term debt, and maintaining adequate fiscal and foreign exchange reserve buffers. Given the rising importance of benchmark-driven portfolio flows, a close dialogue is needed between index providers, the investment community, and regulators. Building on the progress achieved so far, the Chinese authorities should continue financial sector de-risking and deleveraging policies and put greater emphasis on addressing bank vulnerabilities. Structural reforms such as reducing the emphasis on growth targets and tightening budget constraints for Chinese state-owned enterprises will be critical to reduce credit misallocation.

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 March 21, 2019.*

Executive Directors broadly shared the assessment of global economic prospects and risks. They observed that global economic activity had recently lost momentum, reflecting a confluence of factors in a number of large economies. Global trade had slowed sharply, and concerns over trade tensions weakened business confidence. Directors noted that while growth is expected to level off in the first half of this year and firm up thereafter, this short-term outlook is subject to considerable uncertainty.

Directors noted that, over the medium term, growth is expected to moderate further in advanced economies, as population aging constrains the expansion of the labor force and labor productivity growth remains tepid. In emerging market and developing economies, growth is expected to increase modestly. Convergence toward advanced economy income levels, however, remains slow for many of these economies, due to structural bottlenecks and, in some cases, high debt, subdued commodity prices, and civil strife.

Directors agreed that risks to the global outlook remain skewed to the downside amid high policy uncertainty. These include a reescalation of trade tensions and disruptions from a no-deal Brexit. Given still-accommodative financial conditions, the global economy also remains susceptible to a sudden shift in market sentiment and associated tightening in financial conditions. Downside risks in systemic economies, if they were to materialize, also weigh on the outlook. On the upside, if recent tariff increases are rolled back and trade tensions resolved, rising business confidence could lift growth. Over the medium term, many Directors noted risks from rising inequality, climate change, cyber risks, political uncertainty, and declining trust in institutions.

Directors noted that the current conjuncture highlights the urgent need for strong global cooperation and coordination to tackle shared challenges. Many Directors attached priority to resolving trade disagreements cooperatively without raising further distortionary barriers, and reiterated the importance of strengthening the open, rules-based multilateral trading system. Directors stressed that broadening the gains from global economic integration would also require closer cooperation in the areas of financial regulatory reforms, the global financial safety net, international corporate taxation, and climate change. Progress on external rebalancing relies on macroeconomic and structural policies, mindful of countries' domestic conditions and objectives, to increase demand and growth potential in surplus countries, and initiatives to boost supply and potential output in deficit countries.

Against the backdrop of waning global growth momentum and limited policy space in many countries, Directors underscored the need to avoid policy missteps, contain risks, and enhance resilience while raising inclusive growth prospects. Macroeconomic policies should be carefully calibrated, aiming to support growth where output may fall below potential and policy space exists, and ensuring a soft landing where policy support needs to be withdrawn. In the event of a deeper or protracted downturn, policies should become more accommodative where feasible.

Directors stressed that fiscal policy should strike the right balance between growth and debt sustainability objectives as appropriate in individual countries. In countries with high debt, gradual fiscal adjustment is needed, particularly if financing risks are large. In countries with fiscal space, fiscal policy should boost aggregate demand where there is slack and raise potential growth where the economy is operating above potential. In this regard, a few Directors noted the role of automatic stabilizers during cyclical downswings. In the event of a more protracted slowdown in growth, care should be taken to avoid a procyclical fiscal stance. Directors concurred that fiscal policy should also adapt

to shifting demographics, advancing technology, and deepening global integration. Where there is limited budgetary room, such a response will have to occur through budget recomposition and reprioritization.

Amid signs of weakening growth and muted inflation in most advanced economies, Directors welcomed the more gradual approach to monetary policy normalization by major central banks since the beginning of this year, which has helped boost positive market sentiment. They urged policymakers to clearly communicate any reassessment of the pace of monetary policy normalization that reflects either changes in the economic outlook or risks surrounding the outlook, to avoid excessive market swings or unduly compressed market volatility.

With financial conditions still accommodative as the credit cycle matures, Directors noted that financial vulnerabilities would likely continue to build in different parts of the global economy. These include rising corporate debt, sovereign–financial sector nexus, maturity and liquidity mismatches, house price misalignment, and sensitivity of portfolio flows and asset prices in emerging markets to changes in global financial conditions. The tightening in financial conditions late last year was too short-lived to meaningfully slow the buildup of vulnerabilities, leaving medium-term risks to global financial stability broadly unchanged. Where needed, policymakers should deploy prudential tools proactively, expand macroprudential toolkits, and continue to repair public and private balance sheets.

Across all economies, growth-enhancing structural reforms remain key to improving potential output, inclusiveness, and resilience. Directors emphasized that high debt levels in many countries require a multipronged approach, including to enhance debt transparency and management. Broader structural reforms should aim to lift productivity, encourage labor force participation, and upgrade skills. Further deregulation in product markets and services, supported by stronger competition law and policy, could help deter the rise in corporate market power in advanced economies.

Noting that corruption could undermine inclusive growth, public finances, and poverty reduction efforts, Directors highlighted the need to improve fiscal institutions, transparency, and governance in the public sector. Greater cooperation is also essential at the global level, including combating foreign bribery and money laundering of proceeds from corrupt activities, as well as improving the sharing of information to fight tax evasion and prosecute corrupt acts.

Directors stressed that, with external conditions remaining uncertain, emerging market and developing economies should focus monetary policy on anchoring inflation expectations where inflation remains high, and support domestic activity as needed where expectations are well anchored. Depending on country circumstances, efforts should continue to raise revenue, reduce debt-related vulnerabilities, and make steady progress on economic and financial rebalancing.

Directors underscored the need for low-income developing economies to adopt policies that focus on drivers of growth, raise resilience to volatile external conditions, durably reduce debt vulnerabilities, and advance toward the 2030 Sustainable Development Goals, with continued support from the international community. Priorities include improving macroeconomic and macroprudential policy frameworks, strengthening domestic resource mobilization, and gearing fiscal policy toward supporting growth and development objectives, including protection for social spending and carefully selected capital projects. Commodity exporters need to continue diversifying their economies through policies that improve education quality, narrow infrastructure gaps, enhance financial inclusion, and boost private investment.

CHAPTER 1

VULNERABILITIES IN A MATURING CREDIT CYCLE

Global Financial Stability Assessment

Financial conditions have tightened since the October 2018 Global Financial Stability Report *(GFSR), but remain relatively accommodative, notably in the United States.[1] After sharp declines in the fourth quarter of 2018, financial markets rebounded in early 2019. This turnaround in market sentiment has been supported by the Federal Reserve's more patient approach to monetary policy normalization. Given buoyant market sentiment, financial vulnerabilities—such as high leverage and liquidity, maturity, and currency mismatches—may continue to build, raising medium-term risks to global financial stability. Vulnerabilities in sovereign, corporate, and nonbank financial sectors are already elevated by historical standards in several systemically important countries that account for a significant share of the global economy. A sudden sharp tightening in financial conditions—triggered by investors' reassessment of the outlook for monetary policy in major advanced economies, a sharper-than-expected growth slowdown, protracted trade tensions, or a no-deal Brexit—could expose these vulnerabilities and raise near-term financial stability risks.*

Markets Rally as the Cycle Matures

Since the October 2018 GFSR, near-term risks to global financial stability have risen, on balance, although they remain moderate by historical standards. The global economic expansion has weakened and risks to global growth have shifted to the downside (see the April 2019 *World Economic Outlook* [WEO]). Late last year, investors became increasingly concerned about weakening global economic activity and a deteriorating outlook for corporate earnings, against a backdrop of lingering trade tensions and policy uncertainty. Market anxiety about the pace of monetary policy normalization in the United States, including worries that higher interest rates would further squeeze corporate profit margins, contributed to selling pressures. As a result, risk sentiment soured, and most major asset markets sold off in late 2018, except for safe haven assets (Figure 1.1, panel 1). In some markets, price declines were exacerbated by poor market liquidity, but generally, prices appeared to have been driven mostly by fundamental factors (see Special Feature).

Global markets rebounded in early 2019, despite a continued deterioration in earnings expectations (Figure 1.1, panel 2). Shifting perceptions about monetary policy normalization and renewed optimism about trade negotiations between the United States and China sparked a rally in risk assets. As a result, global equities recouped most of their 2018 losses and credit spreads tightened significantly. Despite the risk-on sentiment, some investors worry that the long-lasting credit cycle may be reaching its late stage in the United States and possibly in other advanced economies (see "Late-Cycle Corporate Sector Risks in Advanced Economies" section). In the euro area, fiscal challenges in Italy have rekindled concerns about the sovereign–financial nexus (see "The Euro Area Sovereign–Financial Sector Nexus" section), while fears of a no-deal Brexit continue to weigh on UK financial assets. Emerging markets have been relatively resilient during the late 2018 sell-off, and aggregate portfolio flows have been supported by a subsequent turnaround in global risk sentiment (see "Vulnerabilities in China, Emerging Markets, and Frontier Economies" section).

Despite Tightening Late Last Year, Global Financial Conditions Remain Relatively Accommodative, though with Some Variation across Regions

On balance, financial conditions have tightened somewhat since the October 2018 GFSR in major advanced and emerging market economies:

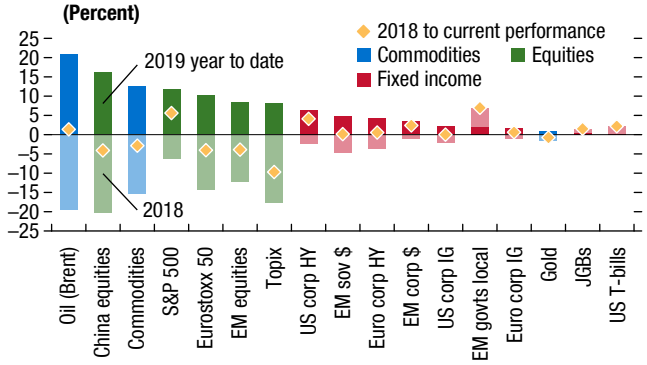
Prepared by staff from the Monetary and Capital Markets Department (in consultation with other departments): Fabio Natalucci (*Deputy Director*), Anna Ilyina (*Division Chief*), Peter Breuer (*Deputy Division Chief*), Will Kerry (*Deputy Division Chief*), Evan Papageorgiou (*Deputy Division Chief*), Sergei Antoshin, John Caparusso, Sally Chen, Yingyuan Chen, Kevin Chow, Fabio Cortes, Dimitris Drakopoulos, Martin Edmonds, Rohit Goel, Tryggvi Gudmundsson, Frank Hespeler, Henry Hoyle, David Jones, Piyusha Khot, Robin Koepke, Sheheryar Malik, Rebecca McCaughrin, Thomas Piontek, Juan Solé, Ilan Solot, Jeffrey Williams, Akihiko Yokoyama, Xingmi Zheng, with inputs from Alexei Goumilevski and Shuyi Liu. Magally Bernal was responsible for word processing.

[1]This GFSR reflects information available as of March 21, 2019, unless otherwise noted.

Figure 1.1. Global Market Developments

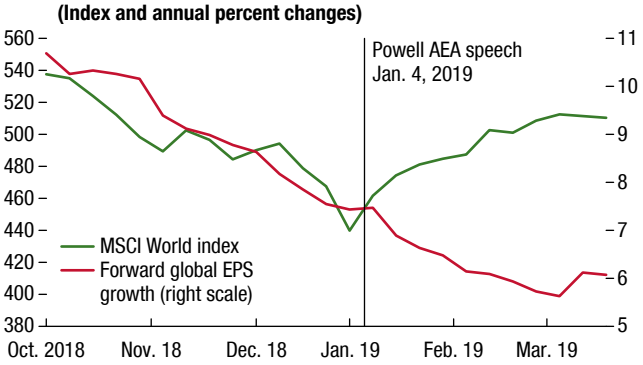
After posting negative returns in 2018, asset prices rebounded this year ...

1. Returns by Asset Class
(Percent)



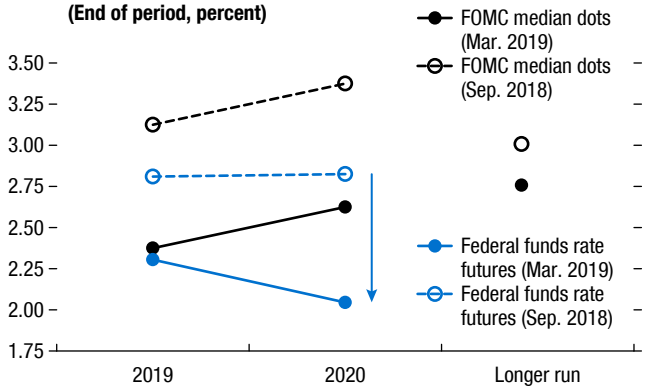
... despite continued downward revisions in corporate earnings forecasts.

2. Global Equity Prices and Forward EPS Forecasts
(Index and annual percent changes)



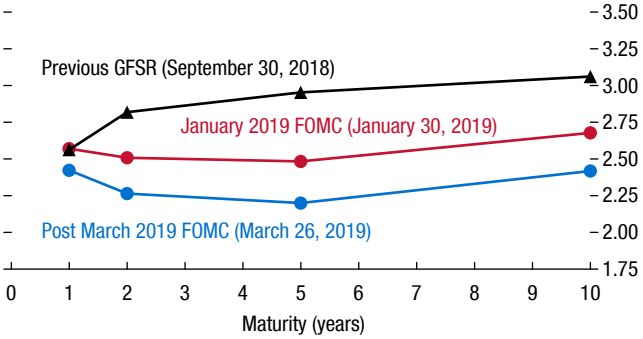
After the dovish shift in US monetary policy, markets do not expect any further rate hikes ...

3. Expected Federal Funds Rate versus FOMC Dots
(End of period, percent)



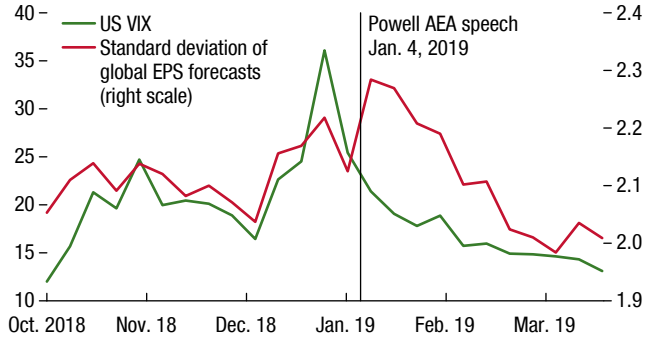
... and yields are expected to stay low for longer.

4. US Treasury Yield Curve
(Percent)



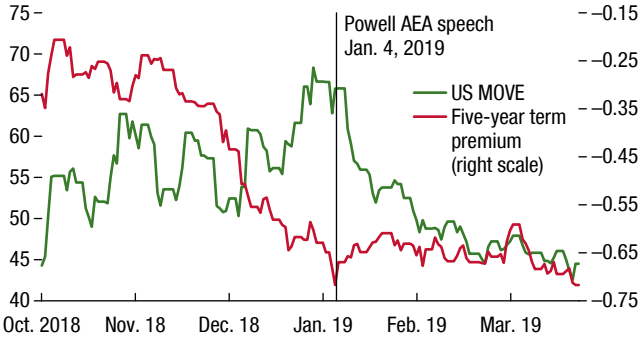
This has resulted in reduced market volatility and uncertainty around earnings forecasts ...

5. US VIX and Dispersion of Global EPS Forecasts
(Percent and index)



... as well as reduced interest rate volatility and a compressed term premium.

6. US MOVE and Term Premium
(Percent and basis points)

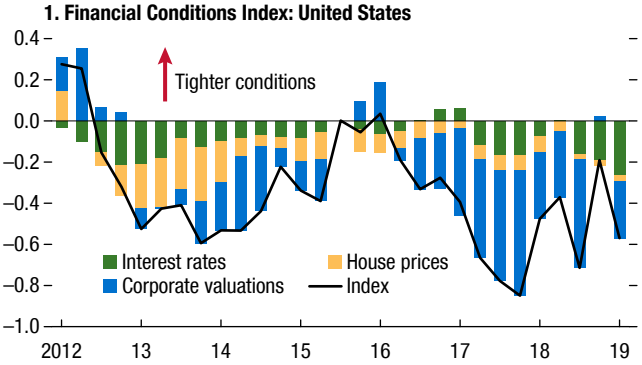


Sources: Bloomberg Finance L.P.; ICE Data Indices, LLC; Moody's; MSCI; Standard & Poor's Leveraged Commentary and Data; Thomson Reuters Datastream; Thomson Reuters I/B/E/S; and IMF staff calculations.
Note: In panel 3, the downward slope of the federal funds rate futures may in part reflect a negative term premium. AEA = American Economic Association; corp = corporate; EM = emerging market; EPS = earnings per share; FOMC = Federal Open Market Committee; GFSR = *Global Financial Stability Report*; govts = governments; HY = high yield; IG = investment grade; JGB = Japanese government bond; MOVE = Merrill Option Volatility Estimate; sov = sovereign; T-bills = Treasury bills; VIX = Chicago Board Options Exchange Volatility Index.

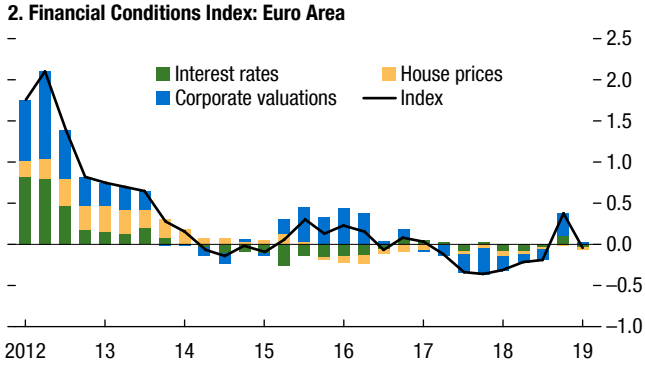
Figure 1.2. Global Financial Conditions

(Z-scores, 1996–2019)

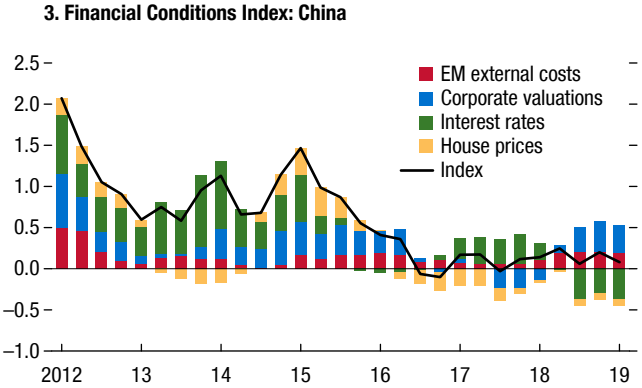
US financial conditions have tightened, on net, but remain accommodative.



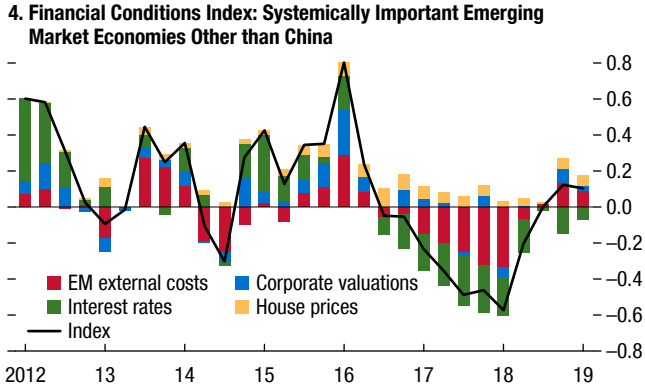
The early-2019 rebound in markets helped attenuate the tightening in financial conditions in the euro area.



In China, financial conditions remain broadly stable as market pressures have been offset by policy easing.



Financial conditions in other emerging markets have been stable in early 2019, after tightening significantly in 2018 due to higher external borrowing costs.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, International Financial Statistics database; and IMF staff calculations.
Note: The *z*-score indicates an observation's distance from the population mean in units of standard deviation. EM = emerging market.

- In the *United States*, the Federal Reserve indicated early this year that it would be more flexible and patient as it determines the appropriate path of monetary policy. In addition, at the March Federal Open Market Committee (FOMC) meeting, it announced that the current runoff of the balance sheet will end in September 2019. These communications led to a reassessment of the outlook for monetary policy normalization by market participants. The policy rate path shifted lower, with investors no longer anticipating any policy rate hikes in 2019–20 (Figure 1.1, panel 3), and the Treasury yield curve moved down sharply (Figure 1.1, panel 4).[2] These moves, together with a rebound in corporate valuations, contributed to an easing of financial conditions (Figure 1.2, panel 1). The dovish shift in US monetary policy reduced perceptions of downside risk and supported positive risk sentiment in equity markets, as reflected in declining market implied volatility (VIX) and earnings uncertainty (Figure 1.1, panel 5). In the Treasury markets, market implied volatility (MOVE) and the term premium—the premium demanded by investors for holding long-term government bonds relative to the risk-free short-term interest rate—dropped to historically low levels (Figure 1.1, panel 6).
- In the *euro area*, the rebound in financial markets early this year helped attenuate the tightening in financial conditions in late 2018 (Figure 1.2, panel 2). The European Central Bank (ECB) ended its net

[2]The Federal Funds futures rate would need to be adjusted for term premiums to provide a more accurate reading of the market expectations of the future policy rate path.

purchases under its bond purchase program at the end of 2018 and reaffirmed its intention to leave policy rates unchanged at least through 2019, with investors not expecting any policy rate hikes before the end of 2020. A new series of targeted longer-term refinancing operations has been announced to help preserve favorable bank lending conditions and the smooth transmission of monetary policy.

- In *China*, financial regulatory tightening, deleveraging efforts, and concerns about trade tensions and growth reduced corporate valuations in 2018 (Figure 1.2, panel 3). In response, the Chinese authorities cut reserve requirements for banks and took other steps to ease credit conditions.[3] These measures have helped lower interbank spreads, but some firms continue to face funding challenges (see "Vulnerabilities in China, Emerging Markets, and Frontier Economies" section). Chinese equities rallied early this year in response to more positive trade rhetoric and supportive policy measures. As a result, the overall financial conditions—as measured by market prices—remained broadly stable over the past six months.[4]
- In *systemically important emerging markets other than China,* aggregate financial conditions have remained stable and close to neutral levels in the first quarter of 2019 after significantly tightening in 2018 on higher external borrowing costs (Figure 1.2, panel 4). Although some country-specific concerns have re-emerged recently, overall investor sentiment has been supportive so far this year (see "Vulnerabilities in China, Emerging Markets, and Frontier Economies" section).

Medium-Term Financial Stability Risks Remain Elevated and Could Build Further

The tightening in global financial conditions has led to somewhat higher near-term risks to global growth and financial stability (Figure 1.3, panel 1). The impact of the net tightening in global financial conditions on the estimated probability distribution of future economic growth outcomes is assessed using the growth-at-risk (GaR) framework (see October 2017 GFSR). The range of outcomes associated with the severely adverse scenario (5th percentile of the distribution) shifted toward lower growth rates (Figure 1.3, panel 2). Despite the recent recovery in financial markets, the net increase in downside risks to growth over the near term remains statistically significant (Figure 1.3, panel 3), though these risks are moderate by historical standards (Figure 1.3, panel 4).

With global financial conditions still accommodative notwithstanding their tightening, financial vulnerabilities will likely continue to build. The recent tightening in financial conditions was too short-lived to cause a meaningful reduction in the buildup in vulnerabilities, leaving medium-term risks to financial stability broadly unchanged. Medium-term risks continue to be elevated (Figure 1.3, panel 5), suggesting that a prolonged period of easy conditions could set the stage for a more severe downturn later.

Global Financial Vulnerabilities Remain Elevated

Vulnerabilities in the sovereign, corporate, and nonbank financial sectors are elevated by historical standards in several systemically important countries and regions that account for a significant share of the global economy. Vulnerabilities arise from leverage, liquidity, maturity, and currency mismatches on the balance sheets of sovereigns, firms, households, banks, insurance companies, and other financial institutions (see Online Annex 1.1).[5] Because these vulnerabilities tend to amplify and propagate the effects of adverse shocks, they may increase financial stability risks. Figure 1.4 highlights balance sheet vulnerabilities in these six sectors in the United States, the euro area, China, and other systemically important advanced and emerging market economies. Panel 1 shows the proportion of systemically important countries with elevated (high and medium-high) vulnerabilities weighted by their size (GDP or assets). Vulnerabilities in the corporate sector are elevated in systemically important countries accounting for about 70 percent of total GDP. Panel 2 shows the distribution of vulnerabilities across sectors

[3]The steps include central bank funding and regulatory incentives for banks that meet lending targets to private firms and small and medium-sized enterprises; an increase in the relending and rediscount quota for small and medium-sized enterprise financing; support for private enterprise bond issuance; relaxed margin financing rules; and softening of asset management rules.

[4]The financial conditions indices in this report include only price-of-risk measures and may not reflect policies affecting the quantity of credit (as, for example, in the case of China). See Online Annex 1.1 in the October 2018 GFSR at www.imf.org/en/Publications/GFSR.

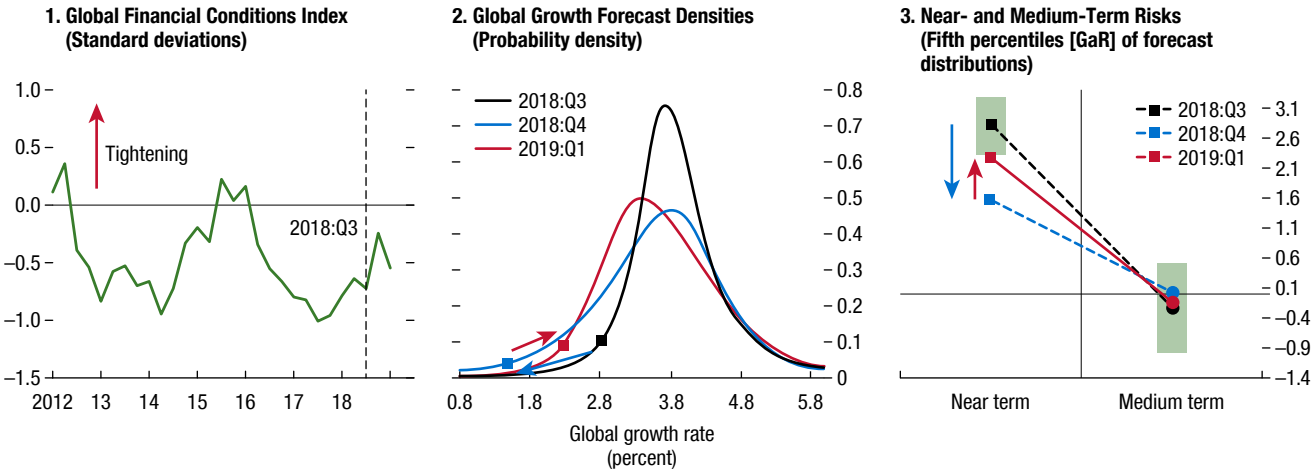
[5]See Online Annex 1.1 in the April 2019 GFSR for more details.

Figure 1.3. Growth-at-Risk Estimates

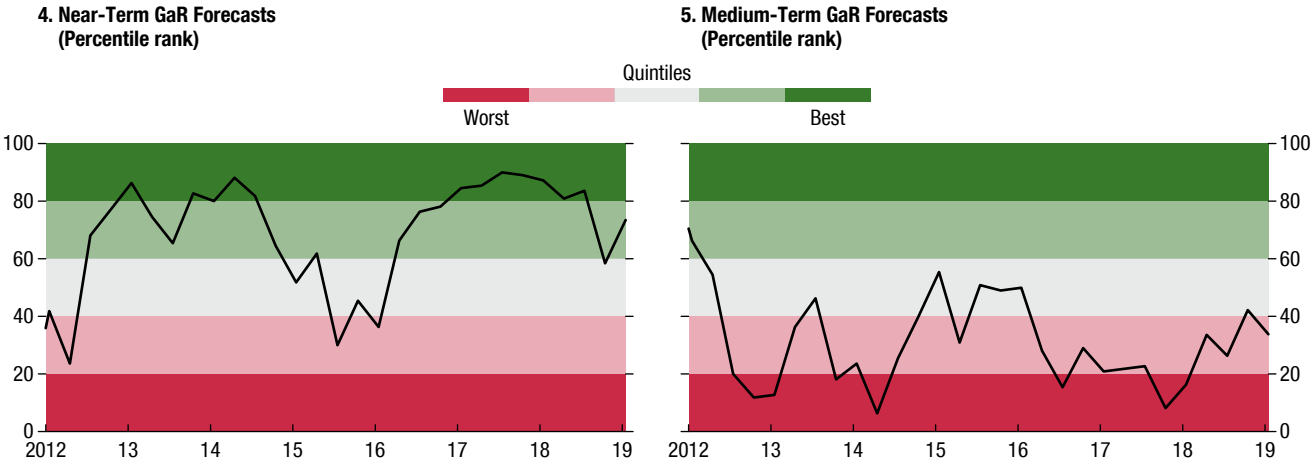
Global financial conditions have tightened since the last GFSR.

Near-term downside risks have increased on net, despite market gyrations ...

... while medium-term risks remain elevated.



The near-term GaR forecast signals deterioration from a recent historically benign peak, whereas the medium-term GaR forecast remains close to historically high risk levels.



Source: IMF staff calculations.
Note: In panel 1, upward movement reflects tightening of financial conditions. The final observation corresponds to 2019:Q1. In panel 2, forecast density estimates are centered around the respective *World Economic Outlook* forecasts. In panel 3, the lines indicate the pairs of near- and medium-term forecasts, and do not assert a linear relationship between the two periods. The shaded regions correspond to ±1 standard error bands around 2018:Q3 predictions. In panels 4 and 5, the color shading depicts the percentile rank for the 5th percentile threshold (GaR) of near-term and medium-term growth forecast densities. See the April 2018 *Global Financial Stability Report* for details. GaR = growth-at-risk; GFSR = *Global Financial Stability Report*.

and regions.[6] Selected key regional vulnerabilities are highlighted in Figure 1.5 and discussed next:

- In the *United States*, procyclical fiscal policy has led to further deterioration of public debt dynamics (Figure 1.5, panel 1; see also the April 2019 WEO).

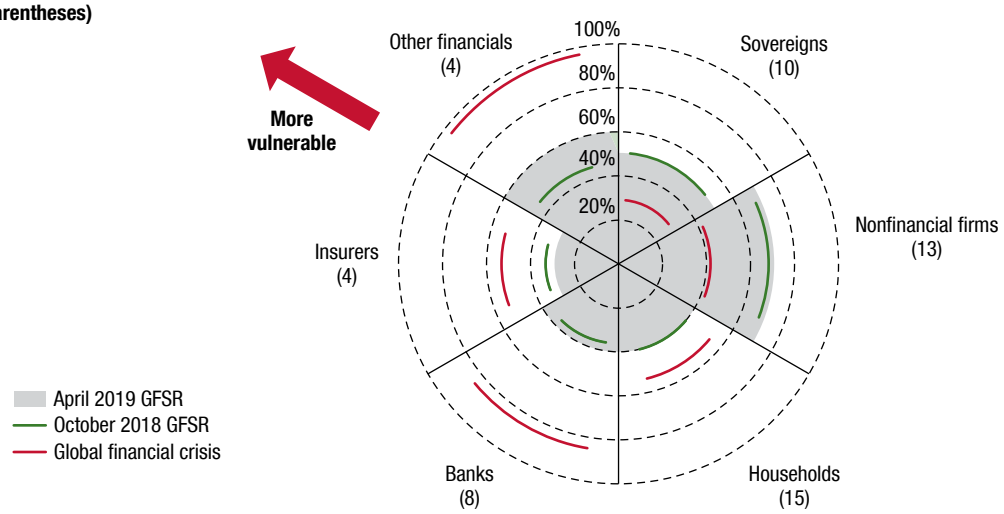
[6]Each sector in a country is compared with the same sector across a sample of 29 systemically important jurisdictions from 2000 to 2018 (latest observation). Advanced and emerging market economies are pooled separately.

Meanwhile, vulnerabilities continue to build in the corporate sector and among nonbank financial intermediaries. The corporate debt-to-GDP ratio is at a historically high level, though still lower than in some other countries (Figure 1.5, panel 2). Although the debt-service capacity of US firms has improved since the global financial crisis, this could change quickly if economic growth slows significantly or financial conditions tighten sharply (see "Late-Cycle

Figure 1.4. Global Financial Vulnerabilities

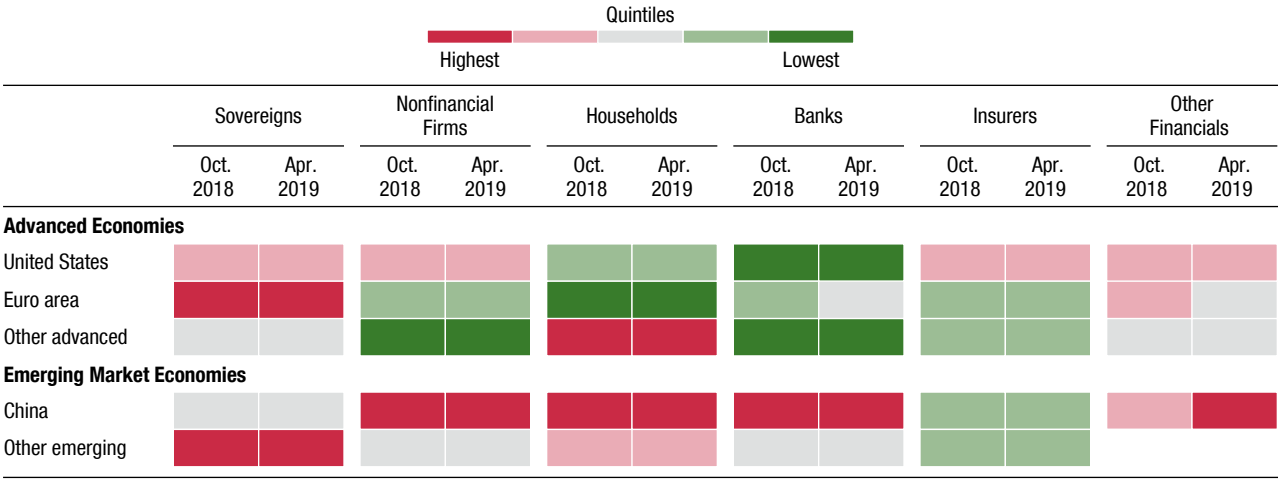
Sovereign and corporate sector vulnerabilities have increased since the global financial crisis, while vulnerabilities remain elevated in other financial sectors.

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



Sovereign vulnerabilities are elevated in many countries, and in China vulnerabilities are elevated in a number of sectors.

2. Financial Vulnerabilities by Sector and Region

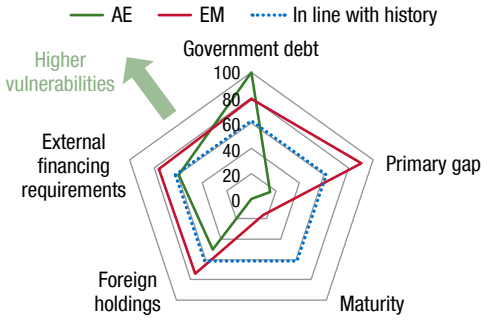


Sources: Bank for International Settlements; Bank of Japan; Bloomberg Finance L.P.; China Insurance Regulatory Commission; European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators database; S&P Global Market Intelligence; S&P Leveraged Commentary and Data; WIND Information Co.; and IMF staff calculations.
Note: In panel 1, the global financial crisis reflects the maximum vulnerability value from 2007 to 2008. In panel 2, red shading indicates a value in the top 20 percent of pooled samples of advanced and emerging market economies for each sector from 2000 through 2018 (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 in emerging market economies is based on all private nonfinancial firms. Other systemically important advanced economies comprise Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom. Other systemically important emerging market economies comprise Brazil, India, Mexico, Poland, Russia, and Turkey.
GFSR = *Global Financial Stability Report.*

Figure 1.5. Balance Sheet Vulnerabilities

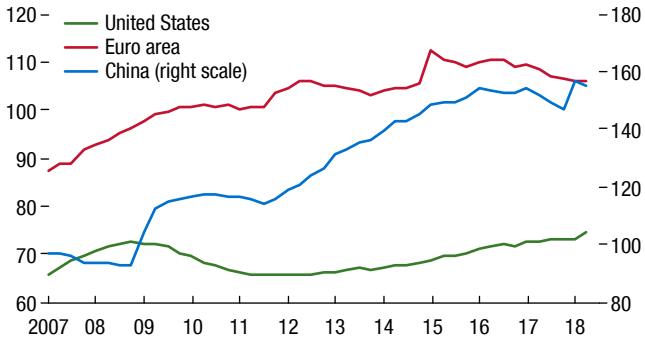
Sovereign vulnerabilities are elevated in both advanced and emerging market economies.

1. Sovereigns: Vulnerability Indicators for Advanced and Emerging Market Economies (Z-scores)



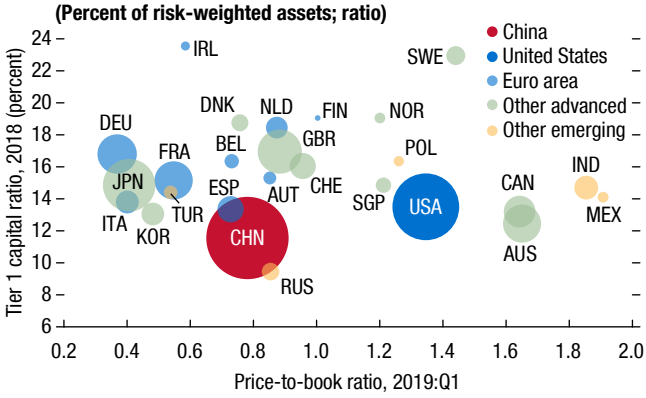
Corporate debt has expanded faster than GDP in several systemically important economies.

2. Nonfinancial Firms: Debt to GDP, by Region (Percent)



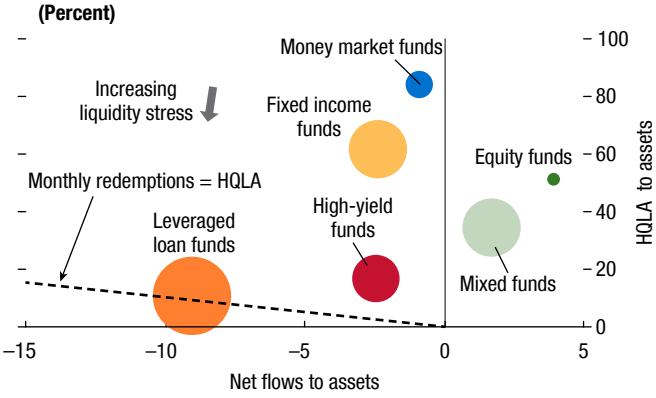
Some banking systems need to continue strengthening their balance sheets.

3. Banks: Capitalization and Market Valuation (Percent of risk-weighted assets; ratio)



Investment funds invested in less liquid assets have experienced higher redemptions during recent stress.

4. Redemptions versus High-Quality Liquid Assets, December 2018 (Percent)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators database; Moody's; Standard & Poor's Global Market Intelligence; Arslanalp and Tsuda (2014); Standard & Poor's Leveraged Commentary and Data; and IMF staff calculations.
Note: Panel 1 plots rescaled average *z*-scores for each of the parameters for 29 systemic countries over 2000 to 2018 calculated within AEs and EMs separately. For more details, see Online Technical Annex 1.1. Primary gap refers to the difference between government revenue and expenditure excluding interest payments and is measured as a percentage of GDP, as are government debt and external financing requirements. Foreign holdings are measured as a percentage of total government debt and maturity is measured as the average remaining number of years until maturity of government debt. In panel 3, the price-to-book ratio is the average for banks headquartered in each country and the size of circles is proportional to bank assets in US dollars. Data labels use International Organization for Standardization (ISO) codes. In panel 4, HQLA measures are assuming that 50 percent of equities, 67.5 percent of corporate IG bonds, and 93 percent of sovereign bonds are liquid assets. Securitized assets were split into IG and non-IG debt. The assigned values are based on Basel III liquidity coverage ratio principles. Bubble sizes indicate the degree of dispersion of observations and relate to one half of the geometric distances between sector averages and most distant observations among those with extreme values for net flows and liquidity within respective sector samples. Sample includes the 50 largest global funds within each fund category reported in Bloomberg. Average HQLA and net flows are computed on asset-weighted base. AE = advanced economy; EM = emerging market; HQLA = high-quality liquid assets; IG = investment grade.

Corporate Sector Risks in Advanced Economies" section). In the nonbank financial sector, funds invested in less liquid assets have experienced larger redemptions during the recent market turbulence (Figure 1.5, panel 4).

- In the *euro area*, vulnerabilities are most pronounced in the sovereign sector, with government debt elevated or still growing in some countries (such as Italy). Although corporate sector vulnerabilities in the euro area do not appear elevated on aggregate, corporate debt has increased significantly in a number of countries in recent years (for example, France). In some countries, corporate vulnerabilities are elevated because of lingering weaknesses among small and medium-sized enterprises. In the banking sector, sharp declines in equity valuations owing to growth concerns and continued structural challenges pose risks for some banks (Figure 1.5, panel 3) (see

"The Euro Area Sovereign–Financial Sector Nexus" section). In investment funds, liquidity and maturity mismatches have been rising since the global financial crisis. Although in aggregate the euro area insurance sector shows moderate vulnerabilities, there are concerns in some jurisdictions (see "The Euro Area Sovereign–Financial Sector Nexus" section).

- In *other advanced economies*, household leverage remains a key concern, with the ratio of household debt to GDP elevated and rising in a number of countries. Government debt remains elevated across most countries. Bank vulnerabilities are generally low in this group of countries, though there are some banking systems with high structural maturity and liquidity mismatches. In Japan, the low profitability of banks remains an ongoing concern, as does elevated risk taking by nonbank financial intermediaries.
- In *China*, nonfinancial and financial sector vulnerabilities remain elevated notwithstanding the authorities' efforts to reduce them (Figure 1.4).[7] Financial regulatory tightening has led to a contraction of investment vehicles' assets, but leverage in the broker-dealer sector has risen. Liquidity and maturity mismatches in the investment vehicle sector have widened, and borrowing by these vehicles has increased. Vulnerabilities in the banking sector also remain a concern, especially given bank exposures to leveraged borrowers, with small and medium-sized banks particularly in need of balance sheet strengthening. These vulnerabilities compound the authorities' challenge of responding to external shocks while containing the buildup of financial imbalances (see "Vulnerabilities in China, Emerging Markets, and Frontier Economies" section).
- In *other major emerging market economies*, weaker fiscal balances have been partially mitigated by reduced rollover risk as fiscal authorities have used the low-interest-rate environment to extend the maturity profile of debt. For banks, the picture is more mixed, with strains more pronounced in some emerging market economies.

[7]See IMF (2017) for a comprehensive assessment of China's financial system.

Asset Valuations Have Declined since the October 2018 GFSR, but Remain Somewhat Stretched

Despite market gyrations, asset valuations in some key markets currently appear to exceed the levels justified by fundamentals:

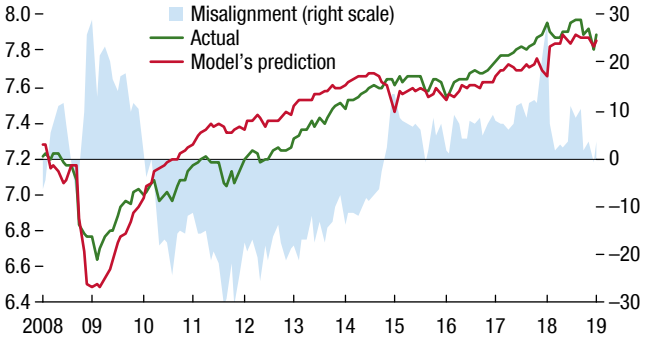
- *Price misalignments have narrowed in most major equity markets since the October 2018 GFSR.* In the United States, price declines in late 2018 helped reduce the extent of overvaluation (Figure 1.6, panel 1). Since then the recovery in equity prices has been accompanied by a reduction in earnings uncertainty (Figure 1.6, panel 2). Equity valuations in most major markets seem close to fair values (Figure 1.6, panel 3).[8]
- *On net, credit spreads have widened since the October 2018 GFSR, mostly as a result of higher credit risk premiums*—reflecting the compensation for liquidity and market risk over and above compensation for default risk (Figure 1.6, panel 4). Thus, although valuations have come down, they remain moderately elevated in US investment-grade, US high-yield, and emerging market corporate bonds. The compensation for default risk remains low reflecting low defaults and a still strong economic environment (see "Late-Cycle Corporate Sector Risks in Advanced Economies" section).
- *Term premiums are historically low but mostly fairly priced* (Figure 1.6, panel 5). Such levels typically reflect, among other things, expectations for low and stable inflation. As countercyclical variables, term premiums have historically been very low or negative ahead of economic downturns (Adrian and others 2014). However, this time the signal provided by the term premiums may be more muted due to unconventional monetary policies (as discussed in the April 2018 GFSR).
- *Real estate valuations appear elevated relative to fundamentals in some countries.* Commercial real estate is often used as collateral for corporate borrowing, so any sharp adjustment in prices could adversely affect firms' access to financing. Commercial real estate prices have risen sharply in a number of jurisdictions over recent years. Because prices have risen faster

[8]Panels 1–3 in Figure 1.6 show the results from a variant of the equity valuation model used in the October 2018 GFSR based on Durham (2013). The equity valuation model includes standard corporate and economic fundamentals—expected future corporate earnings, earnings uncertainty, and interest rates. Factors that may have affected stock prices through channels other than the variables used in the model would be captured by model residuals, which are used as a measure of price misalignment.

Figure 1.6. Asset Price Misalignment

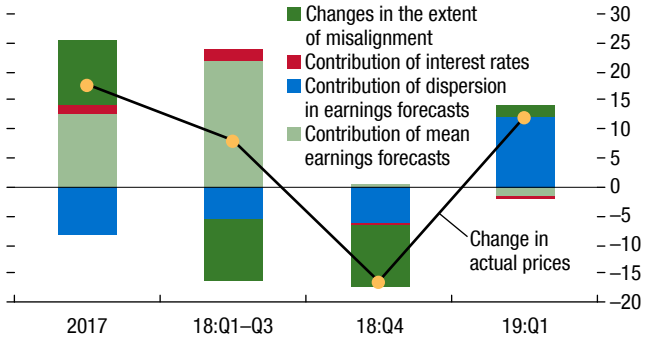
In the United States, the misalignment remained small since late 2018 ...

1. US Equity Market: Prices and Fundamentals-Based Valuations (S&P 500 index price in logs)



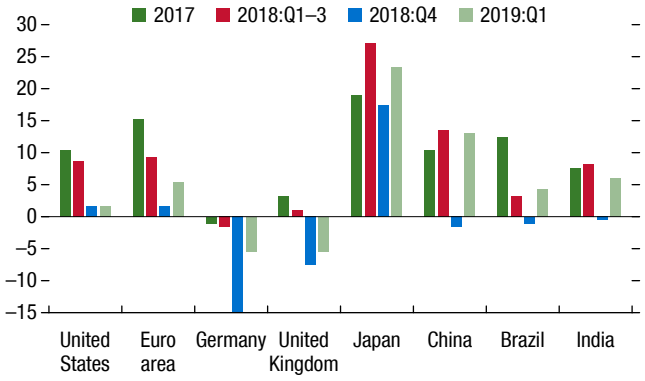
... as the recovery in equity prices has been accompanied by a reduction in earnings uncertainty.

2. US Equity Market: Changes in Prices and Contributions to Valuations (Percent and percent contributions; cumulative)



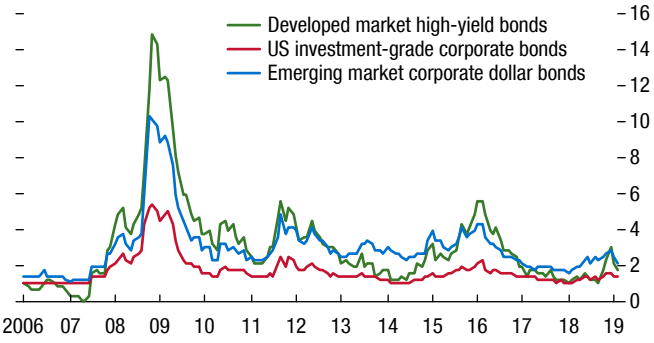
Equity valuations in most major markets seem close to fair values.

3. Global Equity Markets: Price Misalignments (Positive values indicate overvaluation; percent of prices)



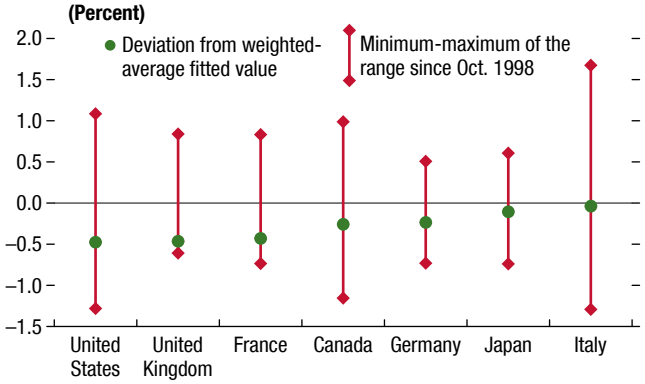
Credit risk premiums have widened, on net, since October 2018, but remain low by historical comparison.

4. Residual Market Risk Premiums for US Dollar-Denominated Corporate Bonds (Difference between corporate spread and default risk component; percent)



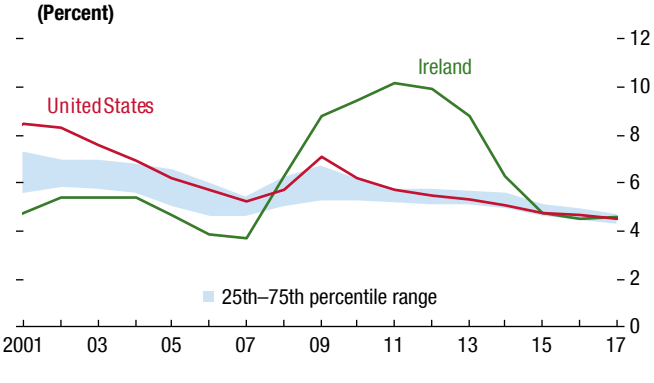
Term premiums are broadly in line with values implied by fundamentals.

5. Estimated 10-Year Term Premium (Percent)



Capitalization rates in most commercial real estate markets reached all-time lows, with some signs of overvaluation.

6. Capitalization Rates for Selected Economies (Percent)



Sources: Bloomberg Finance L.P.; IPD MSCI; JPMorgan Chase & Co.; Moody's; S&P Leveraged Commentary and Data; Thompson Reuters Datastream; Thompson Reuters I/B/E/S; and IMF staff calculations.
Note: Panels 1–3 show the results from an equity valuation model based on average expected earnings, dispersion in earnings expectations, and interest rates. Panel 4 shows the estimated risk premium, defined as the difference between the observed monthly bond spread and the estimated default risk compensation, based on default probabilities by rating. Panel 5 shows 10-year term premium estimates based on the Adrian, Crump, and Moench (2013) model relative to the value implied by fundamentals in a number of models. For explanation of the methodology, please see Box 1.2 in the April 2018 *Global Financial Stability Report*. In panel 6, the capitalization rate is the ratio of the asset's net operating income to its market value. Selected economies include Australia, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

than rental values, capitalization rates—a measure of income relative to prices—have reached all-time lows in some countries, which is indicative of overvaluation, but their spread to risk-free rates is still above precrisis levels (Figure 1.6, panel 6). Concerns about downside risks to residential real estate prices remain in a number of countries (see Chapter 2).

A Number of Risks Could Trigger a Renewed Sell-Off of Risk Assets

Continued accommodative financial conditions will likely facilitate further buildup of vulnerabilities. These vulnerabilities could be exposed in the event of a sharp tightening in financial conditions. Possible triggers include the following:

- *A sharper-than-expected global growth slowdown:* Disappointing economic data releases could lead to further earnings downgrades, poor credit performance, and a repricing of risk assets. A lack of policy space (monetary or fiscal) to accommodate adverse shocks would amplify this risk.
- *Unexpected shifts to a less dovish outlook for monetary policy in advanced economies:* Investor sentiment has improved since the Federal Reserve signaled a change in its stance, and markets have rallied. A change in expectations stemming from stronger-than-expected economic data releases or the possibility that investors have taken too benign a view regarding the outlook for monetary policy in the United States could lead to a sharp repricing of risk assets. In this event, pressures on emerging markets could resume through disruptions in cross-border capital flows.
- *Protracted trade tensions:* Expectations of a positive outcome in the US-China trade negotiations have lifted asset valuations in trade-dependent sectors, even though China's export orders have ebbed. An escalation of trade tensions would likely trigger a renewed sell-off.[9]
- *Brexit:* A stalemate in the Brexit process threatens to unsettle financial markets, damage investors' confidence, adversely affect business investment, and give rise to some operational and contractual uncertainties in Europe and the United Kingdom.
  - The authorities have taken important steps to reassure markets. Risk-mitigation measures taken by the EU and UK authorities include the recent activation of currency swap arrangements between the Bank of England and the ECB to underpin market liquidity. The EU adopted time-limited equivalence decisions for UK central counterparties and central securities depositaries in the event of a no-deal Brexit. The UK has also put in place temporary permission measures. In addition, postcrisis reforms and supervisory actions have strengthened the liquidity positions of banks, dealers, and insurance companies. Authorities urged market participants to prepare for all Brexit outcomes and the private sector has reportedly undertaken a number of steps. Insurance companies are making good progress in restructuring their business in order to continue to serve their customers after Brexit and there has also been some limited private sector action to transfer derivative contracts.
  - Although thus reduced compared to the previous GFSR, risks remain, including around the continued performance of lifecycle events on some uncleared derivative contracts; operational risks for banks, insurers, and asset managers; and market-wide issues such as reduced market liquidity, and risk management challenges and supervisory constraints (see Box 1.3 of the October 2018 GFSR). Market liquidity has proven resilient thus far, although there has been heightened volatility in the gilt market around significant Brexit-related announcements (see Special Feature).
  - Despite intermittent strains and continued uncertainty about the ultimate Brexit outcome, trading conditions in European and UK financial markets have been orderly on the whole. While the immediate aftermath of the Brexit referendum saw outsized moves in foreign exchange and rates markets, as well as redemption pressures in some UK investment funds. More recently, most asset classes have been resilient aside from increased volatility in sterling markets and some redemptions from real estate funds. Given heightened uncertainties related to Brexit negotiations, there is a risk that volatility in financial markets may rise sharply as key deadlines approach.

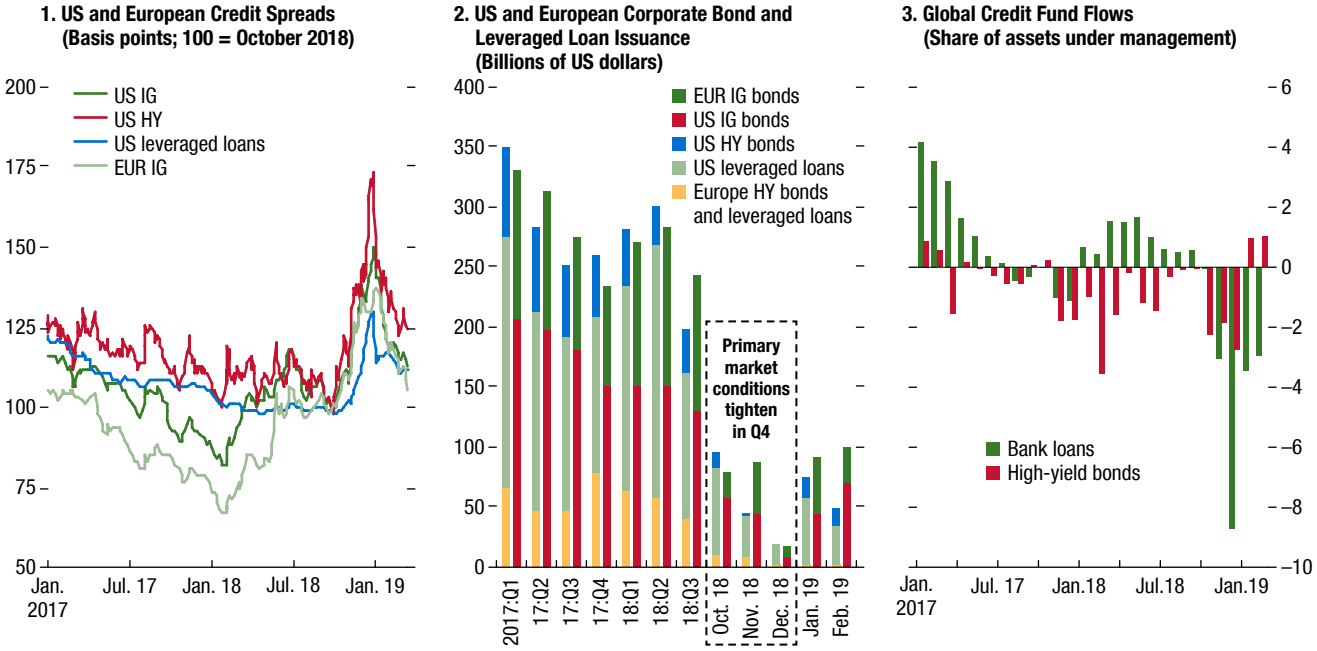
Late-Cycle Corporate Sector Risks in Advanced Economies

A slowing global economy and recent market gyrations have raised concerns about the resilience of nonfinancial

[9]For a more detailed discussion of channels of spillovers and their impact on countries, please see the October 2018 *Regional Economic Outlook: Asia and Pacific*.

Figure 1.7. Credit Market Developments in the United States and Europe

In late 2018, credit spreads widened ... ... new issuance declined ... ... while fund flows decreased, before recovering in early 2019.



Sources: Bloomberg Finance L.P.; Barclay's; Dealogic; EPFR Global; Haver Analytics; S&P Leveraged Commentary and Data; and IMF staff estimates.
Note: In panel 1, IG and HY are investment-grade and high-yield option-adjusted spreads to government bonds. For leveraged loans, spread is over Libor. AUM = assets under management; EUR = European firms; HY = high yield; IG = investment grade; Libor = London interbank offered rate.

firms. In most advanced economies, debt-service capacity in the corporate sector improved during the recent cyclical upswing. Balance sheets appear strong enough to sustain a moderate economic slowdown or a gradual tightening of financial conditions. However, overall debt levels and financial risk taking have increased, and creditworthiness of borrowers has deteriorated in the investment-grade bond and leveraged loan markets. A significant downturn or a sharp tightening of financial conditions could lead to a notable repricing of credit risks and strain the debt-service capacity of indebted firms. Should monetary and financial conditions remain easy for longer, debt will likely continue to rise over the medium term in the absence of policy action, raising the risk of a sharper adjustment in the future.

After Faltering in Late 2018, Risk Sentiment in Credit Markets Is on the Rise Again

Major credit markets rebounded in early 2019 after selling off in late 2018. In December, spreads on corporate bonds and leveraged loans widened sharply in the United States and in Europe, especially for lower-rated firms (Figure 1.7, panel 1). Leveraged finance issuance nearly dried up (Figure 1.7, panel 2), while bond and loan investment funds experienced large outflows (Figure 1.7, panel 3). In early 2019, corporate spreads tightened in parallel with the broader recovery in asset prices, and primary high-yield bond markets reopened. These market gyrations occurred against a backdrop of slowing global growth, as well as changing market expectations about future corporate earnings and the pace of monetary policy normalization in the United States.

The Unique Features of the Current Credit Cycle Imply Different Risks

Accommodative policies adopted after the global financial crisis have succeeded in supporting credit expansion, but debt has risen to historically high levels. Each of the two key segments of the credit market—investment-grade bonds and speculative-grade credit (high-yield bonds and leveraged loans)—has become riskier (see Table 1.1). Furthermore, the role of nonbank lenders, particularly investment funds and foreign

Table 1.1. How Is the Current Corporate Credit Cycle Different from Past Cycles?

Sources of Credit: The Investor Base for Corporate Debt	Uses of Credit: Credit Quality of Corporate Debt Issuers
Market-based finance has expanded faster than bank lending to the corporate sector which, may imply different market dynamics in periods of stress (Figure 1.8, panel 1): • The role of *investment funds*, including exchange-traded funds (ETFs), has increased.[1] Their holdings of corporate bonds in the United States have more than doubled since 2009, reaching about 20 percent in 2018 (Figure 1.8, panel 2). This may imply higher refinancing risks for borrowers. • *Insurers and pension funds* still represent a large share of the investor base in corporate bonds. While these investors are generally viewed as stable, they typically have credit rating restrictions. • *Foreign investors'* share in corporate bond holdings has increased from 25 percent to 30 percent in the United States. These investors may adjust exposures in response to higher foreign exchange hedging costs or to rating downgrades. • In the US *leveraged loan market,* the share of banks declined to only 8 percent, while the share of collateralized loan obligations increased from 47 percent to close to 60 percent.	Corporate bond issuers are now generally *more leveraged* than before the global financial crisis: • In the overall credit market, the share of *speculative-grade credit* (high-yield bonds and leveraged loans) declined from 31 percent in 2007 to 25 percent in 2018.[2] • In the investment-grade corporate bond market, the outstanding stock of *BBB-rated bonds* has quadrupled since the global financial crisis, driven by new BBB issuance, rating downgrades, and new entrants (Figure 1.8, panels 3 and 4).[3] Debt-service capacity in the investment-grade market has improved, but leverage has risen (Figure 1.8, panel 5). In the high-yield bond market, the share of *CCC-rated bonds* has declined from 19 percent in 2007 to 15 percent in 2018. • The *US leveraged loan market* has grown rapidly and approached the size of the high-yield bond market because of new entrants and migration from the high-yield bond market, where investor scrutiny is greater (Figure 1.8, panel 6). The leveraged loan market is now characterized by elevated leverage, limited liquidity, and reduced investor protections.

Source: IMF staff.
[1] ETFs offer daily liquidity to end-investors but may hold less liquid assets (see the April 2018 *Global Financial Stability Report*).
[2] Speculative-grade credit amounted to 3 percent of GDP in the euro area and 12 percent of GDP in the United States in 2018.
[3] BBB-rated bonds are the lowest-rated bonds in the investment-grade category of corporate bonds.

investors, in the US and European corporate bond markets has increased. With some of these funds facing rising liquidity mismatches (as discussed in "Global Financial Stability Assessment" section), financial stability implications may be different during significant market stress or an economic downturn.

The Corporate Credit Cycle Appears to Be Advanced in the United States

The US corporate credit cycle appears to be at its highest point in recent history, and further along than in Europe (Figure 1.9, panels 1 and 2).[10] Selected indicators of corporate fundamentals and financial risk taking point to late-cycle dynamics in the United States (Figure 1.9, panels 3 and 4), partly reflecting the longest economic expansion in US history. Corporate debt is skewed toward lower-rated issuers, and leverage—often a precursor of economic downturns or financial crises—is close to cycle highs across most credit ratings buckets.[11] In Europe, the credit cycle appears to have been shorter and shallower to date, partly due to the euro area debt crisis. European credit providers and firms have been more conservative than their US peers, but structural weaknesses remain in the small and medium enterprise sector.[12]

Corporate Earnings Growth May Have Peaked

Corporate profitability has improved over the past two years (Figure 1.10, panel 1). The level and growth rate of corporate profits—as measured by returns on assets—have been notably higher in the United States than in other advanced economies. The profitability of large US corporations has been boosted by tax reform, but has also been supported by strong revenue growth and wider profit margins (Figure 1.10, panel 2).[13] However, profits declined notably in the fourth quarter last year.

Financial risk taking has remained strong among US firms. As discussed in the April 2017 GFSR, increased financial risk taking by nonfinancial firms—mergers and acquisitions and payouts—historically follows corporate-friendly tax reforms. Large US corporations have continued to increase payouts to shareholders

[10]Indicators of the late stage of the credit cycle include deteriorating underwriting conditions, increased risk taking, easy credit conditions, strong profits, and high leverage. By contrast, a downturn is associated with increasing defaults, falling profits, tighter credit conditions, and a shift from shareholder- to creditor-friendly activities.

[11]Several studies have found that elevated leverage and rapid credit growth are leading indicators of economic downturns or banking crises (see, for example, Chapters 2 and 3 of the October 2017 GFSR).

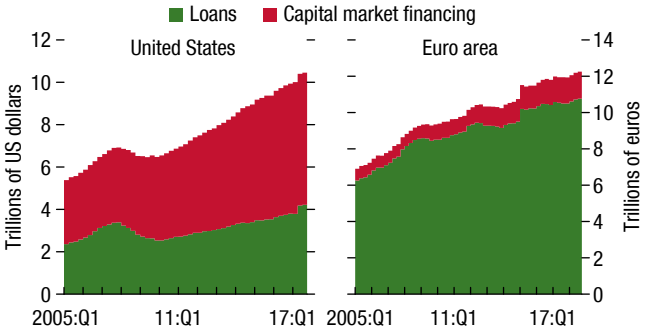
[12]For example, see the European Central Bank's November 2018 *Financial Stability Review.*

[13]Wider profit margins could be due to increased market power in large firms. See Chapter 2 of the April 2019 WEO.

Figure 1.8. The Key Features of the Current Corporate Credit Cycle

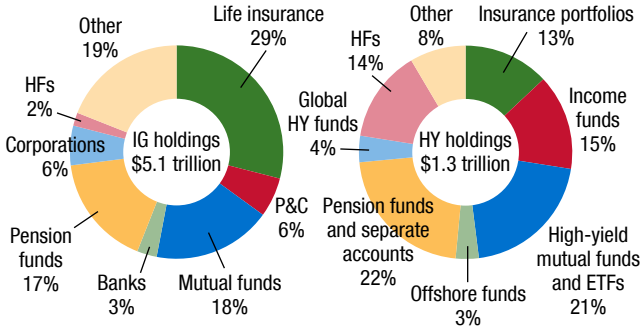
Nonfinancial business sector reliance on capital-market financing has increased.

1. Nonfinancial Business Financing: Loans and Debt Securities



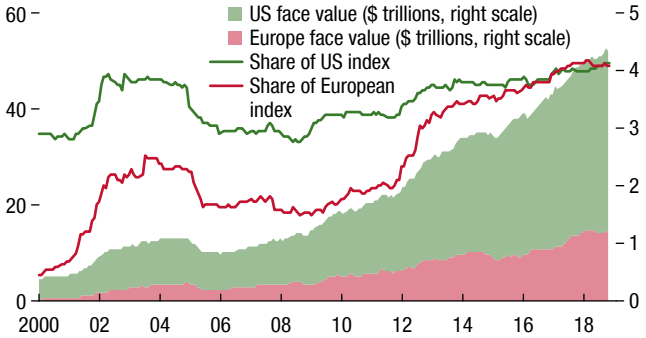
Investment funds and foreign investors account for a large share of corporate bond holdings.

2. Indicative Holdings of US Corporate Bonds



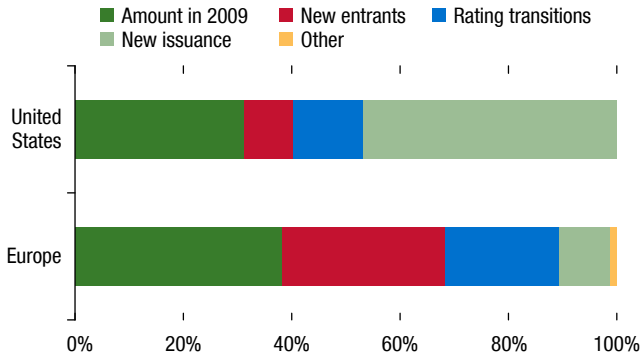
The outstanding stock of BBB-rated corporate bonds has more than quadrupled since the crisis ...

3. BBB-Rated Bonds in Investment Grade Indices (Percent of total; trillions of US dollars)



... driven by new issuance, rating changes, and new entrants.

4. Evolution of BBB Corporate Bond Universe from 2009 to 2018



BBB issuers' debt-service capacity has improved but indebtedness has risen.

5. US Credit Fundamentals of BBBs: 2018 versus 2007 (Percent/ratio/basis points/number/percentile rank)

Credit Fundamentals	Level 2007	Level 2018	Percentile Signal 2007	Percentile Signal 2018
Size (as a percentage of IG outstanding)	34.6	49.3	●	●
Gross Leverage (times)	2.4	3.0	●	●
Net Leverage (times)	2.1	2.6	●	●
Share of Companies with > 4× Leverage (percent)	16	23	●	●
Interest Coverage (times)*	7.3	7.9	●	●
EBITDA Margin (percent)*	19	21	●	●
Gross Margin (percent)*	35	40	●	●
Spread (basis points)	198	121	●	●
* = Icons are reversed			● 0%	● 100%

The loan market has doubled in size, but investor protections and credit quality have deteriorated.

6. US Leveraged Loan Characteristics: 2018 versus 2007

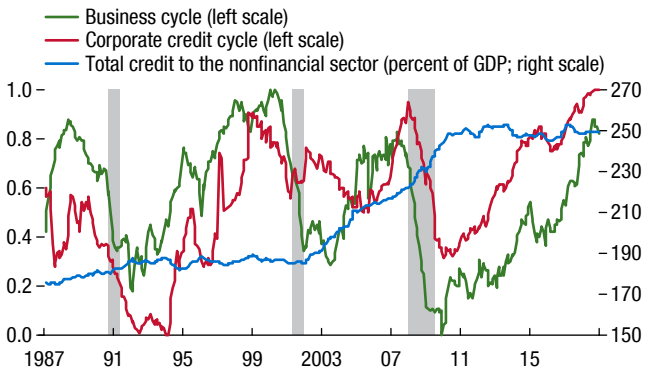
US Leveraged Loan Market Characteristics	Level 2007	Level 2018	Percentile Signal 2007	Percentile Signal 2018
Outstanding Leveraged Loans ($ billions)	554	1,147	●	●
US Issuance (percent of global issuance)	66.9	75.8	●	●
Covenant Quality Index	2.6	4.1	●	●
Covenant-Lite Share (percent of new issuance)	29.2	84.7	●	●
B-Rated (percent of new issuance)	22.6	58.0	●	●
Total Debt/EBITDA (times)	4.9	5.3	●	●
First Lien Debt/EBITDA (times)	3.5	4.3	●	●
Other Debt/EBITDA (times)	1.4	1.0	●	●
Deals with EBITDA Add-Backs (percent of new issuance)	8.4	27.1	●	●
			● 0%	● 100%

Sources: Autonomous Research; Bank of America Merrill Lynch; Barclays; Bloomberg Finance L.P.; CEF Connect; EPFR Global; European Central Bank; Federal Reserve; Hedge Fund Research; ICE Bond Indices; Lipper; Moodys; SNL Financial; S&P LCD; and IMF staff estimates.
Note: In panel 2, "other" includes endowments, foundations, sovereign wealth funds, offshore funds, households, and bonds held by foreign entities. Panel 5 refers to nonfinancial issuers, with the exception of size (which includes financials). The sample is based on percentile ranks of quarterly data from 1997:Q1 through 2018:Q4. In panel 6, a higher score in the covenant quality index represents weaker covenant protection. EBITDA = earnings before interest, taxes, depreciation, and amortization; ETF = exchange-traded funds; HF = hedge funds; HY = high yield; IG = investment grade; P&C = property and casualty.

Figure 1.9. Tracking the Corporate Credit Cycle: United States versus Europe

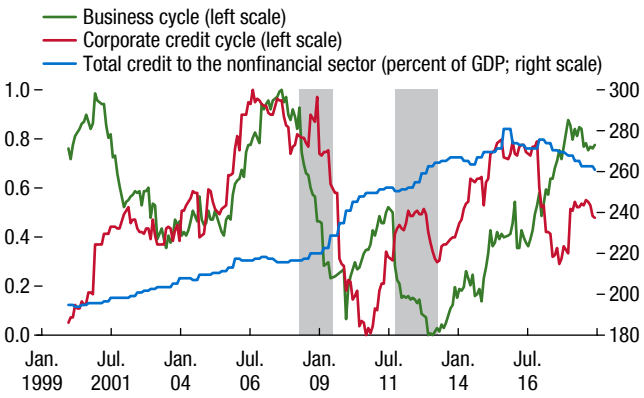
US economic indicators have climbed to postcrisis highs, but the credit cycle has advanced even faster.

1. US Business and Corporate Credit Cycles (Percentile rank, rescaled; percent of GDP)



European economic indicators have started to decelerate, while the credit cycle has been more muted given ongoing bank balance sheet repair.

2. European Business and Corporate Credit Cycles (Percentile rank, rescaled; percent of GDP)



A plethora of indicators of risk-taking point to a late stage of the credit cycle in the United States.

3. Underlying Indicators: US Business and Corporate Credit Cycles (Percentile rank)

		US Credit Cycle Indicators	Latest Level	Signal	Percentile
Business Cycle		Industrial Production (YoY percent)	4.0	●	71%
		Unemployment Rate (percent)	3.9	●	99%
		Consumer Confidence Index (1985 = 100)	126.6	●	88%
		Capacity Utilization (percent of total capacity)	78.5	●	41%
		Output Gap (percent of potential GDP)	0.2	●	70%
Corporate Credit Cycle	Corporate Fundamentals	Debt/GDP - Nonfinancial Firms	74.4	●	98%
		C&I Loan Growth (YoY percent, 6MMA)	4.0	●	33%
		IG Gross Leverage (times)	6.4	●	99%
		HY Gross Leverage (times)	4.4	●	80%
		IG Interest Coverage Ratio (times)	9.8	●	58%
		HY Interest Coverage Ratio (times)	4.6	●	8%
		IG Capex/Sales	4.4	●	26%
		IG Cash/Debt	13.6	●	66%
	Financial Risk-Taking	BBB (percent of total IG)	49.3	●	99%
		CCC or Below (percent of HY new issuance)	8.4	●	45%
		HY/Loan Issuance (percent of outstanding)	9.3	●	27%
		Ex-Fin Net Stock Buyback Volumes S&P 500 ($ billions)	427.6	●	98%
		M&A Loan Volumes ($ billions)	157.1	●	97%
		M&A/LBO Issuance (percent of HY/loans supply)	46.4	●	61%
		LBO Loan Volume ($ billions)	108.6	●	93%
		LBO Transactions > 6 times leverage	47.6	●	90%
		Global CLO Volume ($ billions)	136.5	●	95%
		New Issue Leverage on all First-Lien Loans (times)	4.2	●	95%

Early Cycle ● ● ● ● Late Cycle

In Europe, financials and firms are more cautious after the sovereign debt crisis.

4. Underlying Indicators: European Business and Corporate Credit Cycles (Percentile rank)

		Europe Credit Cycle Indicators	Latest Level	Signal	Percentile
Business Cycle		Industrial Production (YoY percent)	1.2	●	42%
		Unemployment Rate (percent)	8.1	●	88%
		Consumer Confidence (percent balance/diffusion index)	–6.2	●	75%
		Capacity Utilization (percent of total capacity)	83.6	●	80%
		Output Gap (percent of potential GDP)	–0.2	●	68%
Corporate Credit Cycle	Corporate Fundamentals	MFI Loans to Nonfinancial Firms Corp (YoY percent)	2.9	●	61%
		IG Net Leverage (times)	2.0	●	62%
		HY Net Leverage (times)	2.9	●	21%
		IG Int Coverage (times)	7.0	●	3%
		HY Int Coverage (times)	2.3	●	21%
		IG Capex to Sales	5.9	●	30%
		HY Capex to Sales	5.0	●	63%
		IG Cash to Debt	26.6	●	8%
		HY Cash to Debt	19.9	●	11%
	Financial Risk-Taking	BBB (percent of total IG outstanding)	48.7	●	94%
		CCC (percent of outstanding market)	2.3	●	2%
		L12M IG Nonfinancial Supply (percent of IG/HY supply)	82.6	●	64%
		L12M IG Share Buybacks (EUR billions)	41.0	●	53%
		L12M IG M&A (EUR billions)	153.8	●	28%
		L12m Buyout Loan Volume (EUR billions)	22.0	●	47%
		Cov-Lite (percent of loan issuance)	87.7	●	99%
		HY Bond Use of Proceeds for Acquisitions	34.2	●	69%
		Loan Use of Proceeds for Acquisitions	70.6	●	82%

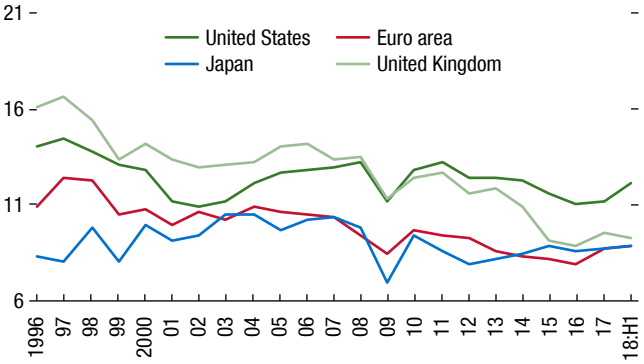
Early Cycle ● ● ● ● Late Cycle

Sources: Bank for International Settlements; Bloomberg Finance L.P.; Bond Radar; Dealogic; European Central Bank; European Commission; Eurostat; Federal Reserve; Markit; Moody's; Morgan Stanley; S&P Leveraged Commentary & Data; and IMF staff estimates.
Note: In panels 1 and 2, indicators are equally weighted based on rescaled percentile ranks. Data extend from 2000 for Europe and from 1980 for the United States. Europe mostly includes the euro area. Shaded areas indicate recessions. In panels 3 and 4, icons and percentile ranks are reversed for unemployment rate, interest coverage, cash/debt, and share of investment-grade (IG) debt. BBB = BBB-rated bonds; Capex = capital expenditure; CCC = CCC-rated bonds; C&I = commercial and industrial; CLO = collateralized loan obligations; Cov-lite = relaxed covenants; EUR = euro; Fin = financial; HY = high yield; Int = interest; LBO = leveraged buyouts; L12M = last 12 months; M&A = mergers and acquisitions; MFI = monetary financial institutions; 1L = first lien; 6MMA = six-month moving average; YoY = year over year.

Figure 1.10. Corporate Profitability Indicators in Advanced Economies

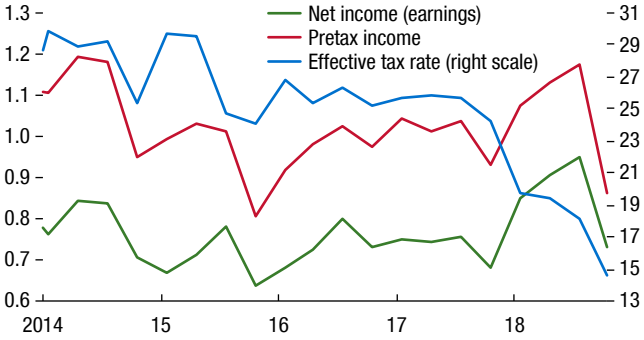
Profitability has been higher in the United States than in other advanced economies ...

1. Global Profitability Trends
(EBITDA in percent of assets)



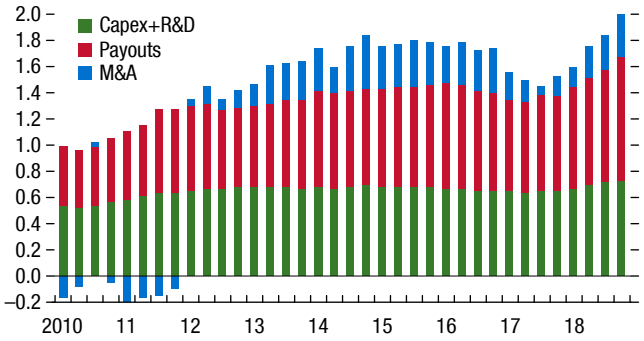
... driven by a falling tax rate and by strong revenue growth—albeit with a notable decline in the fourth quarter of 2018.

2. US S&P 500 Firms: Profitability Drivers
(Percent of assets)



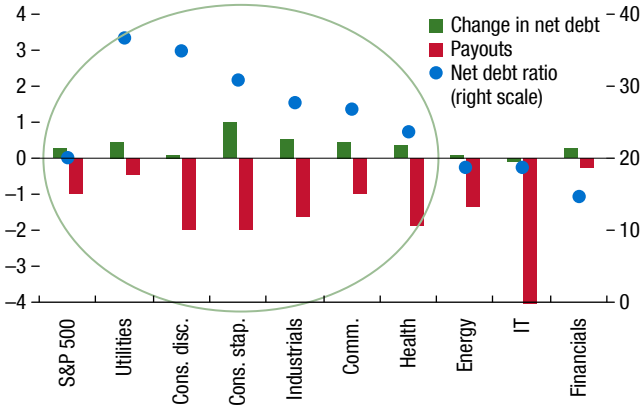
Strong profits in the United States were used for payouts and other financial risk-taking.

3. US S&P 500 Firms: Uses of Cash Flow
(Percent of assets; four-quarter moving average)



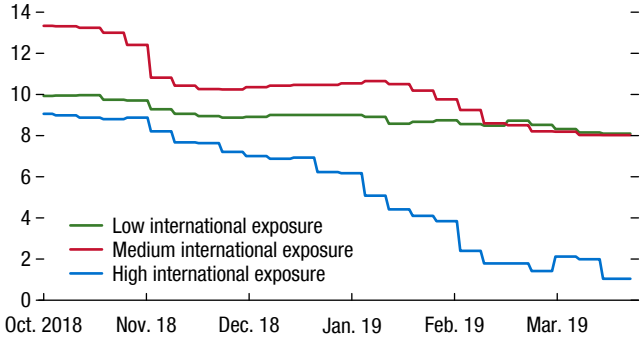
In many sectors, payouts were also financed with borrowing, despite already elevated debt ratios.

4. US S&P 500 Firms: Payouts, Net Borrowing, and Debt Ratios
(2018; percent of assets)



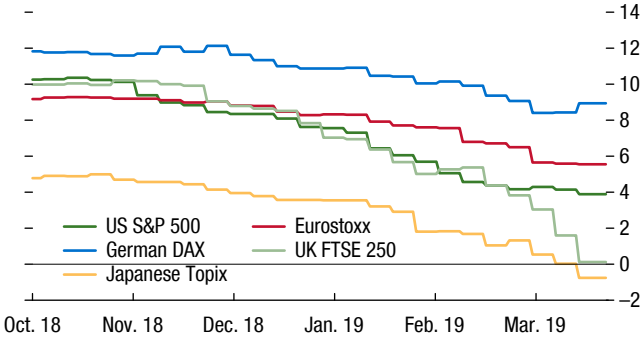
US corporate profit forecasts have been revised down, particularly at firms with significant international exposures.

5. US S&P 500 Sectors: Expected EPS Growth, 2019
(Year-over-year percent change)



Expected earnings growth has been revised down in other regions because of weaker economic data.

6. Global Equity Markets: Expected EPS Growth, 2019
(Year-over-year percent change)



Sources: Bloomberg Finance L.P.; S&P Capital IQ; Thomson Reuters Datastream; Thomson Reuters I/B/E/S; and IMF staff calculations.
Note: In panel 1, the sample from S&P Capital IQ includes about 20,000 firms in the euro area, Japan, the United Kingdom, and the United States. In the euro area, they represent 23 percent of total debt in the total corporate sector; in Japan, 40 percent of total debt; in the United Kingdom, 36 percent of total debt; and in the United States, 76 percent of debt, measured as loans and debt securities. Capex = capital expenditure; Comm. = communications; Cons. disc. = consumer discretionary; Cons. stap. = consumer staples; EBITDA = earnings before interest and taxes, depreciation; and amortization; EPS = earnings per share; IT = information technology; M&A = mergers and acquisitions; R&D = expenses for research and development; SGA = sales, general, and administrative.

through dividends and share buybacks, which outstripped gains in investment and reached postcrisis highs (Figure 1.10, panel 3). In some sectors, payouts have been financed by net borrowing, adding to already-elevated debt (Figure 1.10, panel 4).

Global earnings growth has likely peaked. Market analysts' forecasts of US firms' earnings growth for 2019 have been revised down, reflecting expectations of fading fiscal stimulus, higher interest rates, rising input costs and wages, trade tensions, and slowing global demand. Sectors with high international exposures, such as information technology, have borne the brunt of earnings markdowns, while domestically oriented sectors, such as financials, have been less affected (Figure 1.10, panel 5). In other advanced economies, deteriorating global market sentiment and weaker domestic economic data have contributed to downward revisions to 2019 earnings growth as well (Figure 1.10, panel 6).

Lower Profits Will Weaken Credit Quality, Given High Debt Levels

Until recently, cyclical factors supported corporate balance sheets. A prolonged period of monetary accommodation led to a substantial reduction in the debt-servicing costs of nonfinancial firms. At the same time, the global economic recovery sustained corporate profits globally, while tax reform gave an extra boost to corporate profits in the United States (see the April 2017 and the April 2018 GFSRs). As a result, the share of debt at firms with weak debt-service capacity and significant liquidity and rollover risks, or with excessive net leverage relative to profits, is now broadly lower than both a few years ago and before the global financial crisis in most major advanced economies:[14]

- *Debt-service capacity*—measured by the share of debt in firms with low (below 1) and subpar (between 1 and 3) interest coverage ratios—has improved in most major advanced economies in the recent period and even more so since before the crisis (Figure 1.11, panel 1), reflecting stronger profits and lower interest expenses. One notable exception is the United Kingdom, where the share of debt in firms with low interest coverage ratios has increased.
- *Liquidity and rollover risks* in nonfinancial firms have declined as well. Easy financial conditions and favorable financing terms have allowed companies to refinance and restructure problem debts, extend debt maturities, and build cash buffers. For example, the share of debt owed by firms with low (below 10 percent) cash buffers relative to their short-term debt has fallen notably in most major advanced economies (Figure 1.11, panel 2).
- *Net leverage ratios*—measured by the share of debt in firms with high (above 6) net debt to earnings before interest, tax, depreciation, and amortization (EBITDA)—have improved in the United States and the United Kingdom relative to the precrisis period but have weakened in the euro area and Japan (Figure 1.11, panel 3). Easy financial conditions and relatively comfortable debt-service capacity have allowed firms to continue accumulating debt.

However, structural leverage indicators have deteriorated. *Aggregate corporate debt–to-GDP ratios* have risen to historically high levels in advanced economies. Reflecting companies' efforts to deal with problem debt after the crisis, the share of debt owed by firms with high (above 0.6) debt-to-asset ratios has declined (Figure 1.11, panel 4). However, the share of debt at firms with moderate (between 0.3 and 0.6) indebtedness has increased in both the United States and the euro area.

With debt at historically high levels, the corporate sector is vulnerable to large economic and financial shocks. Although corporate balance sheets are strong enough to sustain a moderate economic slowdown or a gradual tightening of financial conditions, a significant deceleration in earnings growth or a sharp tightening of financial conditions could lead to a notable deterioration in corporate credit quality. A policy easing—even if timely and decisive—may work with a lag to effectively counter a sudden and significant widening of credit risk premiums. A weakening in corporate credit quality would affect investors through both direct credit losses and increased market stress from potential downgrades—particularly in the oversized cohort of BBB-rated issuers.

Large-Scale Downgrades of US Corporate Credits Are Possible, but the Fallout May Be Limited

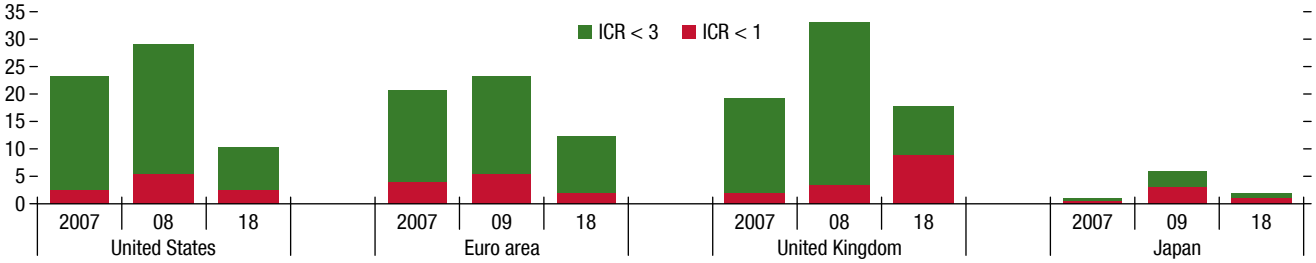
Investors have recently become more concerned about credit risk. A decomposition of high-yield spreads suggests that the widening of spreads in the fourth

[14]Other measures include the riskiness of credit allocation, which was shown to rise during periods of fast credit expansion and to signal a higher probability of economic downturn and financial stress (see the April 2018 GFSR).

Figure 1.11. Corporate Credit Quality Indicators in Advanced Economies

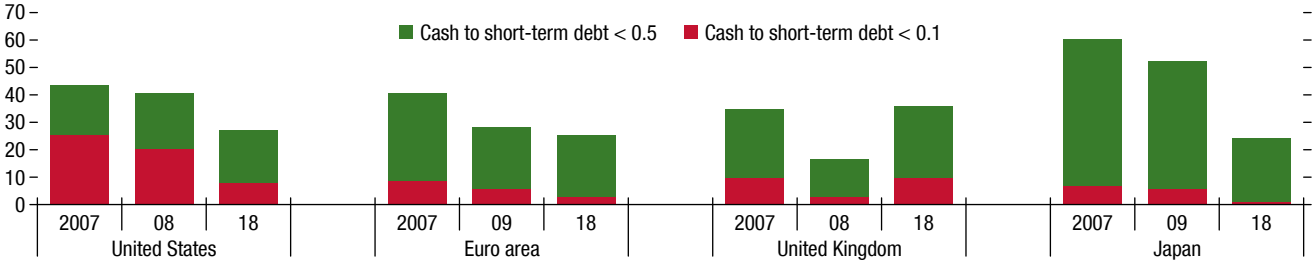
Extraordinary monetary accommodation has supported the corporate sector ...

1. Share of Corporate Debt Owed by Firms with Low (below 1) and Subpar (between 1 and 3) EBITDA-to-Interest Expense Ratios (Percent)



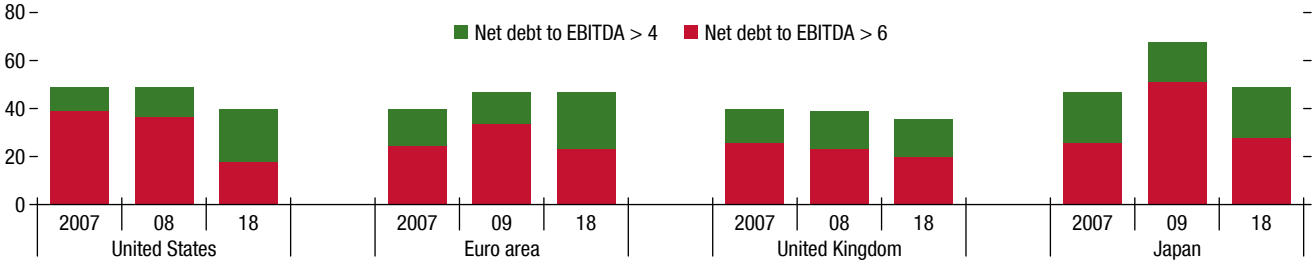
... and favorable financing terms have allowed firms to extend maturities and reduce rollover risks.

2. Share of Corporate Debt Owed by Firms with Low (below 10 Percent) and Subpar (between 10 Percent and 50 Percent) Cash-to-Short-Term-Debt Ratios (Percent)



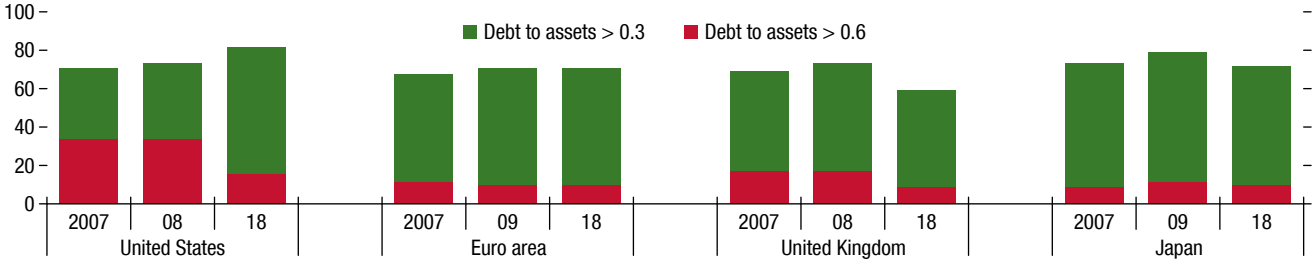
A recovery in earnings has helped restrain the increase in corporate leverage (debt-to-earnings ratios) ...

3. Share of Corporate Debt Owed by Firms with High (above 6) and Elevated (between 4 and 6) Net Debt-to-EBITDA Ratios (Percent)



... whereas debt-to-asset ratios have continued to climb at moderately indebted firms.

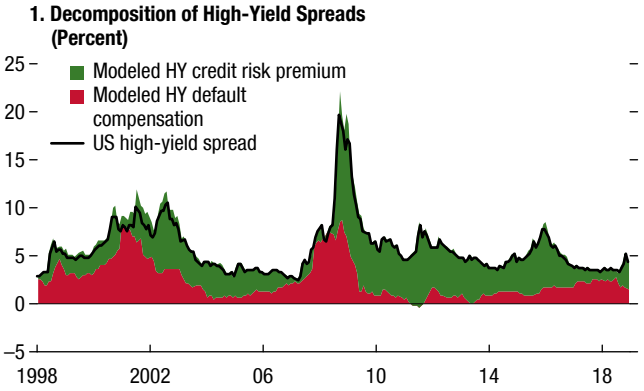
4. Share of Corporate Debt Owed by Firms with High (above 0.6) and Moderate (between 0.3 and 0.6) Debt-to-Asset Ratios (Percent)t



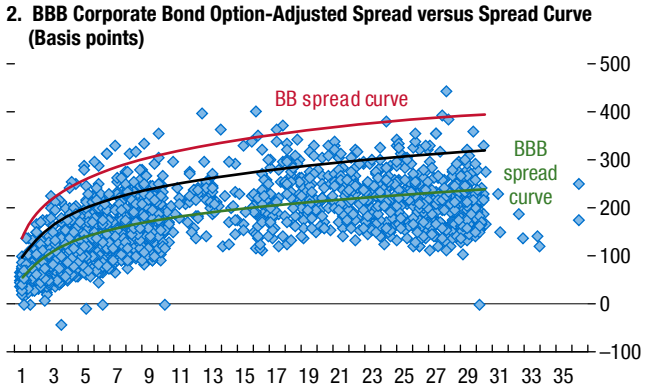
Sources: S&P Capital IQ; and IMF staff calculations.
Note: The sample includes about 20,000 firms in the euro area, Japan, the United Kingdom, and the United States. In the euro area, they represent 23 percent of total debt in the total corporate sector, in Japan 40 percent of total debt, in the United Kingdom 36 percent of total debt, and in the United States 76 percent, measured as loans and debt securities. The middle bars in every panel show the worst year (in terms of corporate credit metrics) since the global financial crisis, which could be either 2008 or 2009. EBITDA = earnings before interest, tax, depreciation, and amortization; ICR = interest coverage ratio.

Figure 1.12. Potential Fallout from the BBB Bond Downgrades on the US High-Yield Corporate Bond Market

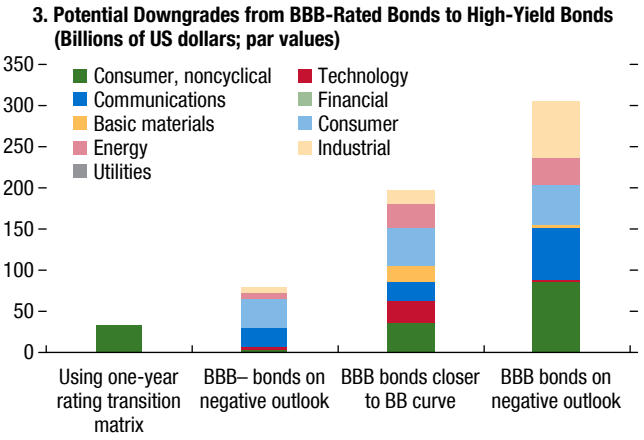
The widening in corporate bond spreads in late 2018 was driven by higher risk premiums ...



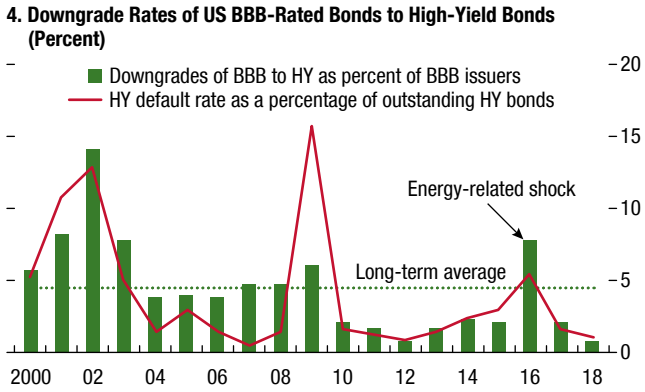
... with approximately $200 billion in BBB-rated bonds trading closer to high yield than the BBB curve.



Market-based estimates of potential downgrades to high-yield bonds are within a range implied by rating agencies.



Waves of downgrades are not uncommon, tend to be led by certain sectors, and are not necessarily associated with recessions.



Sources: Barclays; Bloomberg Finance L.P.; Moody's; and IMF staff calculations.
Note: HY = high yield.

quarter of 2018 was driven entirely by higher credit risk premiums—the compensation demanded by investors for higher uncertainty about credit risk (Figure 1.12, panel 1).[15] Given that the universe of BBB-rated US corporate bonds is roughly twice the size of the entire US high-yield bond market, there are concerns that a series of downgrades from BBB to high yield could significantly increase the supply of high-yield bonds and lead to further widening in credit risk premiums. This could significantly increase strains on the firms' ability to service their debts, forcing them to cut back investment.

Despite the relatively benign default outlook, some investment-grade companies already trade at sub-investment-grade spreads.[16] About 6 percent of BBB-rated companies, or approximately $200 billion in par value, currently trade at levels closer to high yield than to the BBB spread curve (Figure 1.12, panel 2). This market-implied estimate of the amount of BBB bonds at risk for downgrade is roughly in line with its longer-term historical average level and is within a range of estimates, such as those implied by credit ratings (Figure 1.12, panel 3). An increase in

[15]High-yield spreads are decomposed into compensation for default and credit risk premium. Compensation for default is defined as the product of probability of default and loss given default. A simple regression is used to explain probability of default with change in industrial production, unemployment rate, net balances reported in the SLOOS (Fed-Senior Loan Officer Opinion Survey on Bank Lending), and a recession dummy variable. Loss given default is assumed to remain fixed at 60 percent. The credit risk premium is the difference between the observed bond spreads and compensation for default.

[16]Also see Beinstein and others (2019).

supply of high-yield bonds is positively related to a rise in the credit risk premium, and a large downgrade wave has the potential to temporarily increase credit risk premiums for high-yield bonds by as much as an estimated 90 basis points if all bonds that are rated at BBB– with negative outlook were to be downgraded.[17] Furthermore, the greatest impact on credit risk premiums may be felt in the CCC-rating space, where rollover risk would increase significantly.

Waves of downgrades to high-yield bonds happened in the past and were not always associated with downturns and recessions (Figure 1.12, panel 4). However, the investor base for corporate bonds has changed. A larger share of investment funds and rating-sensitive investors could increase the odds of fire sales leading to more adverse market dynamics. Furthermore, the high-yield bond market is less liquid than the investment-grade market and has a narrower investor base. On the positive side, because recent issuance of high-yield bonds has been relatively low, investors may be more willing and able to absorb some increase in high-yield bond supply. In addition, some BBB-rated companies may have sufficient profits and liquid assets to de-lever and preserve their investment-grade ratings.

Risks Have Risen in the Leveraged Loan Market

Over recent years, the leveraged loan market has increased in size, complexity, and riskiness (Adrian 2018). The value of leveraged loans outstanding is approaching that of high-yield bonds (Figure 1.13, panel 1). Meanwhile, the investor base for leveraged loans has shifted toward nonbank investors (Figure 1.13, panel 2). Leveraged loans are increasingly and predominantly being used to fund financial risk taking through mergers and acquisitions and leveraged buyouts, dividends, and share buybacks (Figure 1.13, panel 3). However, borrowers in the leveraged loan market are also dependent on capital markets for refinancing, which leaves them vulnerable to liquidity stress and potential defaults.

Looser underwriting standards, decreased investor protection, a higher share of weak credit, and reduced subordination increase the likelihood of distress and reduce recovery rates in the event of a sudden tightening in financial conditions or a sharp downturn (see the April 2018 GFSR). However, the sources and magnitude of stress may be different this time. For example, greater participation of investment funds in the leveraged loan market means that a flood of investor redemptions could lead to additional market stress.

However, potential spillovers from distress in the leveraged loan market to the rest of the financial system are mitigated by a number of factors:

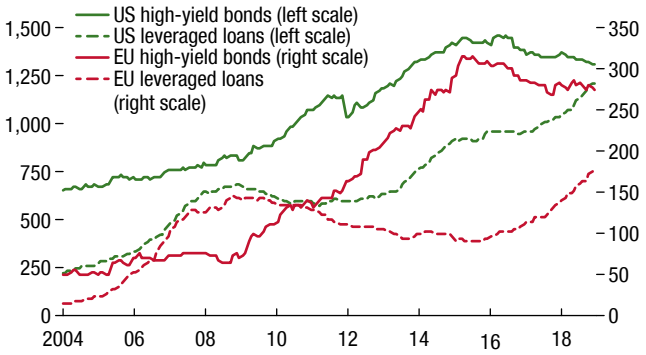
- *Banks play a smaller role in the leveraged loan market*. Loans originated and retained on banks' balance sheets account for only 2.5 percent of total tangible bank equity. Warehouse lines to collateralized loan obligation managers remain modest, estimated at about $20 billion currently versus more than $200 billion in 2008. Although a buyers' strike from institutional investors could always leave underwriting banks with unallocated leveraged loans in their pipeline, pipeline risk management has improved, and overall levels are generally less than one-third of peak levels before the crisis. Finally, mark-to-market losses on collateralized loan obligations should remain contained given the small value of these investments held by banks (Figure 1.13, panel 4).
- *Collateralized loan obligations are held mainly by nonbank investors.* Global banks hold about 33 percent (or $250 billion) of the total stock of collateralized loan obligations (Graham 2018) but are estimated to hold mostly the highest-rated tranches (Figure 1.13, panel 5). While lower-rated tranches could incur substantial losses in an economic downturn, the default risk on higher rated tranches has been low based on recent history, and increased credit enhancements could further reduce defaults.
- *Foreign bank demand for collateralized loan obligations remains strong.* Estimates suggest that Japanese banks account for a sizable share of demand for highly rated tranches. Current US and EU AAA collateralized loan obligation yields, hedged into yen, have continued to provide an attractive return compared with domestic bonds (Figure 1.13, panel 6). However, if hedging costs were to increase, foreign demand could weaken, potentially leading to a widening in spreads.
- *Demand from investment funds is sizable, but there are few crossover investors.* Concentration of fund ownership is meaningful, with estimates that the top 5 and top 20 US loan products own nearly 15 percent and 30 percent of the US loan market, respectively (Caprio 2018). However, spillovers to other fixed-income markets are expected to be contained

[17]The high-yield credit risk premium is modeled as a function of net supply, implied volatility from one-year at-the-money S&P 500 options, and the high-yield credit-default-swap-cash basis. The given estimate of spread widening from downgraded bond supply assumes an increase in net supply and holds the risk factors constant.

Figure 1.13. Developments in the Leveraged Loan Market in the United States and Europe

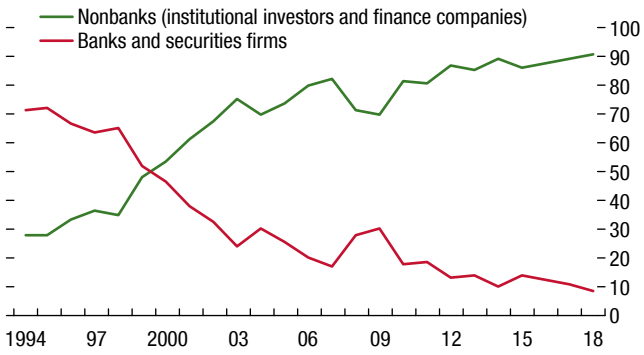
The amount of leveraged loans is almost as large as that of high-yield bonds.

1. High-Yield Bond versus Leveraged Loan Debt Outstanding (Billions of US dollars; billions of euros)



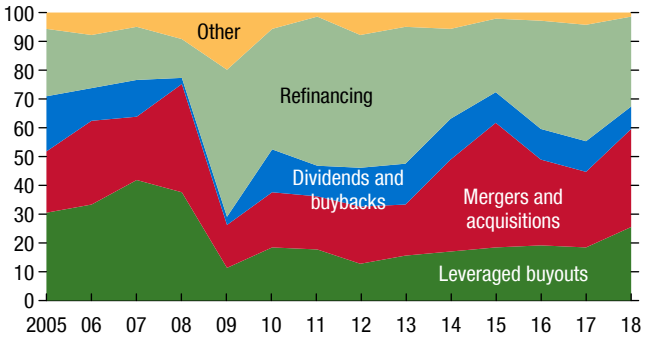
Nonbanks have taken a larger role in financing highly indebted firms.

2. US Leveraged Loan Investor Base: Banks versus Nonbanks (Percent of primary market issuance)



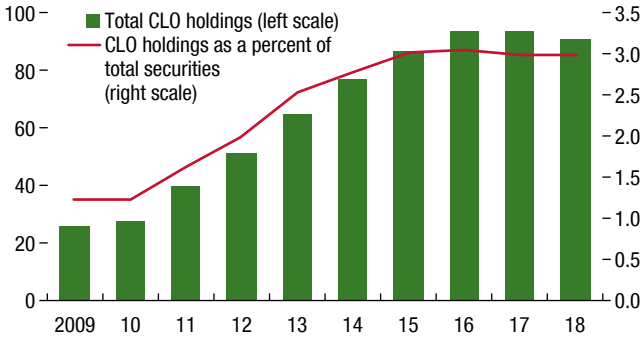
The share of proceeds used to fund acquisitions and shareholder enhancements is large.

3. Leveraged Loan Issuance by Use of Proceeds (Percent)



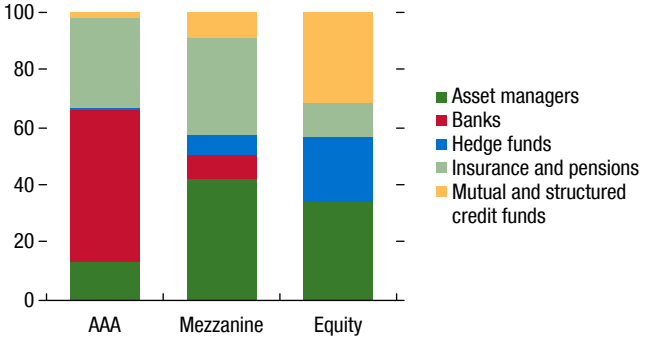
US bank holdings of collateralized loan obligations remain relatively small.

4. US Bank Holdings of Collateralized Loan Obligations (Billions of US dollars; percent)



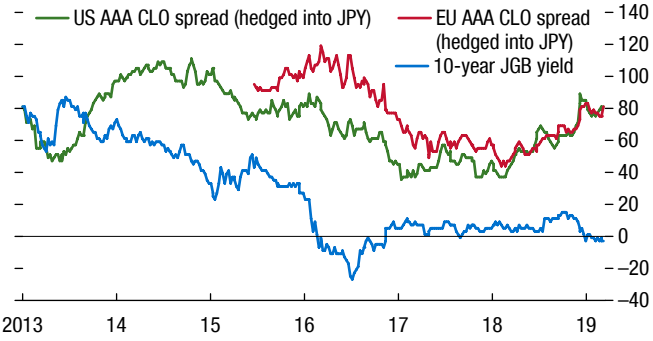
Collateralized loan obligations have enjoyed a stable bid from asset managers and banks ...

5. US CLO Year-End 2018 Investor Base (Percent of new CLO issuance)



... as attractive currency-hedged returns have maintained a strong bid from foreign banks.

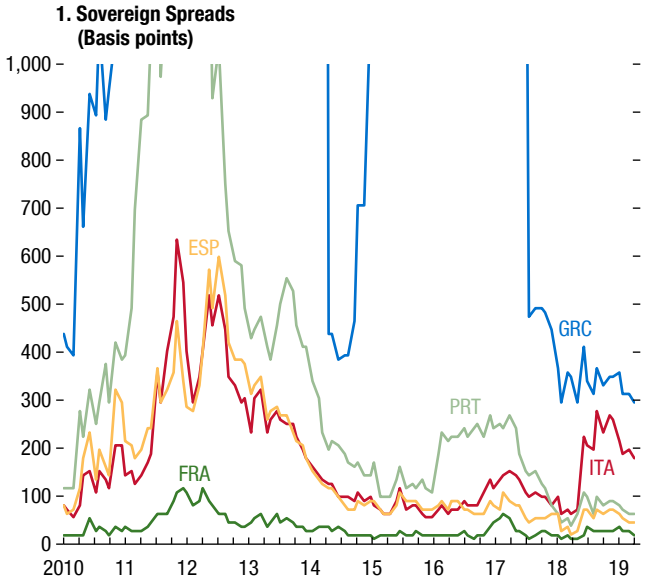
6. US and EU AAA-rated CLO Spreads Hedged to the Japanese Yen (Basis points)



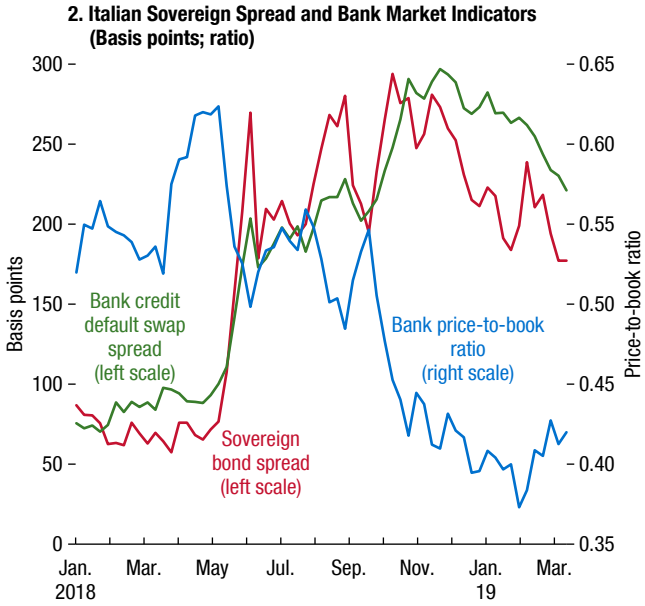
Sources: Bloomberg Finance L.P.; Citi; Federal Reserve Y-9C Reports; S&P Leveraged Commentary & Data; SNL Financial; and IMF staff calculations.
Note: For panel 2, institutional investors include finance companies, insurance companies, hedge funds, distressed debt funds, loan mutual funds, and collateralized loan obligations (CLOs). Panel 5 is based on estimates from Citi. JGB = Japanese government bond; JPY = Japanese yen; LBOs = leveraged buy-outs; M&A = mergers and acquisitions.

Figure 1.14. Italian Sovereign and Banks: Recent Financial Developments

Italian sovereign spreads have widened ...



... and bank market indicators have deteriorated.



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: In panel 1, the vertical axis has been set to a maximum of 1,000 basis points to show the latest data more clearly. In panel 2, the average of individual bank price-to-book ratios and credit default swap spreads is used. Data labels in the figure use International Organization for Standardization (ISO) country codes.

because some of the largest crossover credit funds have only marginal exposures to leveraged loans.

The evolving market structure raises the possibility of different dynamics during times of stress compared with 2007–08. Despite anecdotal evidence of reduced use of financial leverage, the risk remains that large-scale redemptions from end-investors could force investment funds to liquidate some of their holdings of leveraged loans. Given that these funds are important buyers of leveraged loans, large redemptions could induce fire sales and further depress prices. These dynamics may also affect the other institutional investors holding these loans, as well as the broader economy, by blocking the flow of funds to the leveraged credit market. In this event, economic activity of borrowers representing a wide range of sectors could be jeopardized because a sizable 31 percent of issuance is used for refinancing. The borrowers' ability to swiftly shift to the high-yield bond market could be hampered by the relatively large size of the leveraged loan market. Further financial stability implications will ultimately depend on whether nonbanks have retained material links to banks that could amplify the impact of market disruptions on the broader financial system.

The Euro Area Sovereign–Financial Sector Nexus

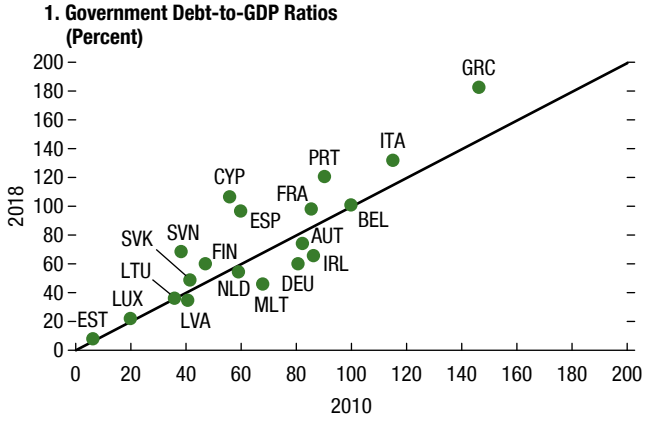
Fiscal challenges in Italy have rekindled worries about the nexus between the sovereign and financial sectors in the euro area. Bank capital ratios are now higher in the euro area and actions have been taken to reduce nonperforming loans on bank balance sheets. But if sovereign yields were to increase sharply, banks' stronger links to sovereigns in countries with high government debt could result in significant losses on bank bond portfolios. This, along with potential losses on nonperforming loans, could result in a significant hit to capital for some banks. Insurance companies could also become entangled in the nexus given their significant holdings of sovereign, bank, and corporate bonds. Against this backdrop, there is a risk that strains in the financial sector could yet again be passed on to companies and households, with negative implications for economic growth.

Concerns Have Reemerged about the Sovereign–Financial Sector Nexus in the Euro Area

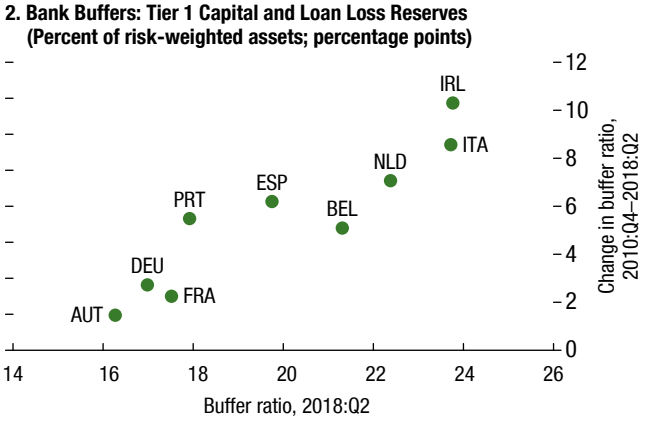
Investor concerns about the sovereign–financial sector nexus have been rekindled by fiscal challenges in Italy, and this led to a widening in sovereign spreads in the second half of 2018 (Figure 1.14,

Figure 1.15. The Euro Area Sovereign–Financial Sector Nexus

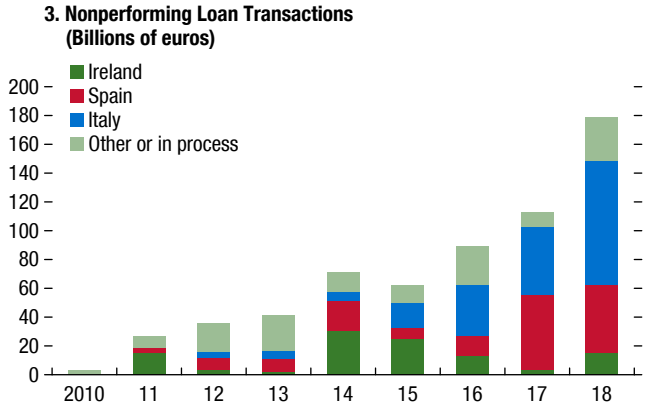
Government indebtedness has risen in several countries.



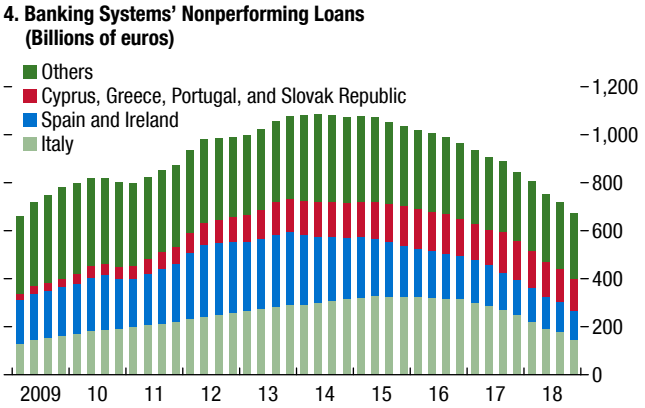
Regulators required banks to increase their buffers ...



... and efforts have been made to dispose of nonperforming loans ...



... but banks need to continue reducing the stock of nonperforming loans on their balance sheets.



Sources: Deloitte; European Banking Authority; Haver Analytics; PricewaterhouseCoopers; IMF, Financial Soundness Indicators database; IMF, World Economic Outlook database; and IMF staff analysis.
Note: Panel 2 is based on the sample of banks in the European Banking Authority's transparency exercise (EBA banks). In panel 4, the data on nonperforming loans are for banking systems in aggregate (from the IMF Financial Soundness Indicators database). Data labels in the figure use International Organization for Standardization (ISO) country codes.

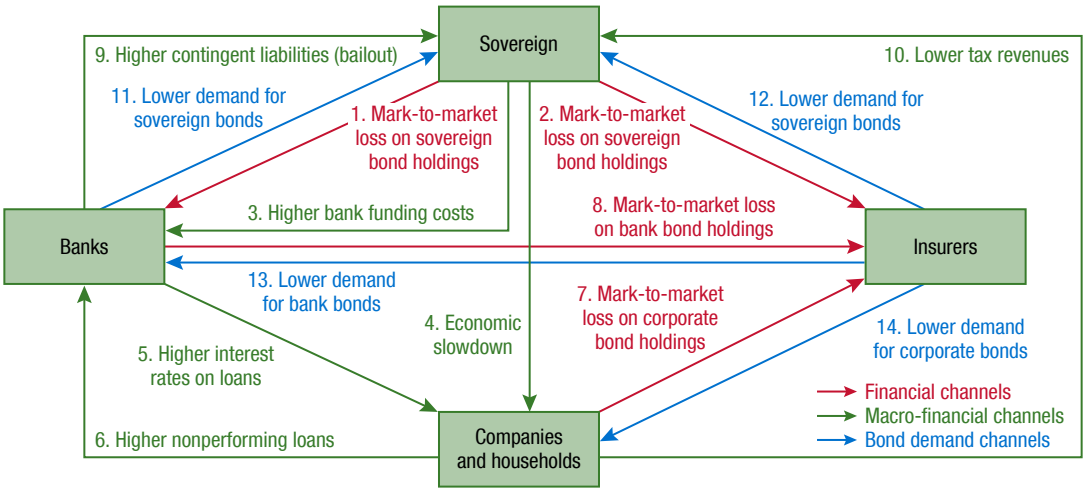
panel 1).[18] These sovereign shocks spilled over to the banking sector, where bank credit default swap spreads have risen in lockstep with sovereign spreads and where equity valuations have fallen (Figure 1.14, panel 2). However, Italian sovereign spreads have partially retraced this year and so far there has been little spillover to sovereign yields in other euro area countries.

[18]The focus here is on the euro area given these recent developments. The sovereign–financial sector nexus could arise in other economies where banks have significant domestic government bond holdings (see Figure 1.21, panel 4, in the October 2018 GFSR) and where sovereign risks are high.

The sovereign–financial sector nexus was at the heart of the euro area crisis in 2011–12. Intense market speculation about the creditworthiness of some governments generated sharp rises in sovereign yields. This created mark-to-market losses on banks' holdings of government bonds. Bank funding costs also rose sharply, and were passed on to companies and households through higher interest rates on loans. The ensuing recession and weak growth since then induced a deterioration in government-debt-to-GDP ratios (Figure 1.15, panel 1) and engendered a substantial rise in nonperforming loans on bank balance sheets.

Several key measures were adopted to tackle the crisis. Regulators and supervisors required banks to

Figure 1.16. Channels of Contagion in the Sovereign–Financial Sector Nexus



Source: IMF staff.

increase their capital and loan loss reserves buffers (Figure 1.15, panel 2). Banks reduced the stock of nonperforming loans through a combination of sales and write-offs, though these efforts should continue (Figure 1.15, panels 3 and 4). Bank funding strains were alleviated through central bank liquidity support, and official sector asset purchases helped stabilize financial markets.

The financial sector framework has also been reinforced. The Single Supervisory Mechanism was established along with the Single Resolution Mechanism and the Bank Recovery and Resolution Directive. However, measures are still needed to fully complete the Banking Union, such as to establish a European Deposit Insurance Scheme.

There is still a risk that the sovereign–financial sector nexus could be reinvigorated. The nexus could spread sovereign strains across the financial system through a complex web of interactions and negative feedback loops that can be summarized into three main types of channels: (1) *financial channels* of mark-to-market losses on bank and insurers' bond holdings (depicted by the red arrows and channels in Figure 1.16); (2) *macro-financial channels*, where sovereign and bank shocks spill over to companies and households via an economic slowdown or higher interest rates (the green arrows and channels in Figure 1.16); and (3) *bond demand channels* that can exacerbate increases in bond yields (the blue arrows and channels in Figure 1.16). These channels, which can operate over different horizons, are discussed in more detail below.

Tighter Links to Governments Have Made Some Banks More Vulnerable to a Sovereign Shock

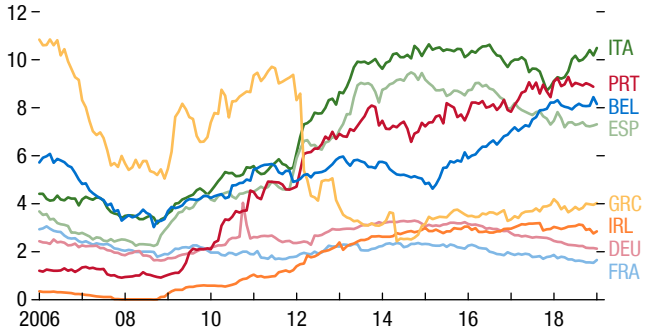
Financial channels between sovereigns and banks have strengthened in countries with more indebted sovereigns. Domestic government bond portfolios of banking systems are large relative to assets in several countries, particularly Belgium, Italy, Portugal, and Spain (Figure 1.17, panel 1). This may partly reflect the higher yields on government bonds in many of these countries, the use of these bonds as collateral for central bank liquidity facilities, zero risk weights on sovereign bonds (which enable government bond portfolios to increase without reducing Tier 1 capital ratios), and liquidity regulations (which treat government bonds as liquid assets). Data for the banks included in the European Banking Authority's Transparency Exercise (EBA banks) also reveal that the proportion of lower-rated government bonds held by Italian and Portuguese banks, in particular, has increased following downgrades to sovereign credit ratings (Figure 1.17, panel 2).

The rising exposure to government bonds, and downgrades to sovereign credit ratings, have made banks in some countries more vulnerable to sovereign shocks (channel 1 in Figure 1.16). Mark-to-market losses on government bond portfolios can be simulated

Figure 1.17. Euro Area Banks, Sovereign Shocks, and Nonperforming Loans

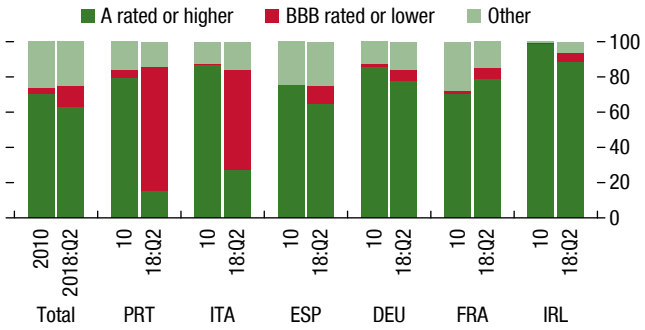
Some banks have strengthened their links to domestic sovereigns ...

1. Banking Systems' Holdings of Domestic Government Bonds (Percent of assets)



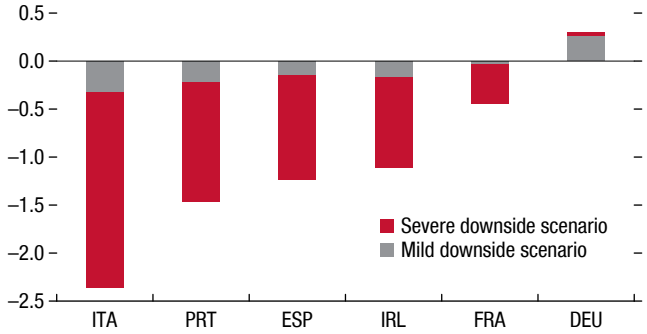
... and sovereign credit ratings have been downgraded in some countries ...

2. Bank Government Bond Holdings by Rating (Percent of government bond portfolio)



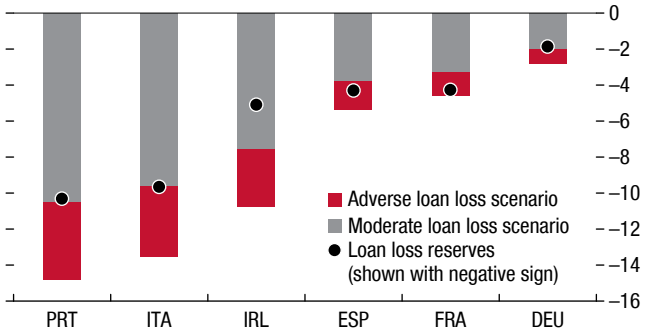
... which together could create losses for banks.

3. Estimated Impact of Sovereign Bond Mark-to-Market Valuations on Tier 1 Capital Ratios, 2018:Q2 (Percentage points)



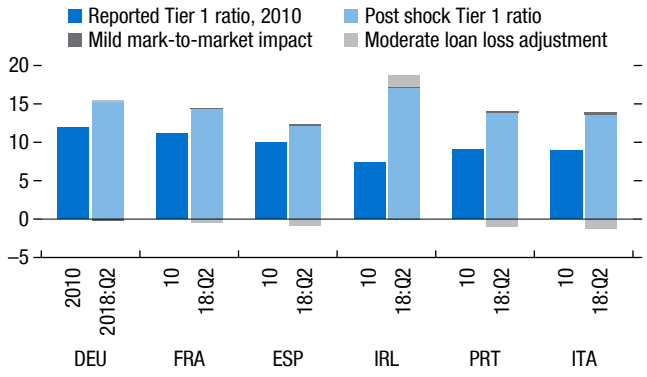
Banks may also need to recognize losses on nonperforming loans that in some countries could exceed loan loss reserves.

4. Estimated Loan Losses and Reserves, 2018:Q2 (Percent of risk-weighted assets)



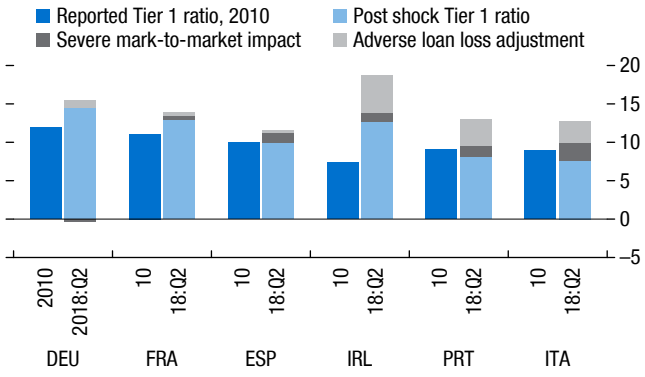
Higher buffers have left most banks better prepared for shocks ...

5. Tier 1 Capital Ratios: Moderate Downside Scenario (Percent)



... but in an adverse downside scenario, capital ratios would come under more pressure.

6. Tier 1 Capital Ratios: Adverse Downside Scenario (Percent)



Sources: Banca IFIS; Bloomberg Finance L.P.; European Banking Authority; Haver Analytics; national central banks; PriceWaterhouseCoopers; SNL Financial; and IMF staff analysis.
Note: Panel 1 is based on banking system data, while panels 2–6 are based on the sample of banks in the European Banking Authority transparency exercise (EBA banks). Panel 5 (6) shows the impact of the mild (severe) downside scenario for changes in government bond yields and the moderate (adverse) scenario for the loan loss adjustment. Positive values for the loan loss adjustment and mark-to-market impact in panels 5 and 6 represent a fall in the capital ratio; negative values represent an increase in the capital ratio. The capital ratios include the impact of reductions in risk-weighted assets related to the disposal of unsecured nonperforming loans, which can in some cases result in a negative number (an improvement in the capital ratio) for the impact of the loan loss adjustment; see Online Annex 1.1 for more details. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Table 1.2. Scenario Assumptions

1. Scenarios of Changes in Sovereign Bond Yields (Basis points)

	Sovereign Credit Rating				
	AAA	AA	A	BBB	BB
Downside Scenario					
Mild	–50	0	25	50	75
Severe	–100	50	150	250	425

2. Loan Loss Adjustment Scenarios (Percent of face value)

	Type of Nonperforming Loan	
	Secured	Unsecured
Scenario		
Moderate	48	65
Adverse	70	90

Sources: Banca IFIS; Bloomberg Finance L.P.; PricewaterhouseCoopers; and IMF staff analysis.
Note: The mild (severe) bond yield scenaro approximates to the 90th (99th) percentile of 3-month changes in 5-year sovereign yields over the period 2000–18. These scenarios assume a flight to quality to AAA-rated bonds, which approximates to the 10th (1st) percentile of 3-month changes over the same period. The moderate loan loss scenario assumptions are based on secondary market prices of nonperforming loans from a survey of market participants. The adverse scenario is based on data for sales of nonperforming loans in Italy.

through two scenarios—a mild and a severe scenario—affecting all sovereign bonds held by euro area banks and calibrated to past stress events in sovereign bond markets (Table 1.2). The scenarios are applied to the EBA banks, using the data available from the latest Transparency Exercise. In the severe scenario, sharp rises in government bond yields would generate significant losses for EBA banks in Italy, Portugal, and Spain, in particular (Figure 1.17, panel 3; see Online Annex 1.1 for more details on the methodology).[19]

However, to fully assess how well prepared banks are for a reemergence of the sovereign–financial sector nexus, the level of bank buffers should be taken into account. One way of doing this is to estimate the value of bad debts using secondary market prices and offsetting these potential losses with banks' loan loss reserves and, if these are not sufficient, capital (Table 1.2; see Online Annex 1.1 for more details).[20]

This exercise is not intended to suggest that all banks should dispose of the remaining stock of bad debts in one go. It is rather meant to be an illustrative assessment to explain how overall bank balance sheet health has changed over time. The analysis—which is again applied to the EBA banks—suggests that the stock of nonperforming loans remains a significant burden that could potentially induce further losses, which in some cases may be larger than loan loss reserves (Figure 1.17, panel 4).

However, the larger capital and reserves buffers built since the euro area crisis have bolstered bank balance sheets in many euro area countries. In the moderate downside scenario, EBA bank Tier 1 capital ratios—after accounting for mark-to-market changes in government bond values in the mild downside scenario and adjusting for potential losses on nonperforming loans in the moderate scenario—would be higher than they were in 2010 (the light blue bars in Figure 1.17, panel 5). The same is also true for most banks in the adverse downside scenario, though the post shock Tier 1 ratios for Italian and Portuguese EBA banks are slightly lower than in 2010 (Figure 1.17, panel 6).

The results, however, do not account for several factors that could mitigate the impact of sovereign risks on banks. First, lack of available data prevented an assessment of any hedges that banks have in place to mitigate losses on higher government bond yields. Second, market contacts have suggested that some banks may be starting to move their government bond holdings from mark-to-market accounts to held-to-maturity portfolios to reduce the potential for losses (although such a move also reduces balance sheet flexibility). Third, the adjustment to nonperforming loans is based on transaction prices, but there are some categories of nonperforming assets that could have lower loss rates than is assumed in the exercise.[21] Nevertheless, it

[19]These results may not reflect their full range of bank exposures to sovereigns because the analysis does not include loans to state-owned entities or off-balance-sheet exposures. The IMF 2019 Article IV Staff Report for Greece, which included a greater range of sovereign exposures, estimated that a 100 basis point increase in Greek sovereign yields would reduce the four largest banks' combined common equity Tier 1 ratio by about half a percentage point.

[20]The loss rates in the adverse scenario are similar to the data on the price of nonperforming loan sales in the Bank of Italy's Notes on Financial Stability and Supervision, No. 13, Bad loan recovery rates in 2017 (December 2018). This note reports that the price of secured bad loans averaged 26 percent (or a loss of 74 percent of face value) and that the price of unsecured bad loans averaged 10 percent (loss of 90 percent of face value).

[21]In Italy, for example, nonperforming loans classified as unlikely to pay (UTP) could have lower loss rates than other nonperforming loans. If we were to assume that UTP loss rates are 25 percent lower than those on other nonperforming loans, estimated loan losses for Italian EBA banks would be 12 percent lower than in the adverse loan loss scenario in 2018:Q2. Assuming these loan losses, the impact on Italian EBA banks' Tier 1 capital ratio would be about

should also be noted that this exercise considers only the larger banks in the euro area; it is possible that results could be different for smaller banks in countries where domestic government bond holdings are high.[22]

Insurance Companies Could Also Face Significant Losses If the Sovereign–Financial Sector Nexus Reemerges

Insurers are large holders of sovereign and bank bonds. Euro area insurers overall own more than 15 percent of outstanding euro area sovereign bonds—slightly less than the amount owned by banks—and almost 25 percent of euro area bank bonds (Figure 1.18, panel 1). Moreover, the average exposure of European insurers to BBB-rated corporate and sovereign bonds increased from about 5 percent to more than 20 percent from 2008 to 2017 (Figure 1.18, panel 2). With a higher percentage of lower-rated bonds, insurers are potentially more exposed to the impact of a sharp rise in sovereign and corporate bond yields, as well as corporate defaults. In addition, any corporate bond downgrades—particularly to below a BBB rating—could increase capital requirements.

Across countries, insurers' exposure to lower-quality debt varies substantially. Insurers in countries with more indebted sovereigns tend to have a greater share of lower-rated securities in their corporate bond portfolios (Figure 1.18, panel 3). In addition, insurance companies in some countries have a high share of riskier securities (subordinated and hybrid debt) in their bank bond holdings (Figure 1.18, panel 4). Such riskier bank debt is more likely to be written down at times of market stress.[23]

These developments have made euro area insurers more vulnerable to the *financial channels* of the sovereign–financial sector nexus (channels 2, 7, and 8 in Figure 1.16). These risks were assessed by applying two downside scenarios to insurers' balance sheets. These include the same shocks to government bond yields that are used for banks, as well as shocks to corporate bond yields (calibrated similarly to the sovereign shocks) and to equity and real estate investments (see Online Annex 1.1 for more details).

These scenarios would imply significant losses for euro area insurers under the severe scenario, particularly for companies in more highly indebted sovereign jurisdictions (Figure 1.18, panel 5). Although most euro area insurers remain well capitalized, a severe scenario would put pressure on insurers that already have lower solvency ratios (Figure 1.18, panel 6). The ultimate impact of these shocks on insurers will, however, be alleviated somewhat by the volatility adjustment under Solvency II. This mitigation will, however, be less effective where insurers have higher-risk portfolios than the reference portfolio used in the volatility adjustment.

Banks and Insurers Could Also Act as a Conduit for Contagion between Sovereigns and the Economy

Macro-financial channels are another potential source of contagion between sovereigns and banks. One channel operates through an economic slowdown, which either cannot be offset by sovereigns with limited fiscal space or that is exacerbated by confidence effects from a sovereign facing fiscal challenges (channel 4 in Figure 1.16). The downturn in the economy would reduce company and household incomes, hampering the debt servicing capacity of these sectors.[24] This channel, which typically operates over a longer horizon, could kickstart two other channels of contagion: it could engender another increase in nonperforming loans on bank balance sheets (channel 6 in Figure 1.16) and it could reduce government tax revenues (channel 10 in Figure 1.16).

Another *macro-financial channel* operates through bank funding costs (channel 3 in Figure 1.16). Sovereign and bank credit spreads are tightly correlated, which has already put upward pressure on the cost of new wholesale funding for banks with lower-rated sovereigns (Figure 1.19, panel 1).[25] There is a risk that banks could pass on these higher funding costs through an increase in interest rates on their loans

90 basis points, compared to around 280 basis points in the adverse downside scenario. Comparable data on less impaired nonperforming loans are not consistently available for banks in other countries.

[22]The Bank of Italy found in its November 2018 *Financial Stability Report* (Bank of Italy 2018) that a 100-basis-point rise in Italian government bond yields would reduce capital ratios of "significant banks" by 40 basis points, but that capital ratios of "less significant banks" would fall by 90 basis points.

[23]Incipient demand for so-called bank bail-in bonds is discussed in EIOPA (2018) and Tanner (2018). Supervisors could consider whether the Solvency II framework is unintentionally motivating insurers to increase exposures to riskier bank debt.

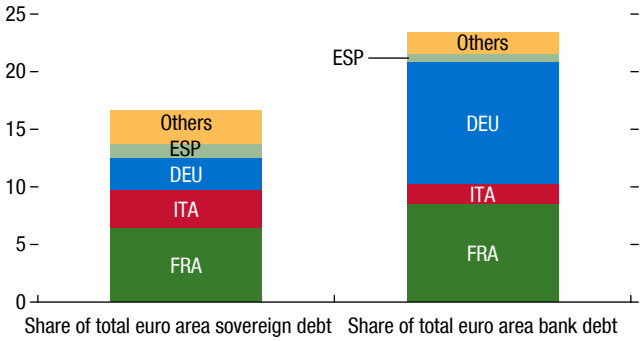
[24]This channel could also operate through lower government expenditure and potential delays in payments from the government.

[25]Estimates by the Bank of Italy suggest that a 100-basis-point increase in the spread on 10-year government bonds could cause the yield on new bank bonds to rise by a similar amount.

Figure 1.18. Selected Euro Area Countries: Insurers' Exposures to Sovereign, Bank, and Corporate Bonds

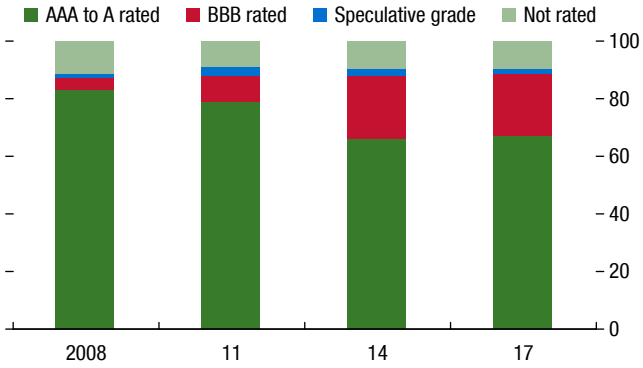
Insurers are important investors in sovereign and bank debt.

1. Holdings of Euro Area Sovereign and Bank Debt by Issuer, 2018:Q2
(Percent of total debt stock)



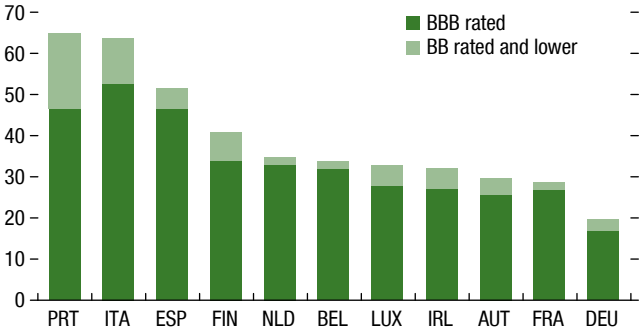
Their holdings of lower-rated bonds have increased ...

2. Sovereign and Corporate Bond Holdings by Ratings
(Percent of total bond holdings)



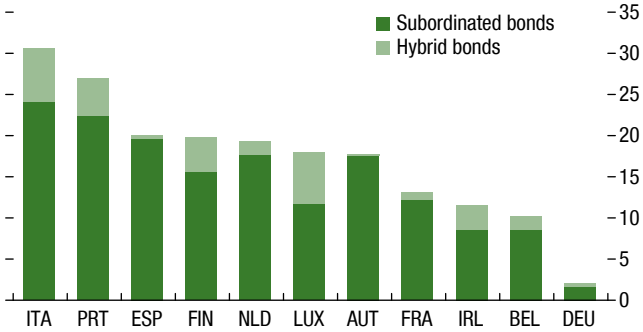
... but vary significantly across countries ...

3. Asset Allocation to Low-Rated Credit, 2018:Q2
(Percent of corporate bond holdings)



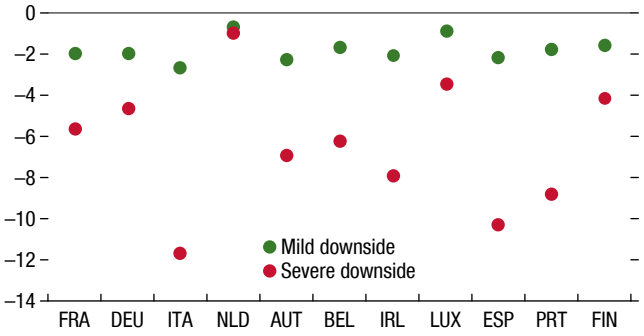
... while some also have significant holdings of riskier bank bonds.

4. Asset Allocation to Bank Subordinated and Hybrid Debt, 2018:Q2
(Percent of bank bond holdings)



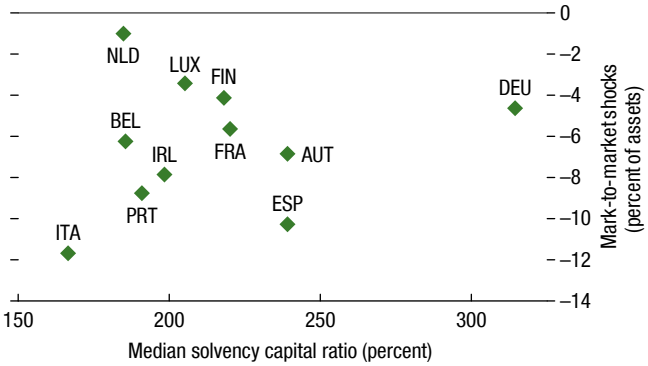
Insurers' sensitivity to shocks differs ...

5. Simulated Mark-to-Market Shocks to Assets, 2018:Q2
(Percent of assets)



... and could be particularly problematic for insurers with lower solvency ratios.

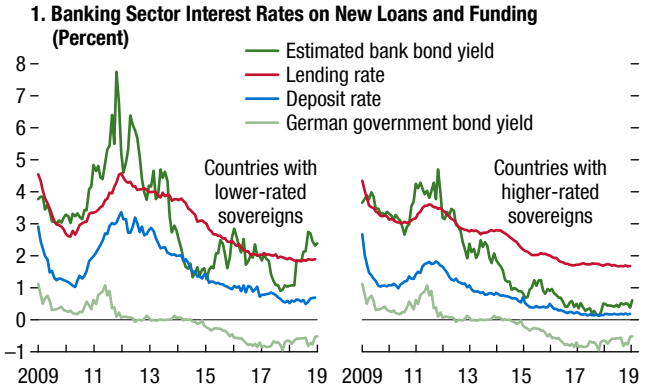
6. Solvency Ratios and Simulated Mark-to-Market Shocks to Assets in a Severe Downside Scenario, 2018:Q2



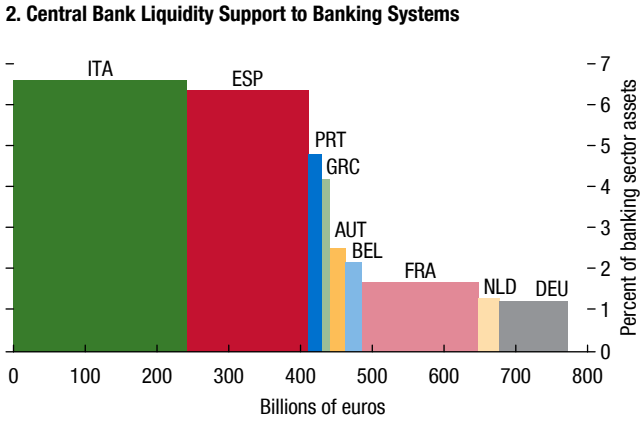
Sources: Arslanalp and Tsuda 2014, update; European Central Bank; European Insurance and Occupational Pension Authority (EIOPA); Haver Analytics; SNL Financial; and IMF staff estimates.
Note: Panel 1 uses EIOPA data for insurers' holdings, Arslanalp and Tsuda (2014, update) for total sovereign debt, and European Central Bank data for bank bonds outstanding. Panel 2 includes non-euro area European countries and includes bottom-up estimates using data from SNL Financial on selected European life insurance companies between 2008 and 2014 and EIOPA in 2017 for European life and non-life insurance companies. Panel 3 includes financial and nonfinancial corporate bonds. Panel 4 uses data included in EIOPA's Financial Stability Report, December 2018. In panels 5 and 6, shocks are applied to aggregate sector balance sheets of insurers as of 2018:Q2. The horizontal axis in panel 6 shows median solvency capital ratios for each country. See Online Annex 1.1 for a detailed explanation. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Figure 1.19. Euro Area Bank Profits and Funding

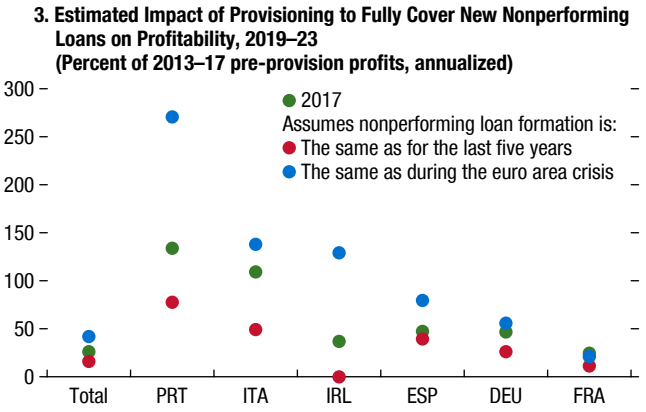
Some banks are already facing rising wholesale funding costs ...



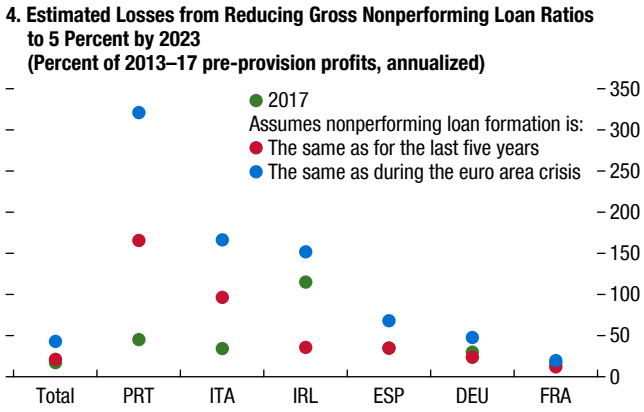
... but central bank liquidity support should limit rises in the overall cost of funding.



Bank provisioning is likely to curtail profitability ...



... as would a cleanup of bad loans.



Sources: Bloomberg Finance L.P.; European Banking Authority; European Central Bank 2017 and 2018; Haver Analytics; national central banks; SNL Financial; and IMF staff calculations.
Note: Panels 1 and 2 are for the banking system as a whole, while panels 3 and 4 are based on the banks in the European Banking Authority transparency exercise (EBA banks). Countries with lower-rated sovereigns are those where the government currently has a credit rating of BBB or below (Cyprus, Greece, Italy, Portugal). Panel 1 shows interest rates weighted by the type of loans or deposits. Bank bond yields are estimated using average bank credit default swap spreads in each banking system. Panels 3 and 4 show the amount of pre-provision profits (based on the average profits during 2013–17) that would be absorbed each year over the period 2019–23 by provisions for losses or from the disposal of bad debts in the simulations. Data labels in the figure use International Organization for Standardization (ISO) country codes.

to companies and households (channel 5 in Figure 1.16). However, so far there is no evidence of such an increase, perhaps because central bank liquidity support through targeted longer term refinancing operations—which have recently been renewed by the ECB—has lowered overall funding costs (Figure 1.19, panel 2). Funding problems, however, could be exacerbated if a sovereign is downgraded to below investment grade by all four major rating agencies, as this would make that country's government bonds' ineligible to serve as collateral at central banks under current rules.

Banks and insurers could also propagate risks further in a period of stress through bond *demand channels* (channels 11–14 in Figure 1.16). If these institutions have faced significant mark-to-market losses, or if the bonds have been downgraded to below investment grade, banks or insurers' could be less willing or able to buy.[26] Such a fall in demand could add further pressure to yields, raising funding costs further and

[26]Banks and insurers not facing such losses could be a stabilizing force in markets if they were to buy into a falling market. This may have been one reason why some banks increased their holdings of domestic government bonds during the euro area crisis.

exacerbating mark-to-market losses. Although there are no signs that the end of central bank net asset purchases has affected sovereign yields, this does mean that the private sector will need to absorb a larger amount of issuance, potentially when their willingness to do so could be challenged.

Looking ahead, banks will need to continue tackling nonperforming loans following the introduction of (1) guidance for banks to raise loan loss reserve coverage to 100 percent on new nonperforming unsecured loans within two years and on new nonperforming secured loans over seven years (ECB 2018), and (2) proposals for banks with gross nonperforming loan ratios of 5 percent or above to establish a strategy to manage and mitigate nonperforming exposures (EBA 2018).

This cleanup of balance sheets is needed, but illustrative exercises suggest that it could also curtail profitability (see Online Annex 1.1 for more details). If banks were to increase reserves coverage according to ECB guidance, the required provisioning is likely to be manageable for banks if the formation of bad debt is similar to the past five years. But with a more substantial rise in nonperforming loans, such as during the euro area crisis, the extra provisioning would put a substantial drag on profits for some banks (Figure 1.19, panel 3). Furthermore, if banks were to implement a strategy to reduce their gross nonperforming loan ratios to 5 percent over five years, there would be a substantial drag on profits in countries with a high stock of nonperforming loans, particularly if there was a sharp rise in new nonperforming loans (Figure 1.19, panel 4).

Recent Policy Measures Should Reduce the Risk of Contingent Liabilities for the Sovereign

A final channel of contagion in the sovereign–financial sector nexus is the risk that public sector funds could be used to rescue failing banks, increasing a sovereign's contingent liabilities (channel 9 in Figure 1.16).[27] The Bank Recovery and Resolution Directive's associated preference for the bail-in of creditors should reduce the likelihood of bail-outs. However, recent cases of intervention in euro area banks suggest that some national authorities have shown a preference for less stringent burden sharing, at a time when loss-absorbing buffers have not been fully developed.

[27]An additional channel in the sovereign–financial sector nexus is through government holdings of bank equities—for example, if bank profitability comes under strain and dividend revenue falls.

So while the new measures provide a good foundation, they are largely untested, and it may be too early to completely rule out the possibility of spillbacks from banks to sovereigns. In that event, there is a risk that a downside scenario of higher government bond yields could initiate a further round of contagion through the sovereign–financial sector nexus, with negative implications for economic growth.

Vulnerabilities in China, Emerging Markets, and Frontier Economies

Emerging market asset prices have recovered from their mid-2018 sell-off and were generally resilient during the turbulence in global financial markets in late 2018. As investors reassessed the outlook for monetary policy normalization in the United States, portfolio flows to emerging markets turned positive. The resilience of portfolio flows, on aggregate, has been partly due to the trend increase in passive investor flows, as well as flows to China. Given that benchmark-driven investors are more sensitive to changes in global financial conditions than other investors, the benefits of index membership may be tempered by stability risks for some countries. As these investors become a larger share of portfolio flows, external shocks may propagate to medium-size emerging and frontier market economies faster than in the past. China, where vulnerabilities remain high, is becoming an increasingly important driver of emerging market flows. Chinese authorities have been facing a difficult trade-off between supporting near-term growth in the face of adverse external shocks and containing the buildup of financial imbalances.

Recent Market Developments

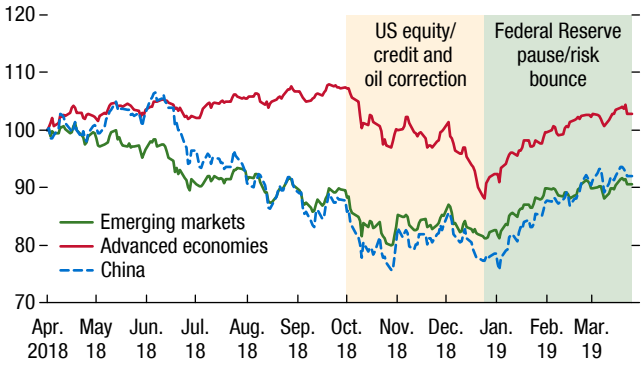
Emerging Markets Have Held Up Well

Emerging market currencies and equities have been resilient during the sell-off in mature markets in late 2018 and have rebounded in early 2019, supported by a turnaround in global risk sentiment. Their outperformance relative to advanced economy currencies and equities in October–December 2018 (Figure 1.20, panels 1–2) was driven by reduced country-specific concerns in major emerging markets (Argentina, Brazil, Turkey), as well as lighter investor positioning and more attractive valuations for emerging market assets after the April–August 2018 sell-off. Although some country-specific concerns have re-emerged recently, overall investor sentiment has been supportive so

Figure 1.20. Recent Developments in Emerging and Frontier Markets

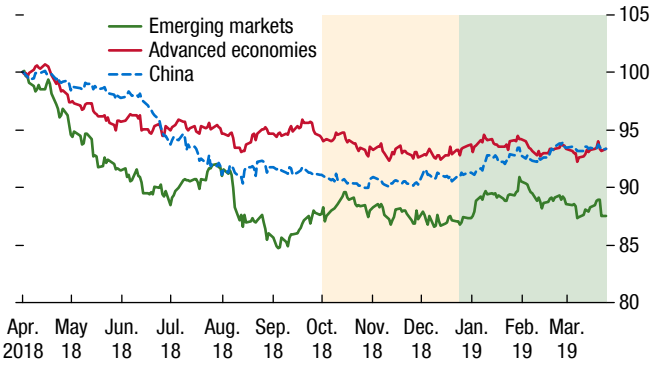
Stability in foreign exchange markets, along with hopes for a US-China trade deal, supported equities.

1. Equity Benchmarks
(Index, April 1, 2018 = 100)



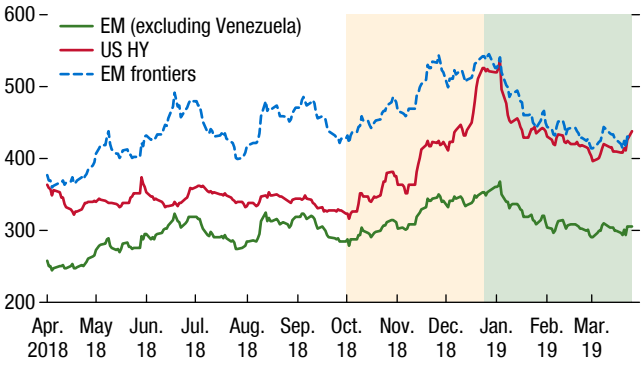
Currencies have been relatively stable after the sharp sell-off last year.

2. Currencies against the US Dollar
(Index, April 1, 2018 = 100)



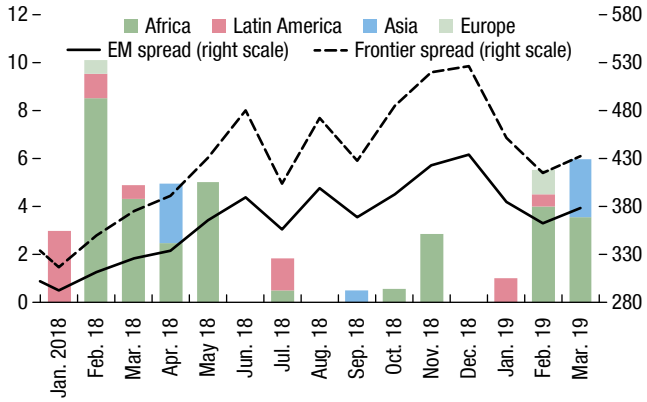
Emerging market credit came under pressure led by weaker issuers, before recovering this year.

3. US and Emerging Market Credit Spreads
(Basic points)



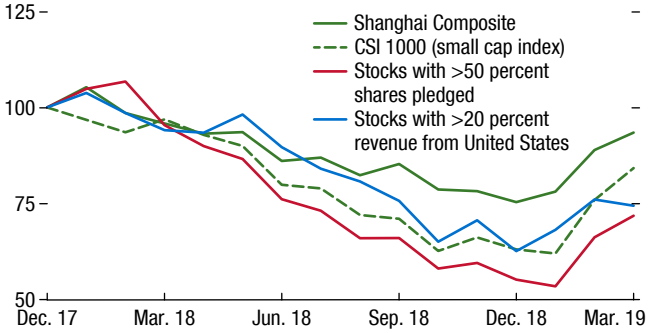
After a lull in the second half of 2018, some frontier market issuers have come back to the market.

4. Frontier Issuance and Spreads
(Billions of US dollars; basis points)



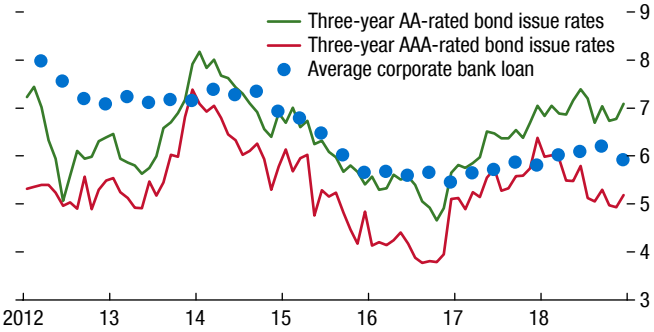
Chinese equities rebounded in early 2019 after declines due to trade tensions and global volatility.

5. China: Equity Market Performance
(Indexed to end-2017)



Policy easing helped partly offset the tightening in financial conditions, but less so for lower-rated firms.

6. China: Lending Rate and Bond Yields
(Percent)



Sources: Bloomberg Finance L.P.; Bond Radar; Haver Analytics; JPMorgan Chase & Co; Wind Information Co.; and IMF staff estimates.
Note: CSI = China Securities Index; EM = emerging market; HY = high yield.

far this year, as investors reassessed the outlook for monetary policy normalization in advanced economies and prospects for de-escalation of US-China trade tensions.

Emerging credit markets have recovered as well but were more affected by the global market turbulence in late 2018 due to the large weight of sovereign issuers with weaker economic fundamentals in benchmark indices (Figure 1.20, panel 3). Among higher-rated issuers, Mexico was a major contributor to the sell-off amid concerns about its major oil company, PEMEX. Bond issuance was subdued in the fourth quarter of 2018. Improved market conditions in early 2019 supported a resumption of bond issuance, including by lower-rated entities, such as Ecuador selling a bond at double-digit yield and Uzbekistan issuing for the first time (Figure 1.20, panel 4). However, debt vulnerabilities remain high for many frontier markets,[28] and in many cases new issuance has been at a very high cost.

China's equity market sold off more sharply than other emerging markets in 2018 before rebounding in early 2019. Trade tensions and the global sell-off added to pressures from the financial regulatory tightening campaign (Figure 1.20, panel 5). Equity market declines were also compounded by pressures on share prices of firms that rely on borrowing collateralized by their own shares, which mainly include smaller, privately owned companies (see Box 1.1 for details). To offset tightening financial conditions, Chinese authorities have eased monetary and credit policies. The required reserve ratio for banks was cut three times since the October 2018 GFSR, and a variety of other credit-easing measures and liquidity injections were undertaken. These measures together with improved global risk sentiment have led to the equity market rising by more than 25 percent and nonfinancial credit growth accelerating in early 2019, while funding costs for higher-rated bond issuers and bank borrowers have declined. Yet yields at issuance for lower-rated firms remained elevated (Figure 1.20, panel 6), and bond market defaults rose sharply among private issuers.

[28]Frontier markets refer to countries included in the J.P. Morgan NEXGEM (Next Generation Emerging Markets) index and low-income countries with international bond issuance that are not part of the index.

Portfolio Flows to Emerging Markets

Portfolio Flows to Emerging Markets Have Been Relatively Resilient

Portfolio flows to emerging markets have rebounded in recent months, after sustained outflow pressures in 2018 (Figure 1.21, panel 1). Portfolio flows had stabilized in the fourth quarter of 2018, despite a challenging external environment. Increased investor risk aversion is estimated to have reduced portfolio flows to emerging markets by some $20 billion in the fourth quarter of 2018 (or about 10 percent of average annual inflows in 2015-18), adding to the drag from the Federal Reserve's ongoing balance sheet normalization (Figure 1.21, panel 2). The reassessment of the monetary policy normalization outlook provided some offset to these pressures, with partial data for the first quarter pointing to a sizable recovery, led by debt portfolio flows.

Steady inflows into emerging-market-dedicated exchange-traded funds (ETFs) cushioned outflow pressures last year.[29] These inflows are part of a longer-term trend. Assets under management in ETFs have been rising steadily as investors have been increasingly attracted by the low cost, high liquidity, and growing availability of such funds for a range of asset markets. For equity ETFs, a large share of inflows has been to China since early 2017 (Figure 1.21, panel 3). These inflows largely reflected MSCI's decision to include certain types of Chinese shares in its most followed benchmark indices. Inflows into hard currency ETFs have been fairly resilient as well (Figure 1.21, panel 4).

Benchmark-Driven Portfolio Flows Are a Growing Share of Flows to Emerging Markets

Portfolio flows to emerging markets are increasingly influenced by the behavior of benchmark-driven investors. An investment fund is "benchmark driven" if its portfolio allocation across countries is guided by the country weights in a benchmark index (Figure 1.22).[30] The amount of funds benchmarked against widely followed emerging market bond indices has

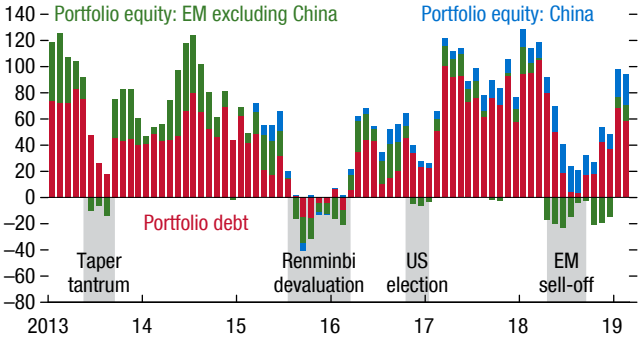
[29]ETFs are used by both retail and institutional investors. Anecdotal evidence suggests that asset managers often use ETFs as a cheap, easily accessible place to temporarily "park" funds before investing directly in the underlying assets.

[30]According to Arslanalp and Tsuda (2015), this differentiation of the investor base is somewhat different from the distinction between passive and active funds, or retail and institutional investors. In particular, the definition of benchmark-driven investors in this GFSR can include "passive," "closet-index," or "weakly active" funds, using the terminology of Miyajima and Shim (2014). Similarly, it can

Figure 1.21. Recent Pressures and Outlook for Portfolio Flows to Emerging Markets

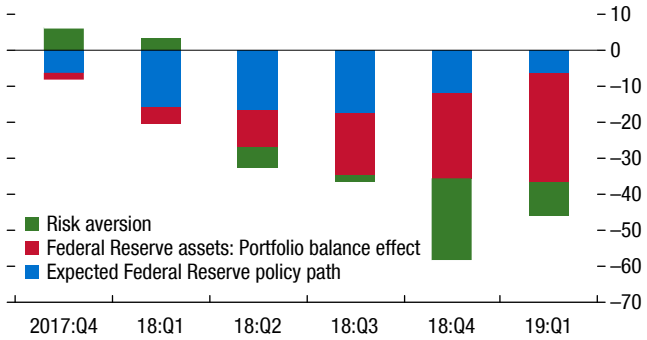
Portfolio flows have rebounded in recent months ...

1. Nonresident Portfolio Flows to EMs (Billions of US dollars, three-month rolling sum)



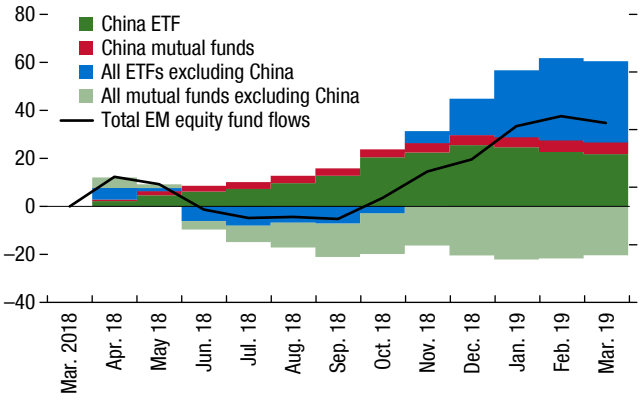
... as the drag from external factors has partially receded.

2. Estimated Cumulative Impact of External Factors on Emerging Market Portfolio Flows (Billions of US dollars)



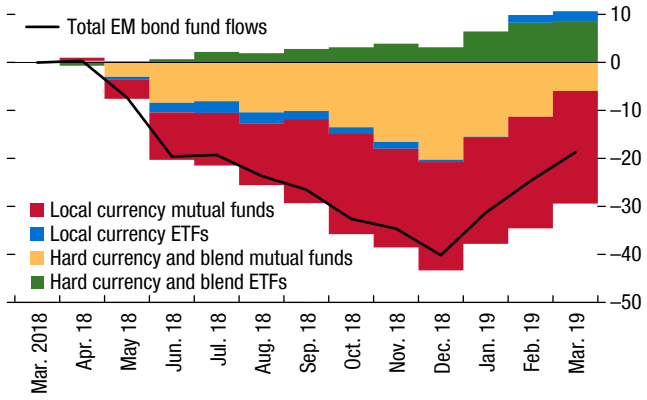
The resilience of emerging market aggregate fund flows reflected strong inflows in Chinese equities.

3. Cumulative Emerging Market Equity Fund Flows (Billions of US dollars)



Bond fund flows were cushioned by resilient inflows into hard currency ETFs.

4. Cumulative Emerging Market Bond Fund Flows (Billions of US dollars)



Sources: EPFR Global; Institute of International Finance; and IMF staff estimates.
Note: The model underlying panel 2 is discussed in more detail in the October 2017 *Global Financial Stability Report.* EM = emerging market; ETF = exchange-traded fund.

quadrupled in the past 10 years to $800 billion (see Online Annex 1.1). While ETFs and index funds explicitly aim to replicate the performance of specific benchmarks, most investment funds, including mutual funds and assets managed in separate accounts, tend to follow benchmark indices fairly closely because their performance is assessed against these indices. Estimates suggest that 70 percent of country allocations of investment funds are influenced by benchmark indices (Raddatz and others 2017).

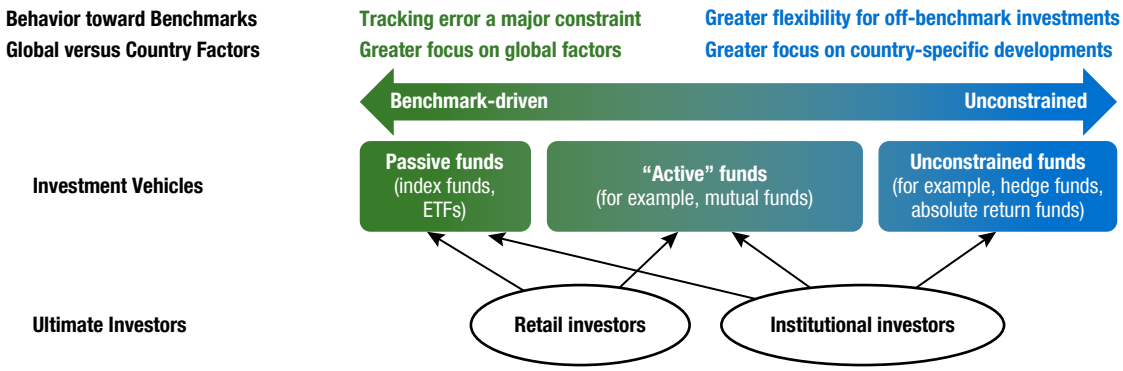
The growing role of benchmark-driven investments entails both benefits and risks for emerging markets. On the upside, inclusion in major benchmark indices provides countries with access to a larger and more diverse pool of external financing. On the downside, benchmark-driven flows to emerging markets can be highly sensitive to global factors and, more generally, to factors common to emerging markets included in benchmark indices. Because benchmark-driven investors tend to treat emerging markets as an asset class—focusing mainly on factors that affect emerging markets as a group, rather than on country-specific developments—benchmark-driven portfolio flows are more sensitive to common factors and therefore

include retail or institutional investors, depending on the investment mandate of portfolio managers.

Figure 1.22. Emerging Market Benchmark-Driven versus Unconstrained Investors

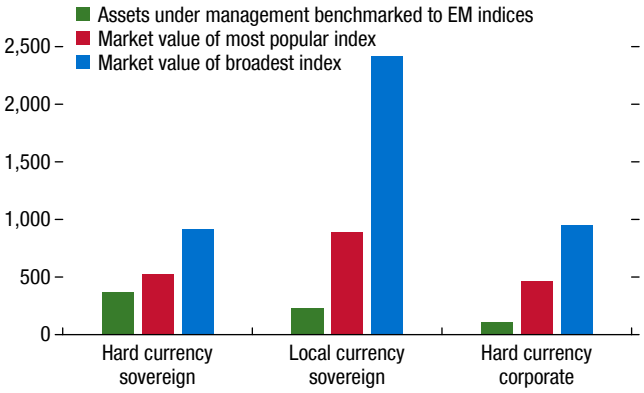
Benchmark-driven investors tend to treat EMs as an asset class.

1. Schematic: EM Benchmark-Driven versus Unconstrained Investors



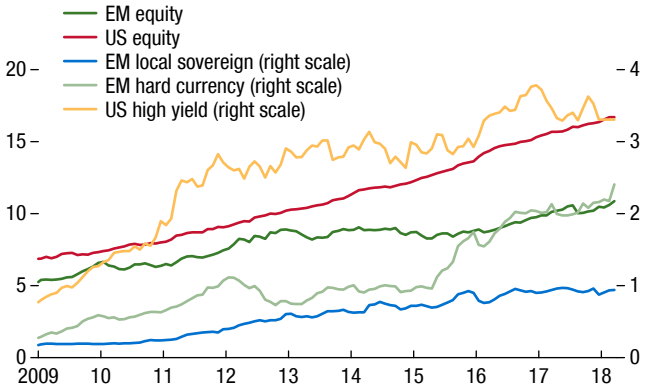
Benchmark-driven investors have a larger presence in hard currency debt than in local currency sovereign debt markets.

2. Assets Benchmarked to JP Morgan EM Indices and Market Capitalization (Billions of US dollars)



Passive investors are still only a small share of the overall asset class.

3. Share of ETFs and Passive Funds as a Percentage of Asset Class (Percent)



Sources: EPFR Global; JPMorgan Chase & Co.; and IMF staff estimates.
Note: In panel 2, "broadest index" refers to the version of the JPMorgan Index without the diversification weighting scheme and with the largest available issuer coverage. "Most popular index" refers to the version of the JPMorgan Index that is most widely followed in its asset class. EM = emerging market; ETF = exchange-traded fund.

more correlated across countries.[31] As a result, a larger share of benchmark-driven investments in total portfolio flows could increase the risk of excessive inflows or outflows unrelated to countries' economic fundamentals and could, in some cases, have destabilizing effects.

At present, the holdings of benchmark-driven and, in particular, passive investors in emerging markets are not that large relative to the investable universe, especially for local currency debt (Figure 1.22 panel 2). Furthermore, the share of purely passive investors (such as ETFs) remains small for both hard currency and local debt, especially when compared with mature markets (Figure 1.22, panel 3). For now, active managers can still be a countervailing force in terms of flows and price effects, especially in fixed-income markets. For example, monthly surveys of investment funds still show a substantial capacity of managers to deviate from benchmark allocations. In addition, other non-benchmark-driven opportunistic funds (see the October 2018 GFSR) have continued to build large positions in some emerging markets and so far have not faced significant pressure from end-investors to unwind.

[31]For example, Miyajima and Shim (2014) show that asset managers in emerging markets tend to behave in a correlated manner. Some of this behavior is because of common or similar portfolio benchmarks and the directional comovement of end-investor flows.

A Larger Share of Benchmark-Driven Investors Increases the Sensitivity of Portfolio Flows to Global Factors

During two recent episodes of significant capital flow reversals, portfolio flows driven by benchmark investors were less sticky than other types of flows.[32] The prospect of faster-than-anticipated policy normalization by the Federal Reserve in May 2013 triggered large portfolio outflows driven by emerging-market-dedicated investment funds, even as other investors (including hedge funds and global investment funds) added to their exposures.[33] Similarly, there were sharp portfolio outflows by emerging market benchmark-driven funds during the most recent emerging market sell-off (between April and August 2018), after almost two years of a steady buildup of their positions in local currency bonds (Figure 1.23, panel 1).

Benchmark-driven flows are highly correlated across countries and highly sensitive to external factors. During 2010–18,[34] the average pair-wise correlation between benchmark-driven flows to individual emerging markets and inflows to all other emerging markets was as high as 0.74, compared with only 0.27 for overall portfolio flows based on the balance of payments data (the last two vertical bars in Figure 1.23, panel 2). In addition, flows driven by emerging market benchmarks are about three to five times more sensitive to global risk factors than the balance of payments measures of portfolio flows. For example, a one standard deviation increase in the VIX (which corresponds to a 3.5 percentage point increase) on average reduces invested assets of benchmark-driven emerging market investors by 2 percent, compared with ½ percent for total portfolio investment (Figure 1.23, panel 3).[35] Similarly, a one standard deviation increase in US 10-year Treasury yields (which amounts to 20 basis points) reduces invested assets by 1½ percent, compared with about ¼ percent for total portfolio investment. Furthermore, the sensitivity of benchmark-driven flows to external factors has increased in recent years (Figure 1.23, panel 4).

As a result, an increasingly larger share of emerging market flows may become more prone to reversals in response to shifts in the global environment. A combination of heightened sensitivity to external factors and growing assets under management (see Online Annex 1.1) means that outflows from benchmark-driven funds in response to a given shock can be much greater now than only a few years ago. For example, estimated outflows in response to a one standard deviation interest rate shock using 2013 data are about $2 billion, whereas this number is close to $11.5 billion using the latest estimated sensitivity and assets under management (Figure 1.23, panel 5).

The Impact on Individual Countries Depends on Their Benchmark Index Weights . . .

Some countries may be disproportionately exposed to benchmark-driven investors. This is due to index inclusion rules and discretionary choices of index providers. For example, leading benchmark indices for local and hard currency bonds use weighting schemes that cap the weights of very large issuers and boost the weights of smaller issuers. Sovereign borrowers are generally more exposed to benchmark-driven investors than are firms, especially where sovereign debt managers aim to meet the various local investability criteria of index providers (see Online Annex 1.1). Countries with sizable shares of benchmark-driven investors in local currency debt markets include, for example, South Africa and Malaysia (Figure 1.23, panel 6).

Frontier debt issuers have benefited from index inclusion and have become an important part of the emerging market debt asset class. The amount of international debt outstanding from frontier issuers has increased dramatically over the past decade, with more than 20 countries issuing foreign currency bonds for the first time. Frontier issuers account for about 13 percent of the outstanding debt eligible for inclusion in the J.P. Morgan Emerging Market Bond Index Global (EMBIG), but their weight in the more widely used version of the index that caps larger issuers (EMBIG-Diversified) is closer to 23 percent, making them a large beneficiary of benchmark-driven flows (Figure 1.24, panels 1 and 2). Given the sizable contribution of frontier markets

[32]Calculations on investor base composition are based on Arslanalp and Tsuda (2015). The group of non-emerging-market benchmark-driven investors includes various unconstrained investors such as hedge funds and absolute return funds but also investors tracking global bond benchmarks. The analysis assumes that investors tracking global bond benchmarks react less to risks specific to emerging markets, given that their overall emerging market exposure is small and more highly rated.

[33]Additional exposures through spot and forward currency markets are not captured here.

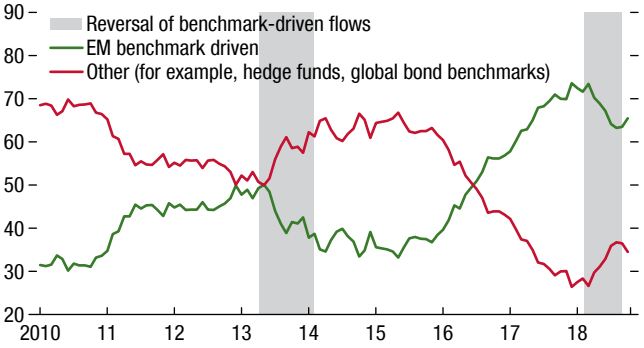
[34]The data set used for this analysis uses the EPFR Global flows into investment funds as a measure of benchmark-driven flows. See also the discussion in Online Annex 1.1.

[35]Estimates are based on a model adapted from Koepke (2018).

Figure 1.23. Benchmark-Driven Portfolio Flows to Emerging Markets

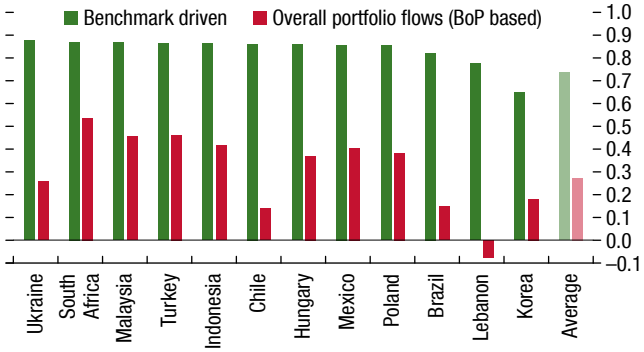
In recent outflow episodes, EM benchmark-driven investors have reduced their holdings rapidly.

1. Estimated Foreign Holdings of Local Currency Sovereign Debt (Share of total in percent)



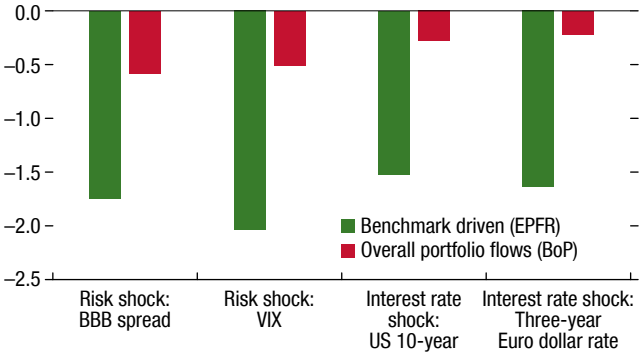
Benchmark-driven flows are highly correlated across countries.

2. Correlations between Flows to a Particular Emerging Market Country and Overall Emerging Market Flows



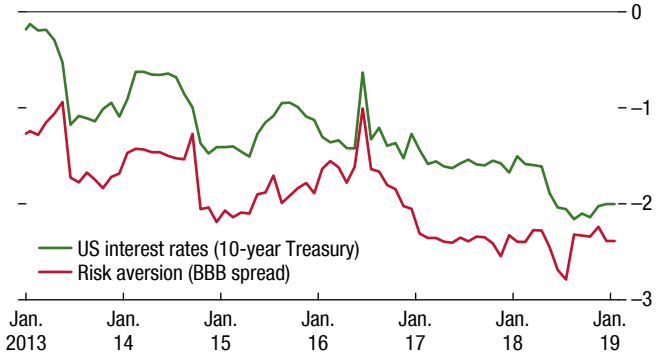
Benchmark-driven flows are highly sensitive to external factors, such as risk appetite and US rates.

3. Sensitivity of Debt Flows to External Shocks (Percent of invested assets)



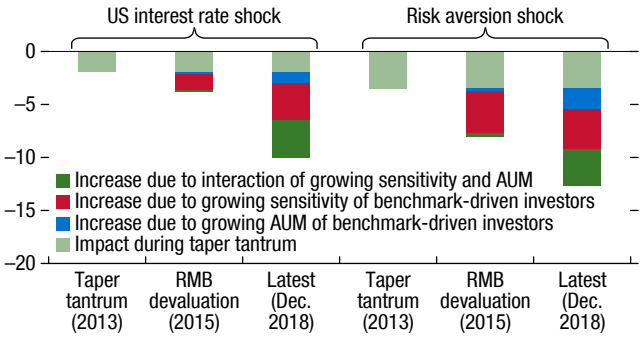
This sensitivity to external factors has increased in recent years.

4. Sensitivity of Benchmark-Driven Debt Flows to External Factors (Percent of invested assets)



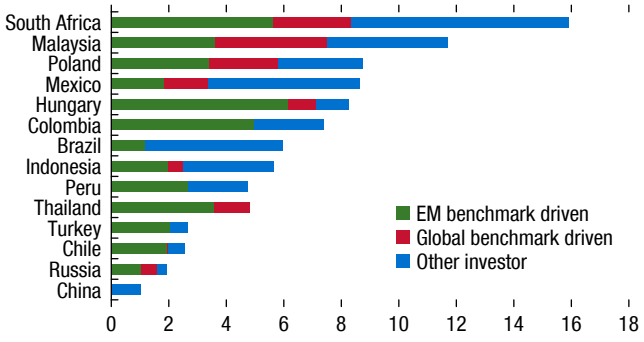
An adverse external shock would result in much larger outflows today than a few years ago.

5. Estimated Outflows from Benchmark-Driven Investors in Response to a One Standard Deviation Shock (Billions of US dollars)



Benchmark-driven investors play a major role in some emerging market sovereign debt markets.

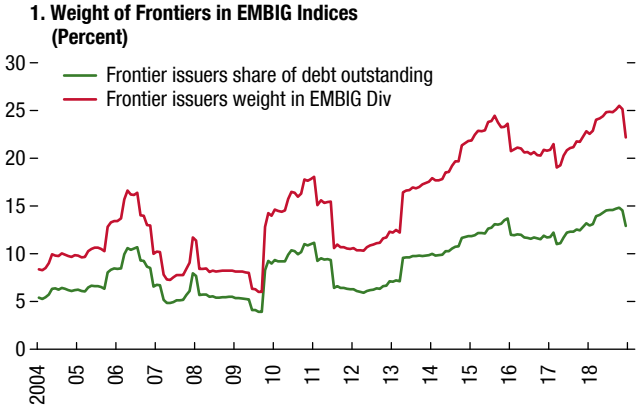
6. Local Currency Government Bonds Held by Nonresident Investors (Percent of GDP)



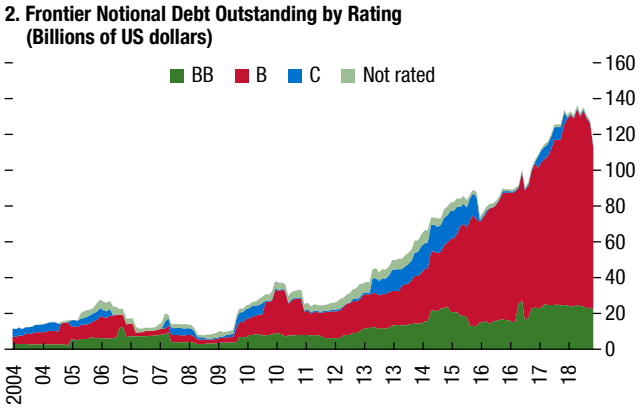
Sources: Bloomberg Finance L.P.; EPFR Global; JPMorgan Chase & Co; Arslanalp and Tsuda (2014); and IMF staff estimates.
Note: In panel 2, correlations are based on EPFR Global's data on country-level flows via investment funds. These data are subject to various measurement and sampling issues. In particular, EPFR estimates country-level flows based on certain assumptions about country portfolio weights because actual data on country-level fund flows are not reported to EPFR. This will tend to inflate estimated correlation coefficients. In addition, India and Thailand were excluded from the analysis because inflows are dominated by domestic funds investing in their own country. Separately, it is worth noting that correlation coefficients for overall portfolio flows are boosted by the fact that overall flows include benchmark-driven flows. In panels 3 and 4, coefficient estimates are calculated for a one standard deviation shock. In panels 4 and 5, coefficients are from a 36-month rolling regression. In panel 6, estimates assume that benchmark-driven investors and foreign investors follow closely the index weights. In reality, deviations for some countries can be substantial. In panel 6, the data are as of 2018:Q2. AUM = assets under management; BoP = balance of payments; EM = emerging market; EPFR = Emerging Portfolio Fund Research, Inc.; RMB = renminbi; VIX = Chicago Board Options Exchange Volatility Index.

Figure 1.24. Emerging Market and Frontier Debt Characteristics and the Impact of China's Inclusion in Benchmark Indices

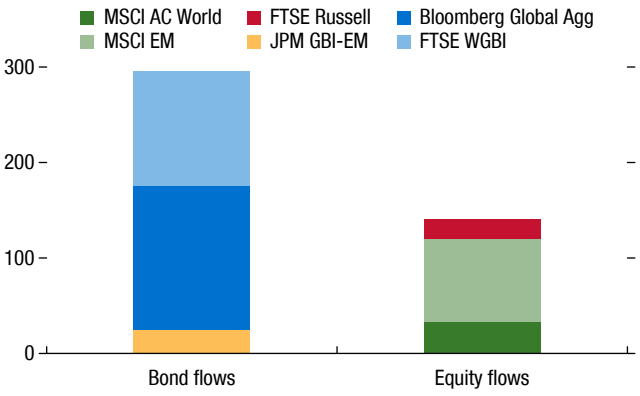
Over the past decade, outstanding frontier debt has increased substantially, with more than 20 debut issuers ...



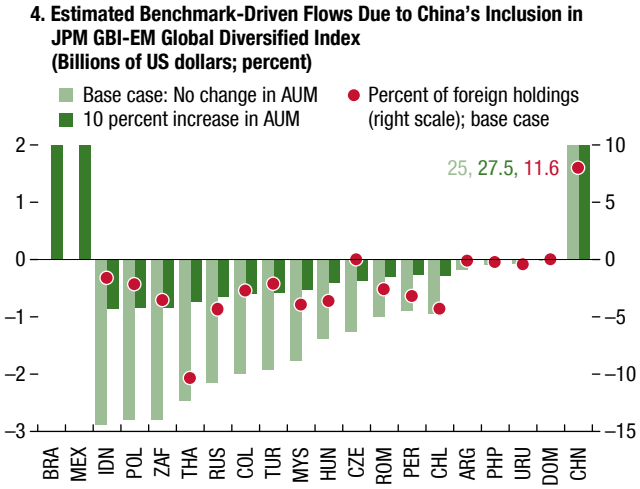
... mainly from the lower-rated (single B) borrowers.



Increase in China's weight in global benchmark indices is expected to boost RMB portfolio flows ...



... which could lead benchmark-driven investors to reduce exposures to other emerging markets.



Sources: JPMorgan Chase & Co; Arslnalp and Tsuda (2014); and IMF staff estimates.
Note: In panel 4, Thailand's foreign holdings of government debt are predominately in local currency. China's weight in the index is assumed at 10 percent. The numbers for China refer to the values of the two bars and the dot. In panel 4, data on foreign holdings are as of 2018:Q2. Data labels in the figure use International Organization for Standardization (ISO) country codes. AUM = assets under management; Bloomberg Global Agg = Bloomberg Barclays Global Aggregate; EM = emerging market; EMBIG Div = JPMorgan Emerging Market Bond Index Global Diversified; FTSE = Financial Times Stock Exchange Group; JPM GBI-EM = JPMorgan Government Bond Index-Emerging Markets; MSCI AC World = MSCI All Country World Index; RMB = renminbi; WGBI = World Government Bond Index.

to the overall performance of emerging market external sovereign debt, increased incidents of distress among these issuers could lead to redemptions from passive and other benchmark-driven funds, and result in outflows even from countries with strong fundamentals.

. . . And on the Inclusion of Other Countries in Benchmark Indices

Index inclusion decisions can lead to substantial rebalancing of portfolios and can alter the risk characteristics of the asset class. For example, J.P. Morgan recently included several Gulf Cooperation Council (GCC) countries in the EMBI Global index.[36] Given the substantial issuance by these countries over the past few years, their weight is expected to eventually rise to 12 percent. In addition to boosting flows to the GCC countries, this will also lead to an index weight

[36]This includes Bahrain, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates. Oman was already part of the EMBI Global.

reduction for other countries and consequently to some rebalancing by benchmark-driven funds. Furthermore, including the GCC countries will also alter the risk and return characteristics of the index; that is, it will increase the average credit rating and the share of oil exporters and, therefore, potentially reduce the price and flow sensitivity of the EMBI Global to global financial conditions and increase its sensitivity to oil price developments.

The inclusion of China's local currency bonds in benchmark indices is expected to boost portfolio flows to China. The renminbi-denominated government and policy bank bonds will be added to the Bloomberg Barclays Global Aggregate Bond Index starting in April 2019 and will be phased in over a 20-month period. With about $2 trillion to $2.5 trillion in assets under management tracking the index and expected country weight of about 6 percent (after full inclusion), this could bring $150 billion in additional inflows to China by 2020. Market analysts expect that inclusion in the Bloomberg index will pave the way for China's inclusion in other bond indices, which could eventually lead to inflows of closer to $300 billion. Furthermore, the gradual inclusion of China's A-shares in MSCI and FTSE equity indices could boost portfolio flows by more than $150 billion[37]—a trend already visible over the past few quarters.

But other emerging markets may see a reduction in benchmark-driven flows due to China's inclusion in benchmark indices. Since emerging markets have a small weight in the global bond benchmark indices, the impact of China's inclusion will be more notable for them when China's local currency debt is included in emerging market benchmarks. For example, inclusion in the J.P. Morgan Government Bond Index-Emerging Markets (GBI-EM) may lead to a potential reduction in fund allocations of $1 billion to $3 billion each for most issuers because of the mechanical rebalancing of the index weights.[38] These fund flows can be larger for some countries, where benchmark-driven holdings constitute a significant amount of their foreign debt holdings (Figure 1.24, panel 4). In reality, the rebalancing process is likely to be more complex. Apart from passive investors, other benchmark-driven investors can substantially deviate from the benchmark weights in an effort to outperform the index.[39]

China's Vulnerabilities

Financial Tightening Has Slowed Credit, but Vulnerabilities Remain Elevated

While vulnerabilities remain elevated in China (Figure 1.4), regulatory tightening has succeeded in containing the buildup in risks. Since the start of a wide-ranging and welcome campaign to strengthen macro- and microprudential regulation nearly two years ago, bank asset growth has slowed considerably, driven by a sharp reduction in claims on other financial institutions (Figure 1.25, panel 1). Banks have largely stopped increasing credit via on- and off-balance-sheet investment vehicles (Figure 1.25, panel 2), leading to slower overall shadow credit growth.[40] The slowdown was led by a sharp contraction in credit by small and medium-sized banks, which were previously the biggest contributors to the shadow credit expansion.

But less progress has been made in reducing vulnerabilities related to the opaque and still-large stock of investment vehicle assets. The regulatory reforms for the asset management sector, introduced in late 2017, have been scaled back somewhat in recent months, opening opportunities for more risk taking within the sector. Bank wealth management products, the largest investment vehicle type, will be allowed to increase leverage via debt issuance, invest in a wider range of equity and loan assets, and may receive coinvestment from sponsor banks. The implementation schedule (through 2020) has also been eased substantially, delaying the most challenging and fundamental aspects of the reform, such as the reduction of illiquid credit holdings and withdrawal of implicit guarantees. As a result, wealth management products still embed significant maturity and liquidity mismatches, as well as leverage to provide yields well above corporate bond yields (Figure 1.25, panel 3). Money market borrowing by investment vehicles

[37]The MSCI estimate assumes that the inclusion factor of A-shares rises to 50 percent over the coming years. Currently the inclusion factor is 5 percent and MSCI has announced an increase to 20 percent by the end of 2019.

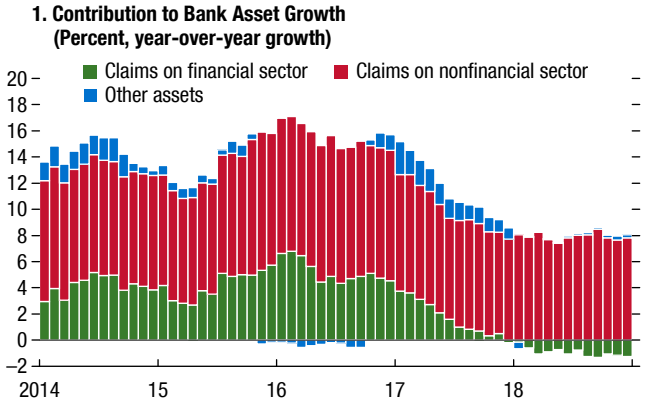
[38]The mechanical rebalancing of index weights happens gradually over time based on a transition period.

[39]For example, surveys show that mutual funds tend to underweight certain lower-yielding local markets. In addition, assuming Chinese bonds end up being the most liquid component of the index, they can substitute for some of the bonds of smaller and higher-rated markets and hence attract additional flows.

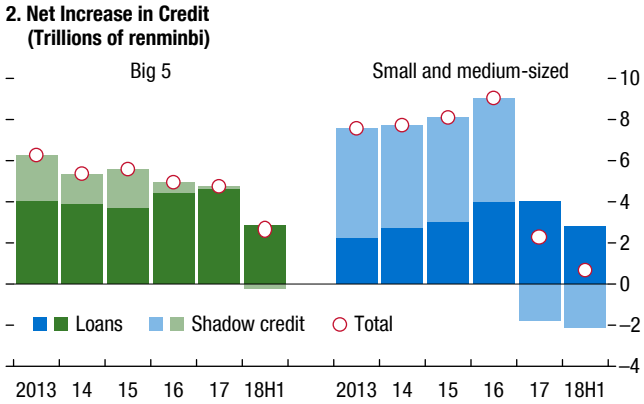
[40]For further details on investment vehicles and the structure of shadow credit, see the April 2018 GFSR.

Figure 1.25. China: Impact of Regulatory Tightening on Credit Expansion

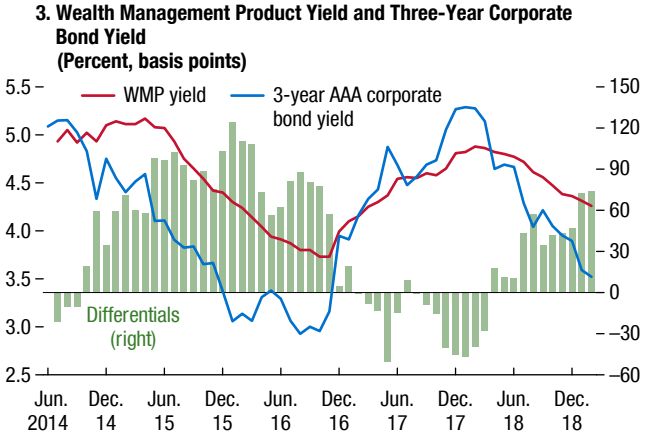
Regulatory tightening has succeeded in reducing linkages between financial institutions ...



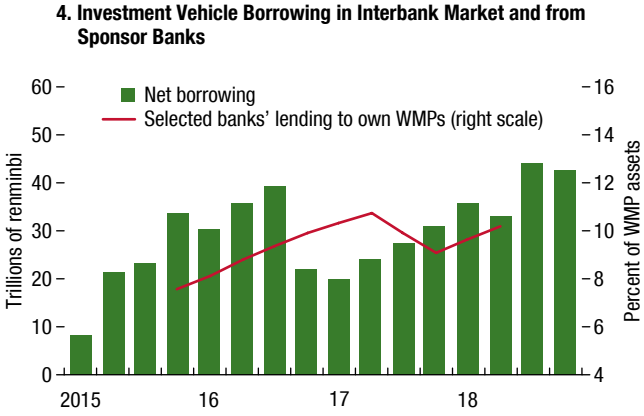
... and curbing shadow credit, especially from smaller banks ...



... but yields on wealth management products remain high, indicating continued use of leverage and risky assets to boost returns.



Investment vehicle short-term borrowing continues to rise, suggesting reforms have yet to reduce risks.



Sources: Bank annual reports; CEIC; Haver Analytics; SNL Financial; Wind Information Co.; and IMF staff calculations.
Note: In panel 2, shadow credit includes both bank-reported on-balance sheet investment vehicles (disclosed holdings of unconsolidated structured entities) and off-balance sheet investment vehicles. The latter is estimated as 65 percent of disclosed off-balance sheet wealth management products, which roughly deducts the proportion of assets that are claims on financial or public sector counterparties; as reported in China Bank Wealth Management Market Annual Report 2017. In panel 4, selected banks' lending to own WMPs based on banks with available disclosures, including for four Big 5 banks and two mid-sized banks that accounted for 43 percent of off-balance sheet WMPs as of 2018:H1. WMP = wealth management product.

remains elevated (Figure 1.25, panel 4), and conversion to net-asset-value-based wealth management products has so far been minimal (just 2.7 percent of all issuance in 2018, from 0.5 percent in 2017).

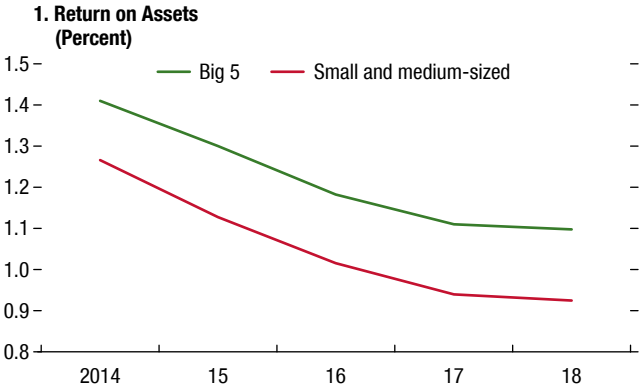
Bank Weaknesses Exacerbate the Tightening in Financial Conditions for Smaller Firms

Small and medium-sized bank balance sheets remain weak, which is contributing to tighter financing conditions for smaller firms.[41] Profitability and capital ratios at small and medium-sized banks continue to edge lower (Figure 1.26, panels 1 and 2), with many banks facing core Tier 1 capital ratios near regulatory minimums and significant future capital needs from unrecognized shadow credit positions. Funding cost pressures are also higher at these banks given that they must compete to raise deposits, limiting the benefit of loosening interbank funding conditions. These constraints have limited banks' ability to offset the sharp reduction in their shadow credit with an increase

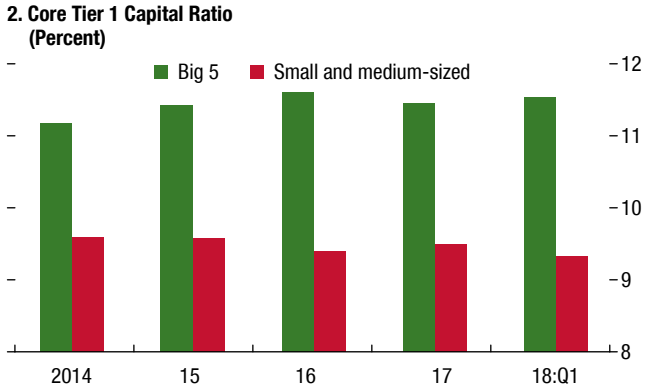
[41]Small and medium-sized banks account for just over half of commercial bank assets, but more than 70 percent of commercial bank loans to small and medium-sized enterprises, and 80 percent of growth in loans to these borrowers since the first quarter of 2015.

Figure 1.26. China: Bank Balance Sheet Weaknesses

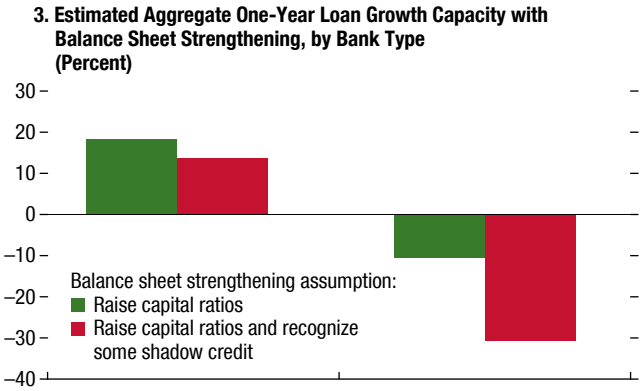
Banks' ability to extend loans to the corporate sector is limited by low profitability ...



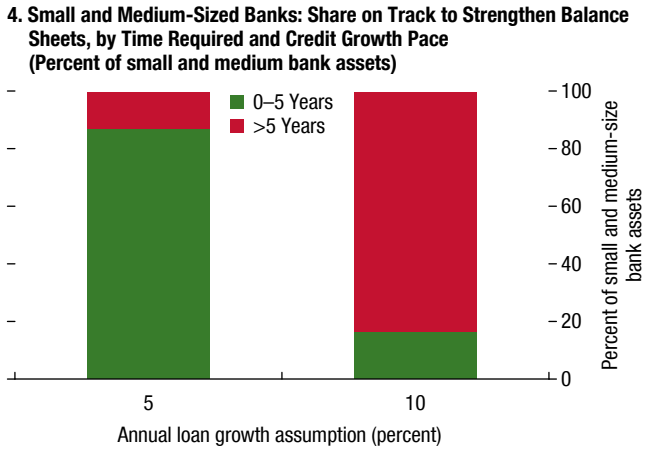
... and weak capital levels.



Banks outside the Big 5 face a trade-off between improving resilience or extending new credit.



Higher credit growth will come at a cost of delaying bank balance sheet repair.



Sources: Haver Analytics; SNL Financial; and IMF staff estimates.
Note: In panels 3 and 4, balance sheet strengthening assumes banks maintain common equity Tier 1 (CET1) ratios equivalent to higher of current ratio or the industry average (10.5 percent), and except in the green bars of panel 3, that banks must hold adequate capital against 50 percent of on-balance-sheet shadow credit and 30 percent of off-balance-sheet shadow credit (wealth management products). In both panels, bank internal capital generation is increased by a 50 percent reduction in the dividend payout ratio and data are based on a sample of Big 5 banks and 25 small and medium-sized banks representing RMB 160 trillion in assets.
RMB = renminbi.

in regular loans (Figure 1.26, panel 3), which require more capital and provisioning charges. This has disproportionately affected smaller firms and those with weaker credit profiles, which tend to rely on small and medium-sized banks for credit.

Small and medium-sized banks face challenges in repairing balance sheets. Given relatively weak capital and profitability, these banks face a trade-off between improving resilience and maintaining credit growth. A hypothetical scenario analysis presented in Figure 1.26 aims to illustrate this trade-off:

- *Banks seek to improve their resilience within a year:* 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, small and medium-sized banks would have to shrink their current loan books about 30 percent to meet this requirement within one year (Figure 1.26, panel 3).[42]

[42]Assumes capital must be held against 50 percent of on-balance-sheet shadow credit and 30 percent of off-balance-sheet wealth management product assets (roughly half of the estimated 65 percent that are nonfinancial credit assets). In addition, each bank is assumed to reduce its dividend payout ratio by 50 percent relative to 2017.

- *Banks maintain credit growth and seek to build resilience over time:* If allowed to achieve the same level of balance sheet strengthening (as above) over time, most small and medium-sized banks would not be able to do so within five years, assuming loan growth of 10 percent (Figure 1.26, panel 4).[43] However, if credit were to grow at a lower rate of 5 percent, then most banks would be able to grow out of their problems within five years. Thus, higher loan growth will prolong balance sheet weakness, making it difficult to ease credit conditions for smaller borrowers and leaving banks vulnerable to shocks.

Further Policy Easing without Deeper Reforms May Increase Financial Vulnerabilities

Challenging financing conditions for small and private firms also reflect distortions in credit allocation. While overall nonfinancial corporate credit growth has declined in recent years, financial sector exposures to real estate (to both mortgages and developers) and infrastructure have still expanded faster than lending to other firms (Figure 1.27, panel 1). Most recently, tightening of shadow credit has accelerated this process, with nonbank investors reducing exposures mainly to sectors other than infrastructure and property (Figure 1.27, panel 2). Bond market activity also underscores domestic investors' preference for infrastructure and property exposures. Among similarly rated issuers, infrastructure and property firms consistently enjoy more favorable borrowing conditions compared with other firms, and are affected less severely when market conditions tighten (Figure 1.27, panel 3). Compared with firms in other sectors, these firms' net issuance increases more during periods of easing and declines less during periods of tightening, particularly for lower-rated firms (Figure 1.27, panel 4). This, in part, reflects the perceived government support for real estate valuations (which support lending collateral) and implicit guarantees of government-controlled fundraising entities.

The financial system's bias toward infrastructure and real estate may further increase credit risks and asset price imbalances. Even though banks report that firms involved in property and infrastructure tend to have the lowest nonperforming loan ratios, they also tend to have higher leverage and weaker debt-service capacity than other nonfinancial firms (Figure 1.27, panels 5 and 6). Residential mortgages and property developer loans may offer more collateral for lenders, but real estate and land valuations are stretched, and credit growth in these sectors is likely to worsen asset price misalignments and increase household debt.[44] Additional infrastructure projects may lack sufficient cash flow and could potentially increase contingent public debt.

Further monetary and credit easing may increase vulnerabilities by tilting credit allocation toward riskier sectors and impeding bank balance sheet repair. Trade tensions and other factors tightening financial conditions have raised downside risks to growth, which have to be carefully managed. Yet given distortions in credit allocation, looser monetary and credit policies may primarily benefit infrastructure and property firms, increasing debt at these firms and among households. Thus, further easing via monetary and credit policies may come at the cost of worsening existing vulnerabilities, undermining the impact on financial conditions and ultimately raising risks to financial stability.

Frontier Market Vulnerabilities

After a lull in the second half of 2018, bond issuance by frontier borrowers restarted early this year and is expected to remain high in 2019 (Figure 1.28, panel 2). Given higher debt vulnerabilities and lower liquidity compared with other emerging market borrowers, market access conditions of frontier and low-income issuers remain highly sensitive to changes in global risk sentiment.[45] During the risk-off episode at the end of 2018, more than two-thirds of the issuers were facing secondary market yields of 7.5 percent or more, compared with almost 10 percent of issuers a year ago (Figure 1.28, panel 3). Issuers that relied more on capital market financing over the past few years may face significant deterioration in their debt sustainability over the medium term.

Frontier markets with weak debt-management capacity tend to face more market pressures. Debt-management-capacity problems are related to gaps in reporting, recording, and monitoring of public debt (Figure 1.28, panel 1). According to the latest debt recording and monitoring capacity assessment (Group

[43]Profitability (return on assets) and risk-weighted asset density are assumed to remain constant in this scenario.

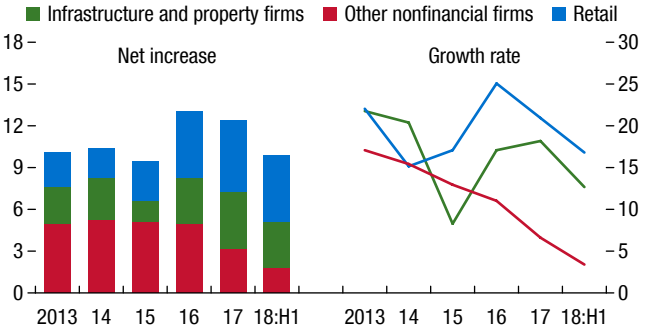
[44]Please see Box 2.3 for more details on housing market vulnerabilities in China.

[45]Please refer to List of Low-Income Country Debt Sustainability Analysis for Poverty Reduction and Growth Trust-Eligible Countries (https://www.imf.org/external/pubs/ft/dsa/dsalist.pdf) for more details.

Figure 1.27. China: Impact of Tightening Financial Conditions on Nonfinancial Firms

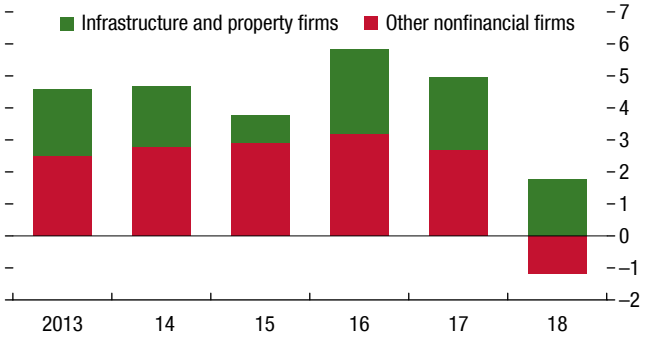
Overall lending to property and infrastructure firms has been resilient ...

1. Increase in Nonfinancial Credit by Sector (Trillions of renminbi, percent)



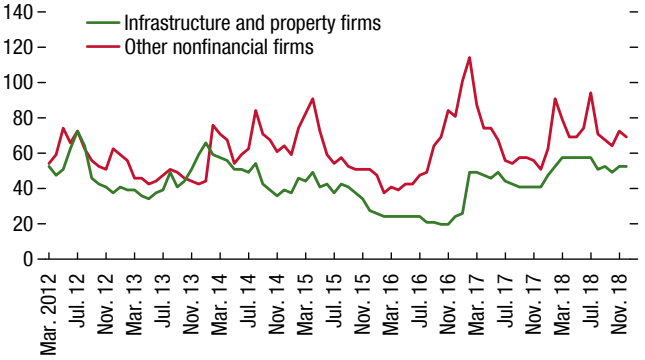
... while nonbank credit to firms in other sectors contracted in 2018.

2. Increase in Nonfinancial Corporate Credit from Nonbanks, by Sector (Trillions of renminbi)



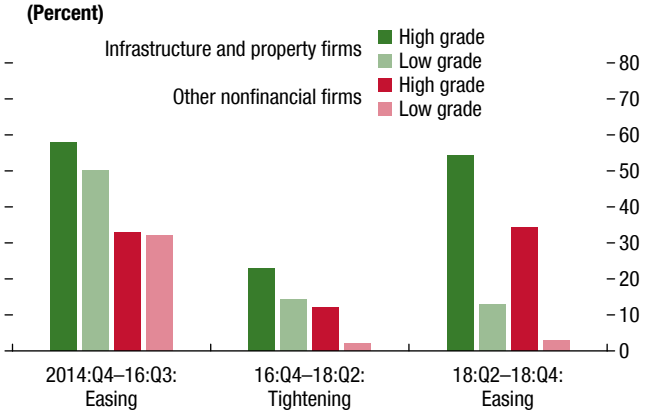
Among similarly rated issuers, infrastructure and property firms enjoy more favorable borrowing conditions ...

3. Average Bond Spreads for AAA-Rated Local Government SOE Issuers, Adjusted for Maturity, Three-Month Rolling Average (Basis points)



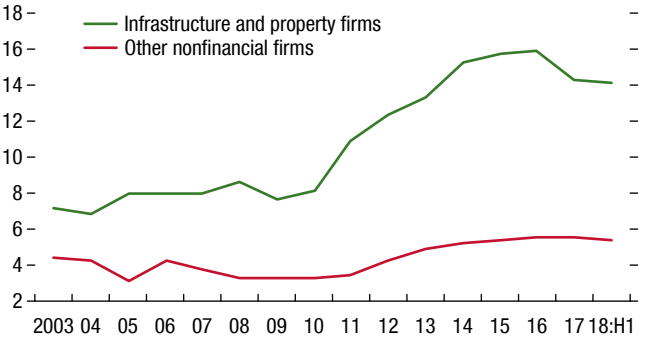
... with greater access to the bond market through the cycle, particularly for lower-rated firms.

4. Bond Market Net Issuance: Annualized Growth Rate by Sector and Grade (Percent)



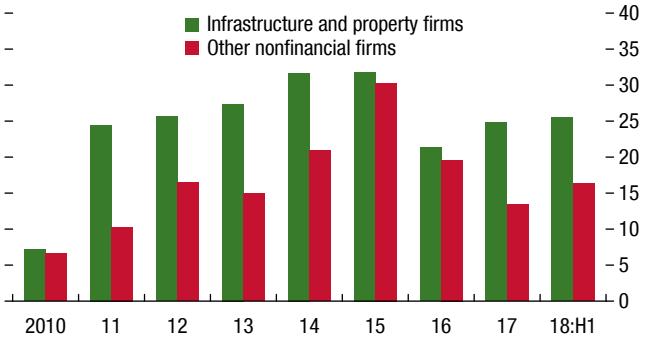
However, property and infrastructure firms tend to be more leveraged ...

5. Median Liabilities to EBITDA Ratio (Ratio)



... and have a larger weak tail of firms than in other sectors.

6. Corporate Debt-at-Risk: Share of Debt of Firms with Interest Coverage Ratio <1 (Percent)



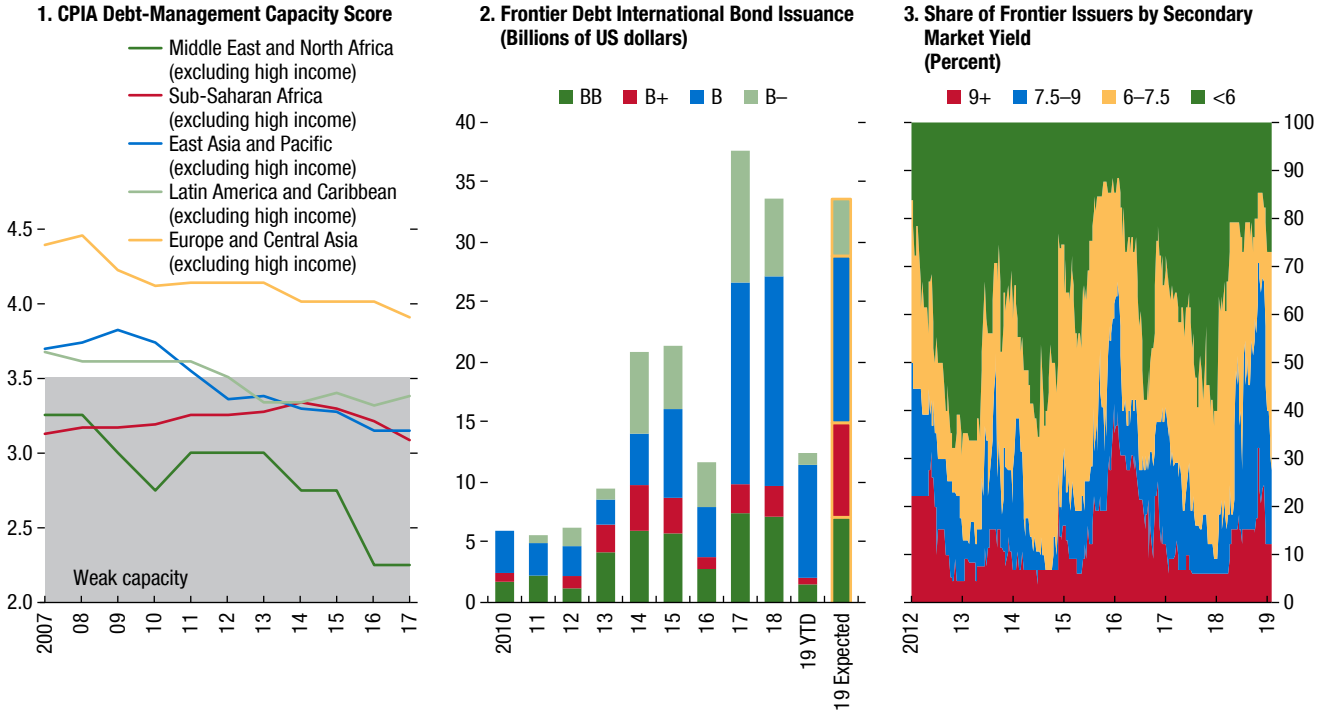
Sources: CEIC; SNL Financial; S&P Global Market Intelligence; Captial IQ database; Wind Information Co; and IMF staff calculations.
Note: In panel 1, data are based on sector allocations for bank-disclosed loans, corporate bonds, and trust company assets under management. In panel 2, data are based on corporate bonds and trust company assets under management. In panel 4, high grade is defined as AAA-rated firms (at origination), and low grade are firms rated AA+ or lower. In panel 6, firm-level interest expense is estimated using the median cost of funding (interest expense divided by interest-bearing debt) from each sector grouping and time period. Panels 5 and 6 are based on a sample of 3,700 Chinese firms from the Capital IQ database. EBITDA = earnings before interest, tax, depreciation, and amortization; SOE = state-owned enterprises.

Figure 1.28. Frontier Debt Vulnerabilities

Debt-management capacity has not kept up with increasing reliance on international debt.

Issuance needs are expected to remain high in 2019 ...

... but at higher borrowing costs.



Sources: Bond Radar; JPMorgan Chase & Co; World Bank; and IMF staff calculations.
Note: In panel 1, debt policy rating assesses whether the debt-management strategy is conducive to minimizing budgetary risks and ensuring long-term debt sustainability. CPIA = Country Policy and Institutional Assessment; YTD = year to date.

of Twenty 2018), 32 out of 70 low-income countries were assessed to have weak capacity. In recent years, the Republic of Congo, Ecuador, and Mozambique recognized substantial previously undisclosed liabilities and had to face distressed funding conditions. More recently, market speculation about Zambia's public debt, as well as uncertainty about short-term sources of financing in Costa Rica, led to a substantial repricing of credit risk and rating downgrades.

Policy Priorities

As the global economic expansion loses momentum, policymakers should aim to prevent a sharper economic slowdown while safeguarding the resilience of the financial system. Monetary policy should be data dependent, and any change in its outlook should be well communicated to avoid unnecessary swings in financial markets or undue compression of market volatility. Macroprudential policies should be used more proactively to affect financial conditions where vulnerabilities are elevated and rising. Efforts should also focus on developing prudential tools to address risks related to rising corporate debt funded by nonbank credit and to address maturity and liquidity mismatches in nonbank financial intermediaries. Measures are needed to mitigate the sovereign–financial sector nexus. Emerging market economies should bolster their resilience to be able to cope with capital flow volatility. In China, authorities should continue financial sector de-risking and deleveraging policies and put greater emphasis on addressing bank vulnerabilities.

As the credit cycle matures and growth momentum slows, clear communication is critical to avoid a market overreaction to changes in the stance of monetary policy. Monetary policy should be data dependent, and any changes in the monetary policy stance reflecting either changes in the economic outlook or risks surrounding this outlook should be clearly communicated. Sudden shifts in investors' outlook for monetary policy in advanced economies could lead to swings in risk sentiment and a sharp repricing of risk assets. On

Table 1.3. Availability/Use of Prudential Tools for Different Types of Vulnerabilities

Sectors	Balance Sheet Vulnerabilities							
	Leverage[1]	Liquidity[2]	Maturity[3]	FX Mismatch[4]	Leverage[1]	Liquidity[2]	Maturity[3]	FX Mismatch[4]
	Countries that Have Relevant Prudential Tools (as percent of all countries)				Countries with Elevated Vulnerabilities and Relevant Prudential Tools (as percent of all countries with elevated vulnerabilities)			
Banks	97	97	21	45	100	100	24	38
Nonbank financials								
Insurers	89	84	0	79	33	50	NA	NA
Other financials	55	62	3	0	50	71	0	NA
Nonfinancial sector *(borrower-based tools applied through banks)*								
Corporations	69	0	3	17	78	0	0	NA
Households	72	0	24	10	80	NA	NA	NA

Sources: 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; IMF, Macroprudential Policy Survey; S&P Global Market Intelligence; S&P Leveraged Commentary and Data; WIND Information Co.; and IMF staff calculations.
Note: Based on the sample of 29 jurisdictions with systemically important financial sectors. The assessment of vulnerabilities is based on the analysis shown in Figure 1.4. Elevated vulnerabilities refer to countries/sectors with a percentile rank in the respective vulnerability exceeding 60 percent. Cells highlighted in blue have entries below 50 percent, which should be interpreted to mean that 50 percent or more of systemically important countries do not have any prudential tools to address specific vulnerabilities. Some of the reported tools can be classified as microprudential. Based on the available information, it is not always possible to clearly distinguish between availability and use. FX = foreign exchange; NA = not available; NBNI = nonbank noninsurers.
[1]Tools reported to target leverage include (1) *prudential requirements for financial intermediaries,* such as capital conservation buffers, countercyclical capital buffers, leverage ratios, requirements for loan loss provisioning, caps on credit growth, limits on variable rate loans, prescriptions for risk weights, and prohibition of resecuritization and rehypothecation; and (2) *borrower-based tools administered through banks,* such as restrictions on loans or borrower eligibility, outright prohibitions against borrowing, loan-to-value ratios, loan-to-income ratios, and debt-service ratios. In addition, limits on insurance product guarantees are included in this category.
[2]Tools targeted at liquidity mismatches include liquidity coverage ratios, liquid asset ratios, levies on noncore funding, core funding ratios, reserve requirements for macroprudential purposes, redemption restrictions (for insurers and asset managers), risk management requirements and eligibility criteria (for central counterparties), and nonspecified measures reported to be targeted at liquidity mismatches.
[3]Tools covering maturity mismatches include net stable funding ratios, loan-to-deposit ratios, and explicit limits on maturity mismatches as well as currency-differentiated versions of those measures and limits on amortization periods.
[4]Tools reported as targeting foreign exchange mismatches comprise currency-differentiated versions of net stable funding ratios, loan-to-deposit ratios, and explicit limits on maturity mismatches as well as caps on loans denominated in foreign currencies, currency-differentiated liquidity coverage and liquid asset ratios, reserve requirements on foreign exchange positions, constraints on foreign exchange funding, and risk weights applying to foreign exchange positions.

the other hand, central banks' communications should not lead to unduly compressed financial market volatility. Central bank independence remains crucial for the credibility and effectiveness of monetary policy.

Policies to Contain Financial Vulnerabilities

Financial sector policies should tackle financial vulnerabilities in an environment in which low yields and volatility are likely to persist. These vulnerabilities include rising corporate debt, increasing house prices, and stretched asset valuations, as well as elevated maturity and liquidity mismatches in parts of the nonbank financial sector (as discussed in "Global Financial Stability Assessment" section). If prudential policies prove insufficient to mitigate medium-term risks to financial stability, consideration should be given to using monetary policy to lean against the wind in countries with strong cyclical positions and inflation at or above target.

In countries where financial vulnerabilities are elevated or rising, policymakers should be proactive in deploying prudential tools or expanding their macroprudential toolkits as needed. Currently, policy tools to contain vulnerabilities are predominantly administered through banks, including borrower-based tools, but there are virtually no prudential tools to address risks related to rising corporate debt funded by nonbank lenders.[46] More generally, few macroprudential tools are available to contain vulnerabilities in the nonbank financial sector. Table 1.3 shows the availability and use of prudential tools to address specific balance sheet vulnerabilities (leverage, maturity, liquidity, and foreign

[46]For example, in the United States, interagency guidance on leveraged lending stipulated that transactions where the borrower's total debt divided by earnings before interest, tax, depreciation, and amortization (EBITDA) exceeded six would generally raise concerns for most industries. Similar guidance has also been issued by the European Central Bank. In France, the High Council for Financial Stability has been working on measures to address corporate sector risks, including large-exposure limits for banks on highly indebted firms. There are also examples of borrower-based tools (caps on loan-to-value ratios) for firms being applied to commercial real estate (Bhutan, China, Lebanon, Mauritius, Poland, Tunisia), but those focus on bank credit.

exchange mismatches) in various sectors of the economy for a sample of 29 systemically important jurisdictions and, separately, for a subset of these countries where specific vulnerabilities are elevated based on the assessment provided in the "Global Financial Stability Assessment" section.

Where credit expansion is leading to high debt in one or more sectors of the economy, policymakers should use broad-based macroprudential tools or sector-specific tools:

- *Broad-based macroprudential tools*, such as countercyclical capital buffers, have been activated or increased in several countries,[47] but more countries would benefit from actively using them to increase their financial systems' resilience and to cool down credit growth (especially if originating from the banking sector), where it may be posing risks to financial stability. Where credit developments are a concern in a particular sector (corporate or household), countries could consider more targeted sectoral capital buffers for banks or increase risk weights and provisions on such exposures (IMF 2014). Countries should also stand ready to permit use of these buffers when the cycle turns.
- *To mitigate financial stability risks stemming from corporate sector vulnerabilities,* countries may also consider developing prudential tools for highly leveraged firms (akin to those applied to households) where overall debt is systemically high.[48] In addition, supervisors should ensure that more comprehensive *stress tests*—that take into account macro-financial feedback effects from high corporate sector indebtedness, as well as correlated risks in related sectors (such as commercial real estate)—are conducted for banks and nonbank financial intermediaries with significant corporate exposures.
- *For leveraged loans,* supervisors should take a comprehensive view of risks, intensify oversight, and enforce sound underwriting standards and risk management practices at banks and nonbank financial intermediaries active in the market. To better align interests between intermediaries and end investors, risk retention rules applied to originating lenders should remain an important tool for improving the quality of assets being securitized and sold to nonbanks.
- *To mitigate financial stability risks linked to rising house prices*, loan-to-value ratios, debt-service ratios, and/or debt-to-income ratios should be applied more consistently and broadly to nonbank lenders and should be calibrated to increase resilience to shocks to asset prices, interest rates, and incomes. The desirability of limiting regulatory arbitrage argues for enforcing the same limits for lending by nonbank financial institutions. Applying multiple indicators provides a more holistic view and limits opportunities for regulatory arbitrage.

Further efforts are needed to develop an adequate prudential toolkit for nonbank financial institutions:

- *For insurance companies,* recent regulatory developments, such as the implementation of Solvency II in Europe, have helped strengthen insurers, but the work on global risk-based insurance capital standards should continue. Where there are concerns about specific exposures (as discussed in "The Euro Area Sovereign–Financial Sector Nexus" section), supervisors should provide guidance to insurers on enhancing their risk management practices for default risk and correlation risk, as well as on appropriate treatment of subordinated and "bail-inable" bond investments. The development of a holistic framework for the assessment and mitigation of systemic risk in the insurance sector should move forward.
- *For asset managers,* supervisors should encourage robust risk management and stress testing. Where needed, prudential policies could include harmonized methodologies for leverage calculation, as well as limits on leverage or credit extension, minimum levels for liquidity buffers, and more specific guidance on liquidity management in investment funds. Proper liquidity risk management is crucial, given rising liquidity risks in some segments of the sector. Currently, the availability of liquidity management tools varies significantly across countries.

More broadly, a rollback of regulatory reforms should be avoided, and the integrity of the institutional framework for macroprudential oversight should be maintained or further strengthened.

[47]Some economies that had already activated a countercyclical capital buffer (Bulgaria, Czech Republic, Hong Kong SAR, Iceland, Lithuania, Norway, Slovak Republic, Sweden) have announced or implemented further tightening countercyclical capital buffers in 2018. Four countries (Denmark, France, Ireland, Luxembourg) also announced activation of the buffer in 2018. At the end of this year, three economies (Hong Kong SAR, Norway, Sweden) will have buffers at 2.5 percent.

[48]A highly indebted corporate sector may pose risks to the financial system because of banks' direct exposures to indebted firms (including through loans, deposits, and contingent liabilities such as lines of credit, warehousing, or pipeline risk) as well as because of indirect channels; higher corporate debt would tend to exacerbate an economic downturn.

Policies to Address the Sovereign–Bank Nexus

Highly indebted sovereigns should take action to place their debt-to-GDP ratios on a downward trajectory. A gradual fiscal adjustment is needed to reduce fiscal risks—where they are elevated—based on policies that will support medium-term growth, as discussed in the April 2019 *Fiscal Monitor*.

Euro area banks should continue to repair their balance sheets. Efforts to reduce the level of nonperforming loans through a comprehensive approach should continue. The introduction of nonperforming loan guidance is welcome, but more action is needed to reduce backlogs in bad debt recovery processes. For example, minimum standards for insolvency and creditor rights, and rules for valuation of collateral would help the resolution of bad debts.

Policies aimed at addressing links between banks and sovereigns should be designed from a holistic perspective, as discussed in the October 2018 GFSR. For example, consideration could be given to mitigating concentration risk in banks' sovereign exposures through coordinated policies in Europe. However, policies that improve banks' resilience to sovereign shocks and discourage banks from holding excessive amounts of sovereign bonds should be designed to minimize possible procyclical effects and financial stability risks in the banking sector.

The European Commission's Bank Recovery and Resolution Directive and associated bail-in requirements aim to reduce contingent liabilities for the sovereign in the event of bank stress. Currently, there is scope to minimize bail-in through approaches that differ from the euro area resolution rules, such as resolution under national bank insolvency regimes. These national regimes should be harmonized. In addition, an alternative means of flexibility should be introduced, such as a financial stability exemption, subject to strict conditionality and appropriate governance arrangements (as advocated by the euro area Financial Sector Assessment Program). This exemption would allow departure from minimum bail-in requirements only when financial stability is clearly at risk, thereby minimizing spillbacks from banks to sovereigns.

Policies to Increase Resilience in Emerging Markets and China

Emerging markets should be prepared to cope with foreign portfolio outflows:

- *Reduce external vulnerabilities and strengthen buffers:* Emerging market sovereigns should aim to reduce excessive external liabilities and reliance on short-term debt, as well as to maintain adequate fiscal buffers, bank liquidity buffers, and foreign exchange reserves. Countries where foreign currency risks pose challenges for banks could consider phasing in currency-differentiated liquidity coverage ratios. Authorities should also monitor risks related to the foreign ownership of local currency bonds, especially when a large share of these bonds is held by benchmark-driven investors.
- *Use the exchange rate as a shock absorber (in countries with flexible exchange rate regimes) and intervene in foreign exchange markets if market conditions become disorderly:* Before intervening, policymakers should consider the level of the exchange rate relative to fundamentals, the adequacy of foreign exchange reserves, the monetary policy stance, and private sector balance sheet exposures in foreign currencies.
- *Use capital flow management measures on outflows only in crisis or near-crisis situations:*[49] These measures should not substitute for necessary macroeconomic adjustment and should be part of a comprehensive policy package to address the causes of the crisis. When warranted, such measures should be transparent, temporary, and nondiscriminatory. Given that certain capital flow management measures can lead to exclusion from benchmark indices, the externalities of such a decision should be considered carefully.

Sovereign debt managers should act to mitigate short- and medium-term rollover risk in a more challenging environment. As volatility and rates increase, markets may show limited appetite for the low-volume and higher-risk issuers that have recently experienced relatively easy market access. Such issuers need to plan ahead to avoid refinancing difficulties that could spill over to the broader emerging debt markets.

As the volume of passive and benchmark-driven investment rises, index membership may become not only a benefit, but also a financial stability consideration for some emerging markets. With the importance of benchmark-driven portfolio flows increasing, a close dialogue is needed between index providers, the investment community, and regulators. Enhanced transpar-

[49]See IMF (2012, 2015, 2016).

ency by index providers, such as on eligibility criteria for index inclusion and advance communication of forthcoming index changes, can help promote greater consistency and less flow volatility. Issuers should strive for index inclusion where prudent and avoid introducing fragmentation and concentration risks by premature or partial inclusion of debt instruments in international bond indices.

In China, authorities should continue financial sector de-risking and deleveraging policies and put greater emphasis on addressing bank vulnerabilities, even as they take steps to mitigate the impact of external shocks. Authorities have had success in containing the buildup in financial risks by slowing credit growth. To build on this progress, credit growth should continue to moderate in a gradual manner consistent with orderly deleveraging. Reflecting progress so far in financial regulatory tightening, shadow banking activity has contracted, but the process of credit reintermediation has absorbed bank capital and required additional funding from nonbank financial institutions. Bank capital buffers should be further strengthened via external injections or profit retention. Timely and effective implementation of announced asset management reforms will also be important in this regard, given that it will help credibly delink banks from their sponsored investment products and associated risks and reduce implicit guarantees in the financial system. Finally, structural reforms (such as reducing the emphasis on growth targets and tightening budget constraints for state-owned enterprises) will also be critical to reduce credit misallocation, especially to sectors that benefit from perceived government support, such as property and infrastructure.

Box 1.1. China's Share-Collateralized Lending and Its Financial Stability Implications

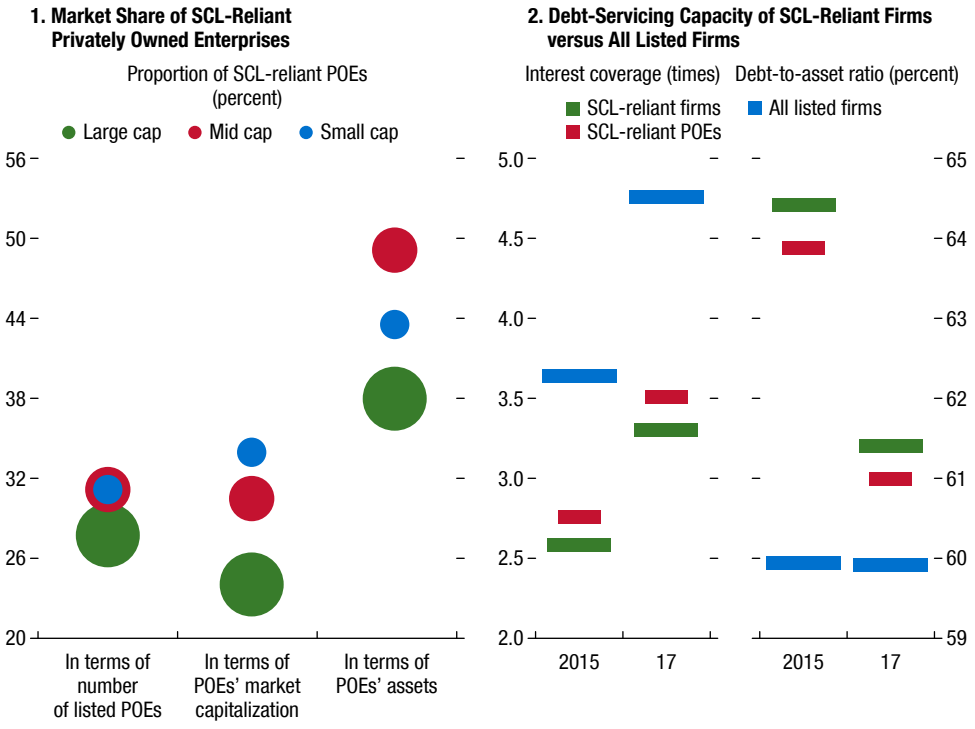
China's sharp equity market declines in 2018 were compounded by pressures on firms reliant on share-collateralized loans (SCLs). These firms saw equity prices fall by more than 40 percent at the trough, weighing on the overall stock market, which declined as much as 26 percent (see Figure 1.20, panel 5). This could have been in part due to investors selling the shares of these firms in anticipation of SCL lenders eventually doing the same to protect their collateral, or otherwise seeking additional collateral that would weaken the firms. The share price declines have likely added to liquidity pressures on SCL borrowers, creating a negative feedback loop between stock market developments and the financial positions of these firms.

This box was prepared by Sally Chen, Kevin Chow, and Henry Hoyle.

This phenomenon may have exacerbated the tightening in financial conditions for smaller and privately owned firms in late 2018, as these firms appeared to be particularly reliant on SCLs.[1] About 20 percent of the market value of privately owned enterprises' listed shares are pledged for SCL, compared with 3 percent for central state-owned enterprises and 6 percent for local state-owned firms. As of the end of October 2018, SCL-reliant firms—firms with at least 30 percent of shares pledged to lenders—accounted for 44 percent of listed private firm assets and 15 percent of all listed firm assets. Notably, nearly half of all mid-cap private nonfinancial companies were SCL-reliant (Figure 1.1.1, panel 1). Widespread distress of these firms

[1]Stock pledging—the practice by major shareholders of pledging companies' shares as collateral for loans—boomed in 2016 and 2017 following authorities' deleveraging campaign, which reduced the tightening of the flow of credit to riskier borrowers.

Figure 1.1.1. China: Market Share and Debt-Servicing Capacity of Firms Reliant on Share-Collateralized Lending



Sources: WIND Information Co. database; and IMF staff calculations.
Note: SCL-reliant firms are firms with at least 30 percent of shares pledged to lenders. In panel 1, each bubble shows the share of SCL-reliant firms within each market capitalization grouping. Cap = capitalization; POE = privately owned enterprise; SCL = share-collateralized lending.

Box 1.1 *(continued)*

Table 1.1.1. Share-Collateralized Lending Exposures by Lender Type, as of October 2018

	Banks	Trust Companies		Securities Firms	
In RMB billion[1]:	434–651	318–478		1,118–1,676	
As percentage of[2]:	Bank lending to firms[2]	Trust company balance sheets[3]	Trust company balance sheets and client assets[4]	Securities firm balance sheets[3]	Securities company balance sheets and client assets[4]
	0.4–0.7	38.4–57.6	1.3–1.9	17.5–26.3	5.2–7.7

Source: Wind Information Co. database; and IMF staff calculations.
Note: SCL = share-collateralized lending.
[1]Ranges shown are estimated loan amounts assuming loans are 50% to 75% of the market value of pledged shares as of October 2018. Loans are usually 50–60% of pledged share value at origination but must be closed out when loan-to-collateral value ratios rise above 75% due to share price declines.
[2]Estimated SCL extended by banks as a share of bank lending to firms.
[3]Estimated SCL extended by trust companies or securities firms as a share of their own assets.
[4]Estimated SCL extended by trust companies or securities firms as a share of their own assets plus client assets under management.

could put at risk the viability of a sizable segment of the sector. SCL-reliant firms also tend to have weaker balance sheets—lower debt-service capacity and higher leverage—than the broader sector (Figure 1.1.1, panel 2).

SCLs also pose risks to lenders because the value of the loan collateral is exposed to market volatility and is highly correlated with the borrower's debt-servicing capacity. The largest SCL lenders are securities firms (about 52 percent of total market value of pledged shares as of October 2018), followed by banks (about 21 percent) and trust companies (about 15 percent), with the remainder mostly nonbank financial institutions such as asset management and investment firms. Direct exposures to SCLs are relatively small for banks (0.4 percent of corporate loans) but could be more significant for securities and trust firms, depending on how much of these loans were made on balance sheet, or otherwise implicitly guaranteed (see Table 1.1.1). Data for the seven largest securities firms imply that on-balance-sheet SCL exposures are significant at about 10 to 20 percent of assets.

Although immediate financial stability risks from this practice appear limited at this point, authorities should further tighten SCL practices to ensure that this form of lending does not pose risks to market functioning or financial stability in the future. The authorities should continue to reduce distortions favoring state-owned enterprises and reduce credit overhang at unviable borrowers. Advancing market reforms will also discourage small privately owned enterprises from more risky forms of borrowing from nonbank financial intermediaries.

Special Feature: Liquidity Risks in Capital Markets

Postcrisis financial regulatory reforms and technological innovations have reshaped the marketplace dramatically. Implications of these developments for the resilience of market liquidity are not yet well understood.[1] Although there is no clear evidence that market liquidity has significantly worsened during normal trading days, the increased incidence of "flash crashes"—when liquidity evaporates suddenly—has prompted concerns about its fragility. By muddling price discovery and amplifying swings in asset prices, poor market liquidity conditions can exacerbate tightening in financial conditions and increase financial stability risks. This Special Feature provides a brief overview of the key structural changes that may have affected market liquidity and applies the framework introduced in the October 2018 Global Financial Stability Report *(GFSR) to analyze liquidity conditions in equity and sovereign bond markets over the past six months. It shows that since September 2018, incidence of liquidity strain has increased, with sovereign bond markets being more prone to episodes of liquidity strain than equity markets.*

Structural Changes in the Supply of and Demand for Market Liquidity

The increased instances of flash crashes in recent years, even in the most liquid markets, have raised concerns about the fragility of market liquidity. Just over the past year, "flash" episodes include the yen spike in January 2019, the sharp drop in S&P 500 futures in early December 2018, and the flash rally in US Treasuries in June 2018. Market analysts attribute these developments to a combination of postcrisis changes in financial regulation, growth of passive investors, and technological advances, which have had profound implications for the demand for and supply of market liquidity.

Tighter financial regulation and supervision have affected banks' incentives and ability to provide market-making services. On the one hand, postcrisis regulatory reforms have increased the resilience of systemically important financial institutions and markets. On the other hand, however, tighter leverage and capital requirements for banks have arguably increased the cost of providing capital market services and changed dealers' incentives to make markets—leading, for example, to some dealers cutting services to less profitable clients (Adrian, Boyarchenko, and Shachar 2017). In the United States, the Volcker Rule has also curtailed banks' proprietary trading activities. Overall, there has been a notable reduction in bank trading books across most jurisdictions during the postcrisis period (Figure 1.SF.1, panels 1 and 2).

Technological advances have changed the nature of liquidity provision. Although traditional broker-dealers still dominate the client business (Brainard 2018), they have been facing increasing competition from nonbank principal trading firms (PTFs)[2] as alternative market makers. The main advantages of PTFs over traditional market makers are higher speed and lower execution costs of transactions, achieved by using automated high-frequency trading strategies (Figure 1.SF.1, panel 3, and Table 1.SF.1). Other features of PTFs are as follows:

- *PTFs generally tend to be concentrated in liquid instruments*. PTFs are most prevalent in standardized, exchange-traded products, such as equities and Treasury futures (Table 1.SF.1). On US dealer-to-dealer electronic platforms, banks and broker-dealers currently account for less than 40 percent of total volumes, with PTFs making up more than half.
- *PTFs tend to use greater leverage, particularly intraday, than dealers*. Regulation of PTFs is minimal, with many jurisdictions just beginning to register them, despite their sizable share of trading volume. PTFs are not subject to capital and liquidity requirements similar to those applicable to banks.[3]

The authors of this feature are Rohit Goel, Piyusha Khot, Sheheryar Malik and Aki Yokoyama, with inputs from Rebecca McCaughrin, and Thomas Piontek.

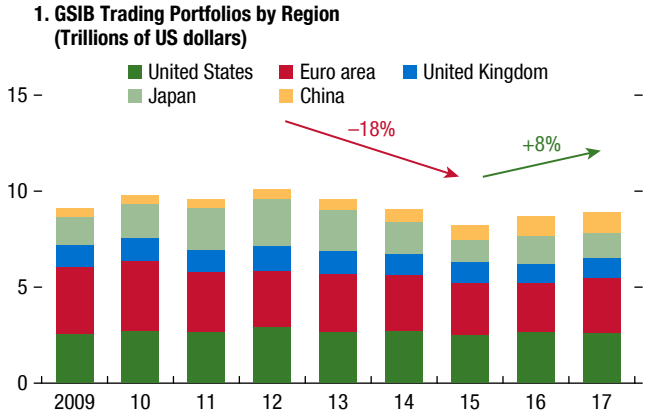
[1]The most commonly used definition of liquidity is the ability to trade a large amount in a short period of time close to the current price. See IMF (2015).

[2]A PTF is a principal investor that deploys proprietary automated trading strategies. It may be registered as a broker-dealer but does not have clients as in a typical broker-dealer business model (US Department of the Treasury and others 2015).

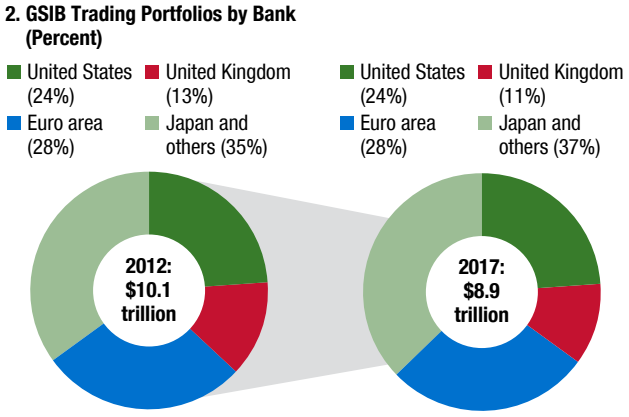
[3]In the United States, the binding capital constraint for brokers and dealers is capital requirements, mandated by the Securities and Exchange Commission. If a PTF is a designated market maker at the New York Stock Exchange, for example, it must maintain capital equal to the greater of $1 million or 15 percent of market value of 60 trading units for each symbol for which the broker-dealer subsidiary is registered as the designated market maker.

Figure 1.SF.1. Structural Changes in the Provision of and Demand for Market Liquidity

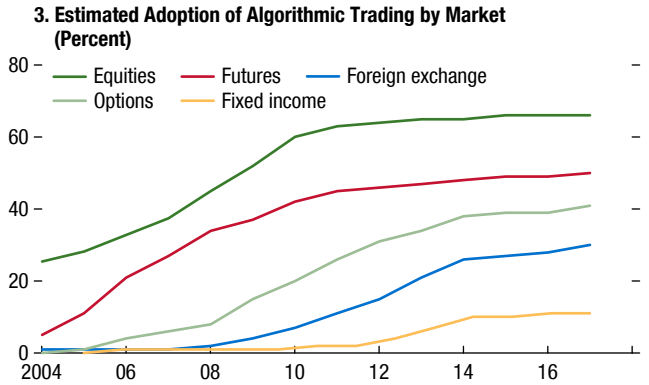
Postcrisis regulatory changes coincided with an initial reduction in bank trading books ...



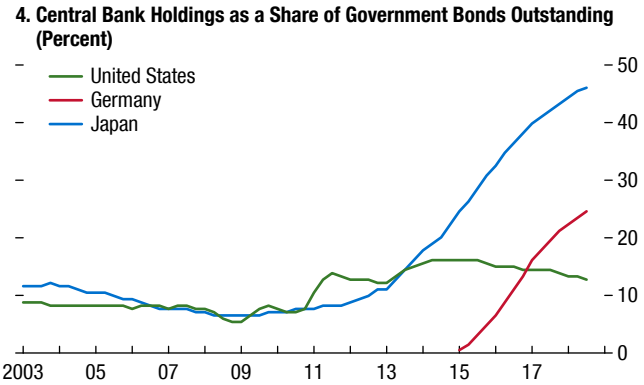
... with declines occurring proportionally across most jurisdictions.



Market participants have been increasingly using algorithmic trading.



Share of central bank holding of government bonds has increased.



Sources: Aite Group; Bloomberg Finance L.P.; equity research reports; Federal Reserve Board; SNL Financial; and IMF staff calculations.
Note: For panels 1 and 2, trading portfolio calculations include trading and available for sale securities. In panel 3, estimates are by Aite Group. GSIB = global systemically important bank.

On the investor side, the growing share of assets under management of exchange-traded funds (ETFs) and passive investors[4] could affect the demand for liquidity:

- *ETFs* offer investors a liquid instrument with exposure to a portfolio of securities with varying liquidity and risk characteristics. The increasing participation of mutual funds and ETFs in less liquid markets may have increased their liquidity mismatches.[5]
- The growth of assets under management of *passive investors* that track market index returns could induce greater correlation of component securities (Sushko and Turner 2018). This increases the likelihood of herding behavior by market participants, implied by higher correlation, and could have adverse implications for market liquidity.

Finally, adoption of unconventional monetary policies by central banks in response to the global financial crisis—specifically, asset purchases—has also affected the supply of and demand for liquidity (Figure 1.SF.1, panel 4). On the supply side, expanding central bank holdings of safe and liquid assets (government securities) resulted, by design, in reduction of the free float of securities available for investors. On the demand side, expansionary monetary policies nudged investors to reach for yield through exposure to duration and credit risk in less liquid asset classes. This portfolio rebalancing channel

[4]See "Vulnerabilities in China, Emerging Markets, and Frontier Economies" section.

[5]See Chapter 1 of the April 2018 GFSR.

Table 1.SF.1. Penetration of Electronic, Automated, and High-Frequency Trading

The degree of "electronification" varies across markets and geographic areas.

Order driven, standardized instruments, predominantly on-exchange ← → Bilateral, quote-driven, heterogenous, off-exchange, OTC

Based on Share of Volume Traded	Equity Futures	Treasury Futures	Cash Equities	Foreign Exchange Spot	Cash Treasuries	European Cash and Futures Government Bonds	Japanese Government Bonds	Interest Rate Swaps	Investment Grade/ High-Yield Corporate Cash Bonds
Electronic Trading	90%	90%	50–80%	80%	70%	60%	60%	20–50%	15–50%[1]
Automated Trading	–	–	70%	45%	55%	–	–	–	–
High-Frequency Trading	40%	60%	35–70%	25–30%	–	–	–	–	–
Major Electronic Brokering Platforms	CME, ICE, Tradeweb, Eurex, SGX, ASX	CME	Large number of platforms and dark pools	EBS/NEX Markets, Reuters, Currenex, FX Connect, Bloomberg, 360T	eSpeed/ NASDAQ Fixed Income, BrokerTec, Dealerweb, Bloomberg	EuroMTS, Eurex, Tradeweb, MarketAxess	BB Super Trade, Tri-Trade, J-GATE, Osaka Exchange	Bloomberg, Tradeweb, Tullet, DTCC, Icap, ICE, CME, NYSE Euronext, Nasdaq	MarketAxess (the largest), Tradeweb, TruMid, Bloomberg, Liquidnet (a dark pool)

Sources: Bank for International Settlements; Greenwich Associates; McKinsey; Rosenblatt Securities; and discussions with market participants.
Note: Electronic trading is characterized by trading conducted on platforms, whereas automated trading refers to a subset of electronic trading that relies on algorithms for decision making and execution of order submissions. High-frequency trading is a subset of automated trading strategies where trading is executed algorithmically and via low latency (less delay). OTC = over the counter.
[1]A total of 15 percent to 20 percent of corporate bond trading in the US investment-grade corporate bond market is conducted electronically, whereas about 50 percent of trading volume is conducted electronically in European investment-grade corporate bond markets and 20 percent in high-yield markets.

may have reduced (general) risk premiums across asset classes (as intended), potentially driven by compression in liquidity risk premiums.

Standard Liquidity Metrics May No Longer Adequately Reflect Market Liquidity Conditions and Risks

Given the changes in market structure discussed above, standard daily liquidity indicators may not fully capture market liquidity risks and should be interpreted with caution:

- *Standard quantity-based market liquidity measures show some signs of deterioration, whereas price-based measures appear relatively more robust.* Turnover ratios (defined as trading volumes relative to securities outstanding) have declined across markets since the global financial crisis (Figure 1.SF.2, panel 1), along with realized volatility. In some markets, a lower free float ratio (defined as the portion of publicly traded company shares) contributed to lower turnover ratio.[6] Meanwhile, bid-ask spreads for major markets have been relatively tight, though there has been some deterioration in a few foreign exchange markets in recent years, and in equity markets in recent months (Figure 1.SF.2, panel 1). One possible reason is that, as traditional dealers (banks) have continued to reduce market-making capacity, their main margin of adjustment has been through quantities rather than prices (for example, by reducing or cutting services to smaller, less important clients) (BIS 2016). In the foreign exchange market, bid-ask spreads widened following increased margin requirements in 2015 (PricewaterhouseCoopers LLP [PwC] 2015).[7]
- *Divergence between highly liquid and relatively illiquid markets appears to have increased.* This may be because participation of traditional market makers, which provide liquidity across all markets, has declined, whereas participation of nontraditional market makers (such as PTFs), which tend to be

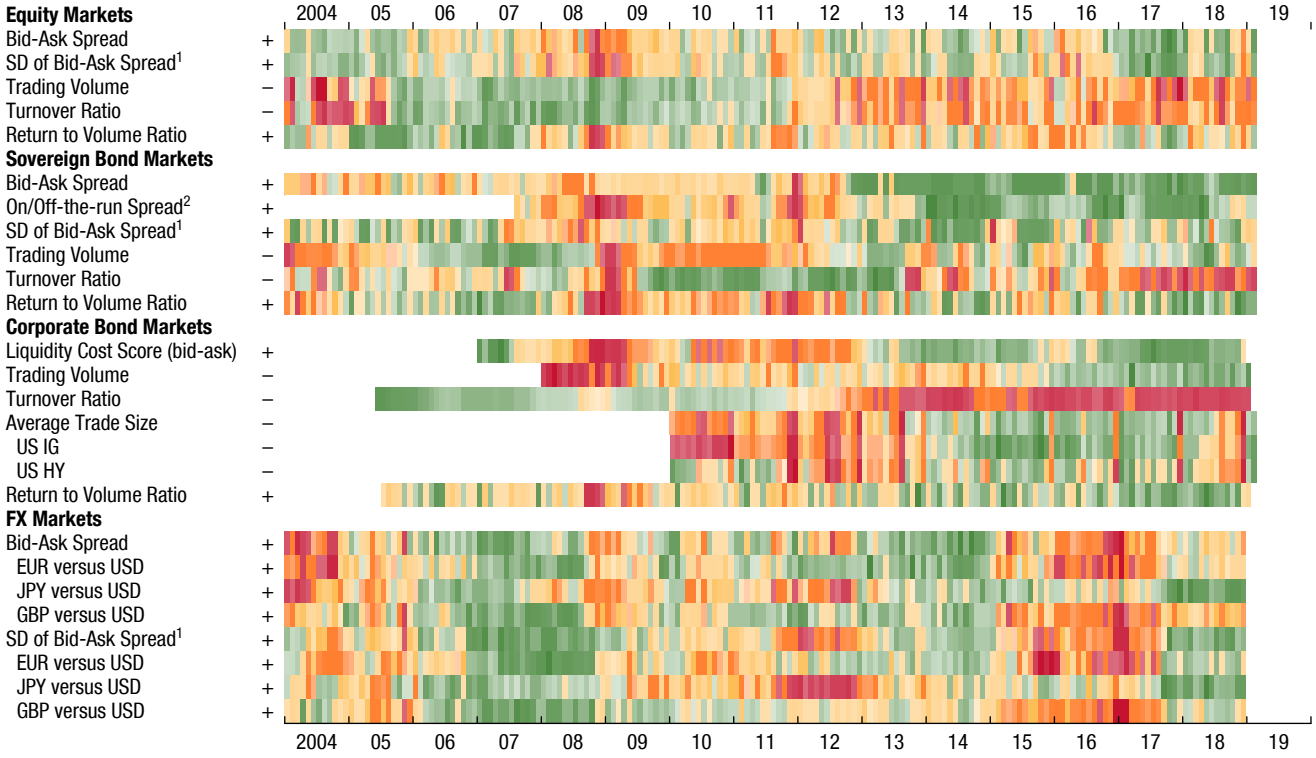
[6]Increased average tenors of debt since the global financial crisis could have also contributed to a lower turnover ratio.

[8]The National Futures Association raised the margin requirements for transactions involving several major currencies, including the Swiss franc, Japanese yen, and Australian dollar, following the Swiss franc event of January 15, 2015 (PwC 2015).

Figure 1.SF.2. Evolution in Market Liquidity

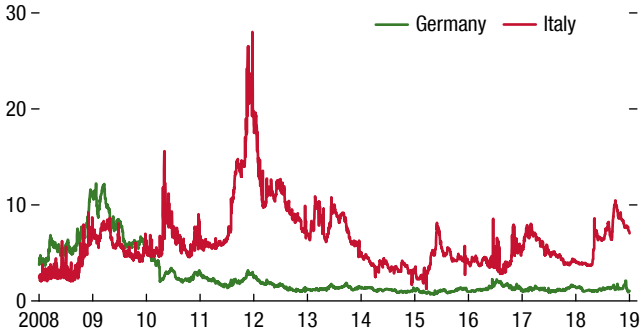
The standard quantity-based market liquidity measures show some signs of deterioration while price-based measures seem more robust.

1. Market Liquidity Heatmap



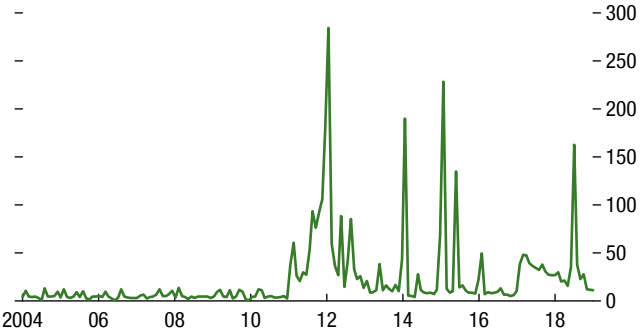
There is greater divergence in liquidity conditions across major sovereign bond markets ...

2. Bloomberg Liquidity Index



... with increased fragility in some sovereign bond markets.

3. One-Month Standard Deviation of Bid-Ask Spreads in Italy Sovereign Benchmark Bonds (Basis points)



Sources: Barclays Capital; Bloomberg Finance L.P.; Haver Analytics; Japan Bond Trading; JPMorgan Chase & Co.; MarketAxxess; Reuters; Securities Industry and Financial Markets Association; and IMF staff calculations.

Note: For panel 1, indicators are based on maximum *z*-score among regions. Regions are the euro area, Japan, and the United States for equity markets, and Germany, Italy, Japan, the United Kingdom, and the United States for sovereign bond markets. For equities and Japan sovereign bonds, bid-ask spreads are estimated based on Corwin-Schultz (2012). Liquidity Cost Score covers the United States and euro area, and other indicators for corporate bond markets are for the United States. Cash bond data are used for bid-ask and on/off-the-run spreads, and futures market data are used for trading volume, turnover ratio, and return to volume for sovereign bond markets. FX = foreign exchange; SD = standard deviation; EUR = euro; GBP = British pound; JPY = Japanese yen; USD = US dollar.

[1]One-month standard deviation of bid-ask spread.

[2]Bloomberg Liquidity Index.

active mainly in very liquid markets, has increased. For example, in the Italian sovereign bond market, Bloomberg's liquidity index[8] (a proxy for aggregate on- and off-the-run spreads) has been consistently elevated in recent years, while a similar index for German bunds has been stable. This may have been partly due to non-liquidity risk-related factors, as off-the-run Italian bonds have recently reflected higher credit and redenomination risks compared to on-the-run bonds. However this could also suggest that divergence between on- and off-the-run bonds is becoming larger in Italy compared with Germany (Figure 1.SF.2, panel 2).[9] Furthermore, bid-ask spreads in the Italian bond market appear to have become more volatile even during the periods when sovereign spreads were relatively tight and stable (Figure 1.SF.2, panel 3).

- *Liquidity conditions may be more fragile than they appear on the surface based on standard indicators*. Trading volume may not necessarily be an accurate indicator of market liquidity conditions, given that a large part of it may be driven by electronic trading aimed at taking advantage of small pricing differences across trading platforms. This is likely to be the case in foreign exchange markets, where more than three-quarters of spot trading is electronic, and there has been a significant proliferation of trading platforms.[10] Some market participants cite "algorithmic market making" as a possible reason; that is, a practice in which market makers are constantly generating quotes without actual underlying transactions.[11]

[8]The index levels are measured by the root mean squared error between bonds' market yields and theoretical yields based on cubic and exponential spline methodologies (Bloomberg).

[9]The euro area sovereign debt crisis may have contributed to the divergence.

[10]Because of the proliferation of trading platforms in foreign exchange markets, traders often try to arbitrage between platforms. For example, they can write a computer program to show a somewhat lower bid price on platform A conditional on the presence of a slightly higher bid price by someone else on platform B to make a profit in nanoseconds. If traders lift their indication, all other indications linked to the lifted price on other platforms may also be lifted instantaneously.

[11]The electronic trading platform enables market makers to optimize their algorithm to generate quote prices. The practice of so-called algorithmic market making involves writing a program to show the second-best bid-ask prices constantly following the best ones with a marginal spread. That way quotes may be shown at all times without having any actual transaction. Should many traders follow the same strategy, market depth appears to be decent. If there is, however, a large flow or shock, the bid-ask spreads widen violently and sweep away the market depth. That is, if the best bid-ask indications are withdrawn, all second-best algorithm-based indications are also withdrawn instantaneously, with market liquidity evaporating quickly. For equity markets, see Degryse and others (2018).

High-Frequency Intraday Jump Analysis May Provide a Better Reading of Market Liquidity Conditions and Risks than Standard Liquidity Indicators

The analytical framework used here to detect liquidity strain—first introduced in the October 2018 GFSR with respect to US equity markets—relies on examining the characteristics of jumps (or discontinuities) in intraday price evolution.[12] Price jumps can be of two types: "large" jumps (finite activity) that are linked to significant news shocks (potentially related to economic fundamentals) or episodic series of "small" jumps (infinite activity). In what follows, uncovering statistically significant evidence of the latter within intraday data is interpreted as evidence of liquidity strains. Intuitively, in a market with ample liquidity, an adjustment in prices in response to a significant news shock would be expected to occur rapidly. However, if liquidity is poor, this adjustment would be relatively sluggish, reflected by periods of small jumps (see the October 2018 GFSR Online Annex 1.1 for the description of the methodology).

The *jump analysis* applied to sovereign bond and equity markets in advanced and emerging market economies during September 2018–February 2019 yielded several observations:[13]

- *The frequency of liquidity strain events has been higher in emerging markets relative to advanced economies*. Jumps—large or small—constitute a markedly larger proportion of intraday price variability in emerging markets than in advanced economies, for equities and especially sovereign bonds (Figure 1.SF.3, panel 1). Looking at individual countries, price jumps in bond markets tend to be more reflective of liquidity strain (Figure 1.SF.3, panel 2). The frequency of liquidity strained days detected each month is also higher in emerging markets than in advanced economies (Figure 1.SF.3, panel 3). These observations may reflect structural differences in market liquidity between emerging market and advanced economies.
- *Sovereign bond markets seem to have been more prone to episodes of liquidity strain than equity markets*

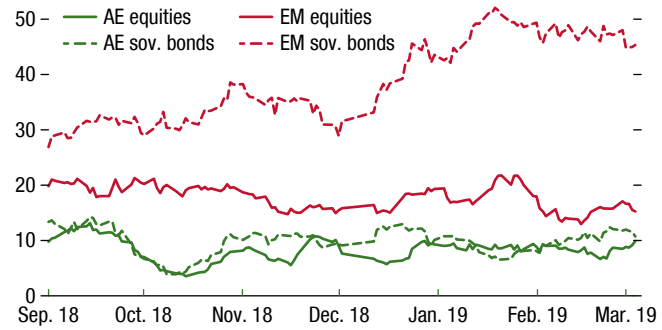
[12]See the October 2018 GFSR, Box 1.4, and its corresponding Online Annex 1.1.

[13]The sample of countries includes Brazil, China, France, Germany, India, Italy, Korea, Mexico, Portugal, Spain, the United Kingdom, and the United States.

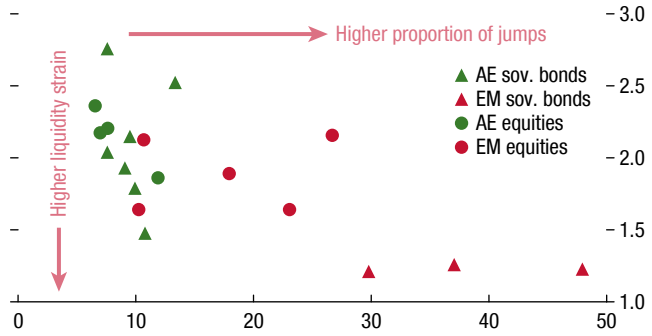
Figure 1.SF.3. Prevalence of Jumps and Liquidity Strain in Advanced and Emerging Markets

The frequency of liquidity strained days has been higher in emerging markets than in advanced economies during September 2018–March 2019. Sovereign bond markets seem to be more prone to liquidity strains than equity markets, especially in emerging market economies.

1. Proportion of Intraday Price Variability Explained by Jumps: EM and AE Average (Percent; 10-day moving average)

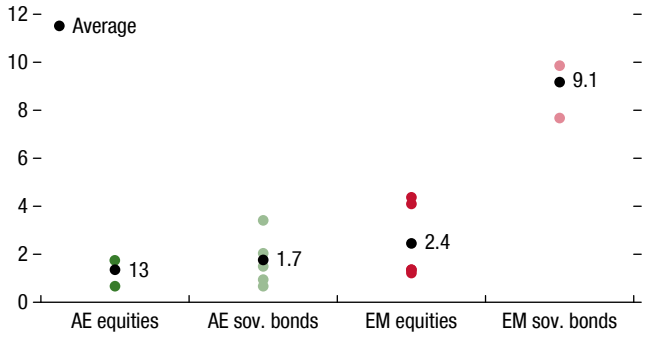


2. Proportion of Jumps versus Liquidity Strain (Index and percent; September 2018–March 2019; dots and triangles denote individual countries or markets)

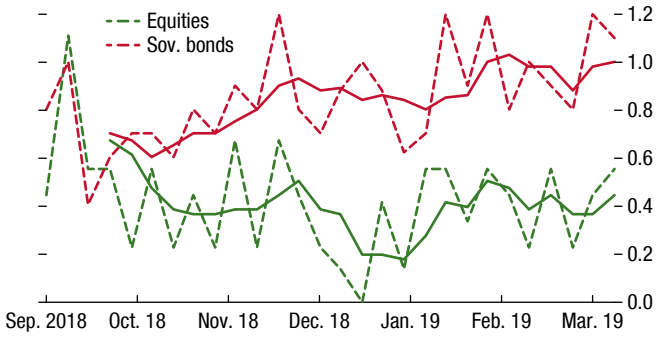


The frequency of liquidity strain in sovereign bond markets seems to have increased over the past six months.

3. Average Frequency of Liquidity Strained Days (Number of days per month; September 2018–March 2019; dots denote individual countries or markets)

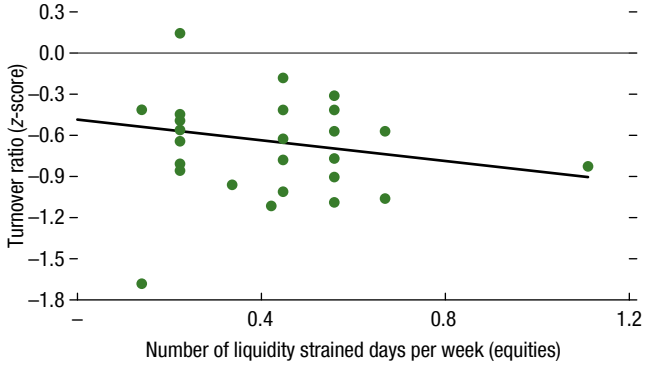


4. Average Frequency of Liquidity Strained Days across Markets (Number of days per week; solid lines denote four-week moving averages)

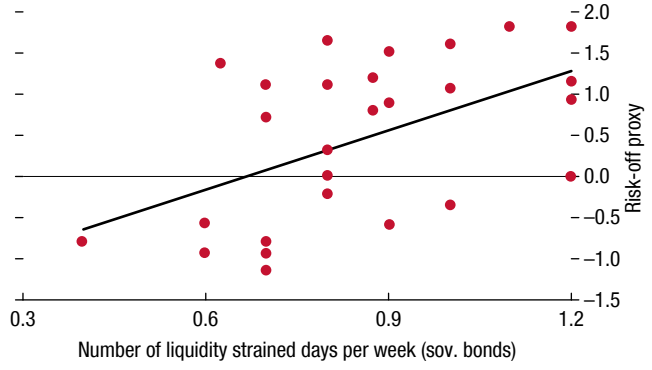


The frequency of liquidity strain is correlated with standard liquidity metrics and a proxy for risk-off periods.

5. Frequency of Liquidity Strain in Equities versus Turnover Ratio (*Z*-score and number of days per week; September 2018–March 2019)



6. Frequency of Liquidity Strain in Sovereign Bonds versus a Proxy for the Risk-Off Periods (Index and number of days per week; September 2018–March 2019)

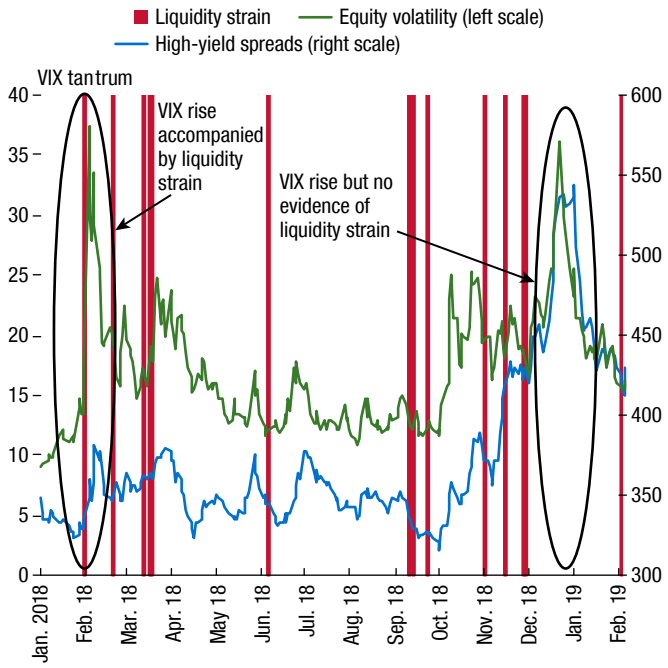


Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: "Jumps" refer collectively to finite activity (large) and infinite activity (small) price jumps. Uncovering significant evidence of infinite activity jumps in intraday data is interpreted as suggestive of liquidity strain. Panel 1 represents average across emerging markets (EM) and advanced economies (AE). Panel 3 considers frequency of liquidity strained days per month. In panel 6, "risk-off proxy" is the second principal component of US Treasury 10-year yields and US dollar index, both in levels. Sov. bonds = sovereign bonds.

(Figures 1.SF.3, panels 2 and 3). This may be in part due to the greater importance of dedicated market makers in bond than in equity markets. Sovereign cash markets have traditionally been traded over the counter, where the process of matching buyers and sellers requires a fair amount of intermediation and involves significant search costs (Duffie 2012). By contrast, most equity instruments are traded over exchanges. Therefore, the effects of structural changes in the provision of liquidity may be more pronounced in sovereign bond markets (for example, see PwC 2015).

- *The incidence of liquidity strain seems to have been rising over the past few months (Figure 1.SF.3, panel 4), particularly in sovereign bond markets.* The frequency of liquidity strain in equities is loosely correlated with conventional liquidity metrics, such as the turnover ratio (Figure 1.SF.3, panel 5), while the frequency of strain in sovereign bonds is closely correlated with the risk-off proxy (Figure 1.SF.3, panel 6). In some markets, these strain episodes have coincided with extended asset price declines, underscoring the importance of monitoring liquidity conditions on a high-frequency basis, especially around key events (see below).

Figure 1.SF.4. Equity Volatility, High-Yield Spreads, and Days with Liquidity Strain
(Percentage points; basis points)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: VIX = Chicago Board Options Exchange Volatility Index.

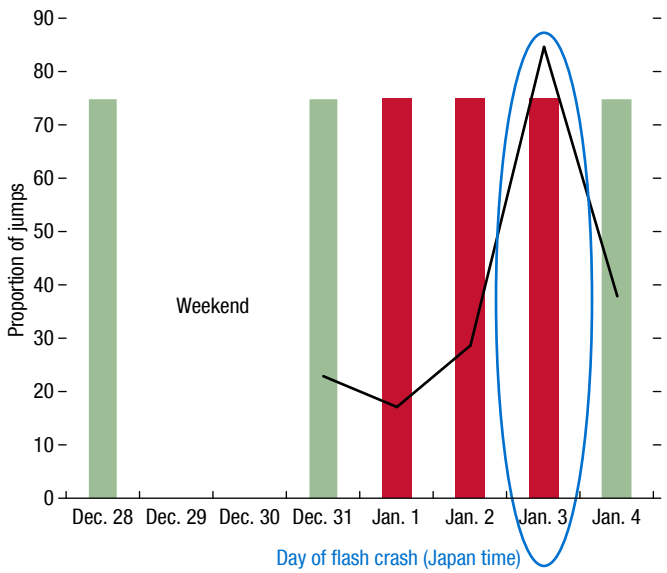
Liquidity Strains Tend to Rise around Key Events

The framework described in this Special Feature can be used to analyze market liquidity conditions surrounding particular events. Analysis shows that heightened uncertainty on (and around) policy-relevant news announcements has tended to result in market liquidity strains. In addition, it reveals that while some volatility spikes coincided with illiquid market conditions, others appear to have been driven by other factors. Three case studies are presented below.

VIX tantrum versus VIX spike at the end of 2018: Over the past year, the Chicago Board Options Exchange Volatility Index (VIX) surged to a very high level (around 35 points) on two occasions. The first spike was on February 2, 2018 (the so-called VIX tantrum), and the second on December 24, 2018 (see Figure 1.SF.4). While the VIX tantrum spike was accompanied by liquidity strain, the latter episode was not characterized by any meaningful deterioration in intraday market liquidity. This difference could be due to different underlying shocks that generated market volatility on these days. Whereas the VIX tantrum was largely driven by technical factors (see the April 2018 GFSR), the most recent spike—which was preceded by a more gradual increase in market volatility over the previous few months—was more likely driven by investors' reassessment of the outlook for growth and US monetary policy normalization.

Japanese yen flash event: On January 3, 2019 (Japan Standard Time), the Japanese yen market experienced a flash event (Figure 1.SF.5). The currency surged nearly 4 percent against the dollar in a span of minutes between New York and Tokyo/Singapore trading hours, the so-called witching hours of Asian trading. Market participants attributed this to technical factors, including short covering in yen and potential amplification effects of algorithmic trading. However, jump analysis shows that liquidity strains were already present days ahead of the flash event day, possibly due in part to a public holiday in Japan. So, the impact of a flash crash during the witching hours likely exacerbated the already-strained liquidity conditions in this market. As a result, on January 3, an exceptionally high proportion of price variation (over 85 percent) was due to jumps.

Figure 1.SF.5. Proportion of Intraday Price Variation Due to Jumps: In Japanese Yen/US Dollar
(Percent)



Sources: Bloomberg Finance L.P.; and IMF staff analysis.
Note: "Jumps" refer collectively to finite activity (large) and infinite activity (small) price jumps. Uncovering significant evidence of infinite activity jumps in intraday data is interpreted as suggestive of liquidity strain. Red bars indicate days of predominantly liquidity-strained trading. Green bars correspond to days of significant news-related jumps, but not necessarily liquidity issues.

Brexit: The Brexit negotiations between the United Kingdom and the European Union have been followed closely by the markets. The analysis of intraday liquidity conditions in the 10-year UK gilt market, since September 2018, reveals that, on average, the proportion of variation explained by jumps tended to rise significantly around key events (from below 10 percent to close to 40 percent), typically accompanied by evidence of liquidity strain (Figure 1.SF.6, panel 1). Furthermore, the data show that the frequency of liquidity strained days per month has risen in the UK gilt market since September 2018. For example, between November 2018 and January 2019, it has averaged 2.3 days a month (Figure 1.SF.6, panel 2), compared with an average frequency for other major advanced economy sovereign bond markets of 1.5 days a month.[14]

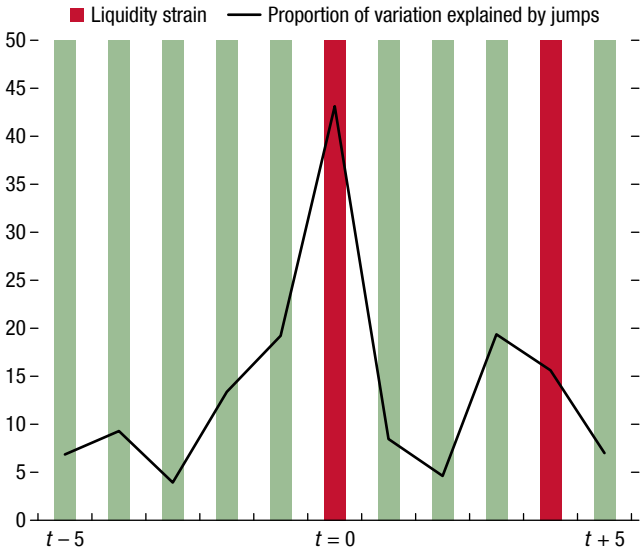
In Conclusion, Market Liquidity Conditions Merit More Scrutiny

Illiquidity events can precipitate fire sales and result in significant asset price moves, contributing to sudden and sharp tightening in financial conditions and thus raising financial stability risks. In addition, poor market liquidity impairs price discovery and increases transaction costs. Therefore, market liquidity conditions merit close scrutiny by regulators, including assessments of the robustness of trade infrastructure and supporting transparency in the marketplace. As trades transpire at ever higher frequencies, counterparties to PTFs should carefully monitor intraday activity and leverage exposures and strengthen their liquidity risk management practices. Improving availability of data on the activities of nonbank market makers would help the private and public sectors with timely assessment of liquidity risks in global capital markets.

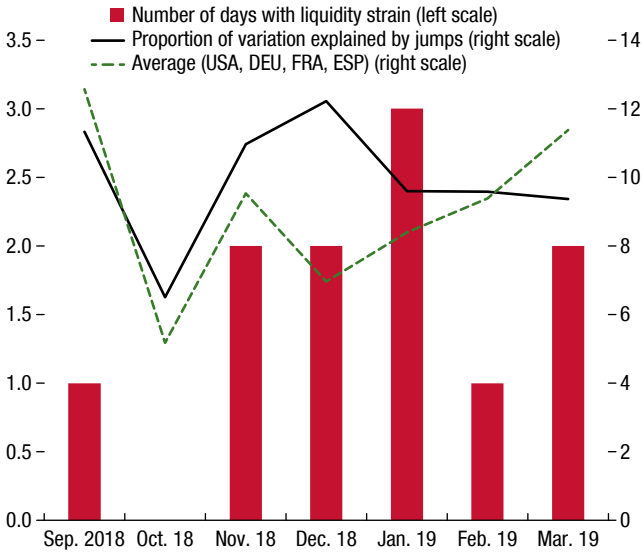
[14]The Bloomberg Liquidity Index for the UK gilt market (a proxy for aggregate on- and off-the-run spreads) suggests a broadly similar pattern in liquidity conditions over the same period. However, other standard liquidity metrics, such as the turnover ratio in gilt futures, have remained relatively more resilient.

Figure 1.SF.6. Brexit Event Study on Jumps and Market Liquidity

1. Brexit Event Study: Market Liquidity Strain around Key News Events (Percent)



2. Brexit Event Study: Frequency of Liquidity Strained Days and Proportion of Variation Explained by Jumps (Number of days per month; percent)



Sources: Bloomberg Financial L.P.; and IMF staff estimates.
Note: "Jumps" refer collectively to finite activity (large) and infinite activity (small) price jumps. Uncovering significant evidence of infinite activity jumps in intraday data is interpreted as suggestive of liquidity strain. In panel 1, key events ($t = 0$) included in the chart are: (1) confidence vote on December 12, 2018; (2) the runup to the Commons vote on January 16, 2018; and (3) the start of European Union Summit in Salzburg on September 20, 2018. Data labels in panel 2 use International Organization for Standardization (ISO) country codes.

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CHAPTER 2

DOWNSIDE RISKS TO HOUSE PRICES

Summary

Large house price declines can adversely affect macroeconomic performance and financial stability, as seen during the global financial crisis of 2008 and other historical episodes. These macro-financial links arise from the many roles housing plays for households, small firms, and financial intermediaries, as a consumption good, long-term investment, store of wealth, and collateral for lending, among others. In this context, the rapid increase in house prices in many countries in recent years has raised some concerns about the possibility of a decline and its potential consequences.

Against this backdrop, this chapter studies and quantifies house prices at risk—a measure of downside risks to future house price growth—in a sample of 32 advanced and emerging market economies and major cities. The chapter finds that lower house price momentum, overvaluation, excessive credit growth, and tighter financial conditions predict heightened downside risks to house prices up to three years ahead. The measure of house prices at risk helps forecast downside risks to GDP growth over and above other simpler measures of house price imbalances, and thereby adds to early-warning models for financial crises. Estimates show that downside risks to house prices have rotated since the global financial crisis, with most countries at higher risk at the end of 2007 facing lower risks today, but in many advanced and emerging market economies house prices remain at risk.

This chapter also explores the relationship between policies and house prices at risk. While house price levels should not be considered a direct target for monetary or macroprudential policies or for capital flow management measures, the link between policy actions and downside risks to house prices can shed light on how these actions map into housing sector vulnerabilities and financial stability. The results indicate that a tightening of macroprudential policies is associated with a reduction of downside risks to house prices. This is especially the case for policies aimed at strengthening the resilience of borrowers, such as limits to the maximum loan-to-value or debt-service-to-income ratios. Monetary policy can also influence downside risks through its relationship with financial conditions, but on top of that, the chapter finds that an unexpected easing of the monetary policy rate is associated with lower downside risks to house prices, but only in the short term in advanced economies. Thus, the overall results point to a higher effectiveness of targeted and timely macroprudential policies than monetary policy in reducing downside risks. The relationship with capital flow management measures is more nuanced, with some results suggesting a temporary association between a tightening of those measures and lower downside risks in advanced economies.

What can policymakers do with this knowledge? In addition to building buffers for banks and ensuring households do not overborrow, policymakers in charge of financial stability can use estimates of house prices at risk to complement other surveillance indicators of housing market vulnerabilities and guide macroprudential policy actions aimed at building buffers and reducing vulnerabilities. Downside risks to house prices could also provide relevant information for monetary policymakers when forming their views on the downside risks to the economic and inflation outlook.

Introduction

Developments in the housing market are important for households, firms, and banks. Housing serves both as a long-term investment and a good that is consumed as it is used and generates considerable utility for households (a consumption good). In most countries, housing makes up a large share of households' wealth, and higher house prices increase households' net worth and thus can boost consumption. Housing is also an important source of collateral that homeowners can use to borrow when facing temporary income shocks and to obtain financing for their small businesses.[1] On the other hand, rising housing prices may lock out potential buyers from buying a house if they have trouble coming up with a down payment, or may reduce households' disposable income if they must cut their spending to meet increasing mortgage or rental outlays. This can dampen economic growth and depress firm sales and profits. Households spend significant amounts of money on housing-related services. Notably, housing consumption and investment accounted for about one-sixth of the US and the euro area economies in 2017, representing one of the largest components of GDP in both cases. Finally, in many countries, mortgages and other housing-related lending make up a large fraction of banks' assets; hence changes in house prices can significantly affect the quality of banks' portfolios and profitability.[2]

House price dynamics and macroeconomic and financial stability are tightly connected. Recessions are deeper and last longer when house prices fall more and more quickly (Claessens, Kose, and Terrones 2012). More than two-thirds of the nearly 50 systemic banking crises in recent decades were preceded by boom-bust patterns in house prices. The 2007–08 global financial crisis is a case in point, in which the housing crisis spilled over onto other sectors and resulted in a full-blown crisis. Moreover, certain housing market characteristics, such as higher loan-to-value ratios and greater reliance on wholesale markets, are associated with increased risks of crises (Cerutti, Dagher, and Dell'Ariccia 2015). Furthermore, the interactions between house prices and credit volumes may result in self-reinforcing feedback loops where an increase in house prices facilitates an expansion in credit (through collateral effects) that puts further upward pressure on house prices. When that process is reversed, large declines in house prices may be followed by a collapse in credit and GDP growth. Such a pattern was observed in the run-up to the global financial crisis and its aftermath (Alter, Feng, and Valckx 2018).

In recent years, the simultaneous increase in house prices in many countries has raised concerns about the potential consequences of coordinated, large declines. In many countries and cities, house prices have increased substantially over the past five years (Figure 2.1)—a pattern that reflects the increased synchronization of house prices (see Chapter 3 of the April 2018 *Global Financial Stability Report* [GFSR]). Heightened synchronicity can signal the presence of downside risks to economic activity, especially when leverage is high.[3] Central banks have also expressed concern over the high growth of house prices and the consequent risks to their respective economies.[4] To the extent that the likelihood of large house price declines—or, put differently, downside risks to house prices—has increased amid the decades-long decline in interest rates and rising household leverage, macroeconomic and financial stability risks may also have increased.[5]

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[1]For a discussion on the role of housing for smoothing consumption from income shocks, see Aron and others (2012) and Favilukis, Ludvigson, and Van Nieuwerburgh (2017). For the use of housing as a source of financing for small firms, see Banerjee and Blickle (2018) and Schmalz, Sraer, and Thesmar (2016).

[2]See Kara and Vojtech (2017). Rising house prices boost bank capital by increasing the value of houses owned by banks and the value of the collateral pledged by borrowers. The financial accelerator model of Bernanke, Gertler, and Gilchrist (1996) maintains that endogenous developments in credit markets, such as variations in net worth or collateral, amplify and propagate shocks to the real economy.

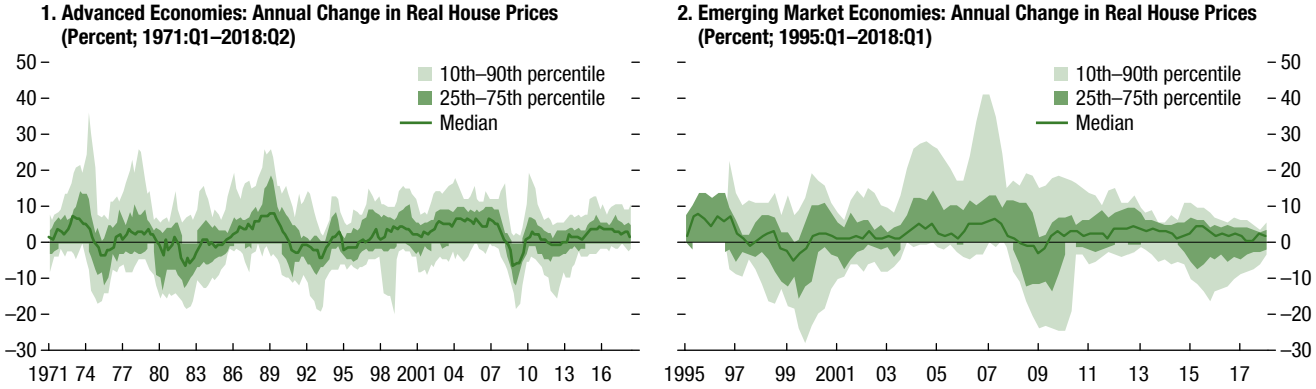
[3]This is in line with recent academic studies that examined the role of global house price determinants (Cesa-Bianchi, Ferrero, and Rebucci 2018; Hirata and others 2012).

[4]See, for example, the Bank of Canada November 2018 *Financial System Review*, Reserve Bank of Australia April 2018 *Financial Stability Review*, European Central Bank November 2018 *Financial Stability Review*, US Federal Reserve System 2018 *Financial Stability Report*, and *China Financial Stability Report* 2018.

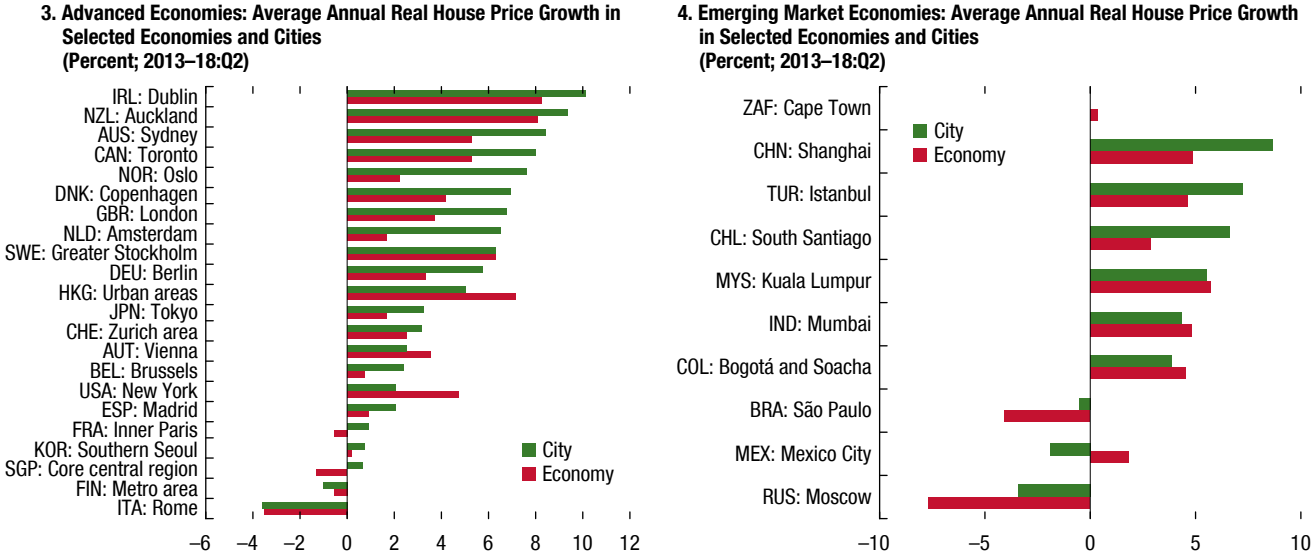
[5]In this context, the April 2008 *World Economic Outlook* points out that spillovers from the housing sector to the rest of the economy are larger in economies where mortgage credit is easier to

Figure 2.1. Historical Developments in Real House Prices

Comovement in house prices in advanced and emerging market economies is prevalent, but differences can be large ...



... and in most economies, real house prices have increased considerably since 2013.



Sources: Bank for International Settlements; national statistical offices; Organisation for Economic Co-operation and Development; and IMF staff calculations.
Note: Panels 1 and 2 show the distribution of four-quarter real house price changes (median, interquartile, and 10th–90th percentile range) for advanced and emerging market economies. For Chile, the data are available to 2017:Q4; for Malaysia, 2016:Q4; for Dublin, 2016:Q4, and for Oslo, 2017:Q4. Data labels in the figure use International Organization for Standardization (ISO) country codes.

To quantify downside risks to house prices, this chapter develops a methodology to model (large) house price declines with a given (low) probability and horizon—that is, house prices at risk. The evidence of disproportionate macroeconomic consequences of large declines in house prices makes the understanding and measurement of downside risks to house prices valuable for financial stability monitoring and policymaking. This chapter builds on the growth-at-risk (GaR) framework of the October 2017 GFSR[6] to study downside risks to house prices at various horizons in a sample of advanced and emerging market economies, at both the country and city level. Following that framework, the chapter identifies the size of very large

access, and that easy monetary policy seems to have contributed to the run-up in house prices and residential investment.

[6]The growth-at-risk approach, a summary measure for financial stability, links current financial conditions to the distribution of future growth outcomes. Specifically, growth at risk refers to the set of outcomes that fall into the 5th percentile of (conditional) forecast densities of global growth. See also Adrian and others (2018).

declines in future house prices (that is, downside risks to future house prices) within the lowest (least likely) quantiles of its conditional distribution, typically the 5th percentile. Using a statistical technique known as quantile regression, it is possible to study how house prices at risk move when the conditioning variables change. This framework is used to address the following questions:

- How do factors identified in past studies that affect expected house prices, or relate to housing vulnerabilities, help forecast downside risks to the growth of future house prices (that is, unlikely but possible steep declines, as measured by house prices at risk)? Does this relationship vary with the length of the forecast?
- What is the relationship among macroprudential policy, monetary policy, capital account openness, and capital flow measures, and house prices at risk? Is there evidence that these policies may reduce downside risks to house prices—even when that is not their primary aim?
- What does elevated house prices at risk tell us about possible downside risks to economic growth and financial stability?

The main findings are as follows:

- *House prices at risk move in response to pricing factors.* The house-prices-at-risk measure deteriorates in response to changes in fundamental factors, which include tightening of financial conditions,[7] a decline in real GDP growth, and higher credit growth. It also worsens with greater house price overvaluation—a measure of deviation from fundamentals. These effects vary with the horizon over which house price risks are evaluated and are generally more pronounced in the short term. The relationship between these variables and house prices at risk (at the 5 percent quantile) is stronger than that with median house prices (at the 50 percent quantile), and these effects appear to be stronger at the city level than the country level. Additional results also suggest that downside risks to house prices move together across advanced economies ahead of major crises.
- *The house-prices-at-risk measure is a useful early-warning indicator that can be used for financial stability surveillance.* Adding the house-prices-at-risk measure to standard growth-at-risk and financial-crisis-prediction models enhances the predictive power of these models. Thus, while house price levels should not be considered a target for either monetary, macroprudential, or capital flow management policies, the house-prices-at-risk measure can be used to gauge financial stability risks and provides useful information to evaluate the need for prospective policy action.
- *Macroprudential and monetary policy measures can reduce downside risks to house prices.* All else equal, a tightening of macroprudential housing measures in response to rising vulnerabilities in housing markets, such as tighter constraints on loan-to-value and debt-service-to-income ratios, lowers downside risks to house prices. Similarly, easier monetary policy improves house prices at risk in the short term (up to one year) in advanced economies and may have longer-lasting effects through financial conditions.
- *Capital inflows seem to increase downside risks to house prices in advanced economies, which may justify capital flow management measures in specific cases.* Evidence finds that a surge in capital inflows simultaneously raises the likelihood of high house price growth in the short term and downside risks to house prices in the medium term. Capital flow management measures can support macroeconomic policy adjustment and financial stability during capital inflow surges when other policy options are limited, or timing is crucial (IMF 2017). More detailed city-level evidence suggests that the relationship between various capital flows and house prices at risk varies with the type of capital flows and across countries.

The remainder of the chapter is organized as follows. First, downside risks to house prices are placed within the broader macro-financial stability framework. Next, the chapter describes the data used and provides some preliminary statistics. The chapter then turns to the measurement of house prices at risk, examines their importance for macro-financial stability and growth, and evaluates the role of various policies that may mitigate downside risks. The last section presents policy recommendations and conclusions.

[7]Chapter 1 contains a more detailed description of current financial conditions in advanced and emerging market economies, and a new methodology (building on Chapter 3 of the April 2017 GFSR). The measure for financial conditions used here does not include house prices.

Conceptual Framework

There is an extensive body of research on the determinants of house price valuations, but little effort has focused on how they relate to the likelihood of a large decline in house prices (downside risk). Several studies have related the expected growth of house prices to household income, macroeconomic and financial conditions, leverage, speculative bubbles, macroeconomic policies, and structural factors such as population growth and urbanization.[8] But the relationship among these and other variables and the risk of large house price declines has received much less attention in the literature. A few studies find that domestic credit, interest rates, international liquidity, and bank deregulation can influence the probability of house price busts (Agnello and Schuknecht 2011; Muellbauer and Murphy 2012). Others have documented that households' expectations of a continued increase in house prices seem to have played a significant role in the US housing boom and bust around the global financial crisis of 2008 (Kaplan, Mitman, and Violante 2017; Burnside, Eichenbaum, and Rebelo 2016; Fuster, Laibson, and Mendel 2010).[9]

Downside risks to house prices are an integral part of the broader financial stability framework, in which macro-financial imbalances adversely affect the real economy (Figure 2.2). Adrian and others (forthcoming) argue that financial stability risks reflect the interaction of macro-financial imbalances—also called vulnerabilities—and negative shocks, which are hard to predict. These vulnerabilities increase because of excessive risk taking by lenders and borrowers during good times. In the housing sector, this process relates easy financial conditions, and hence easy credit—reflecting a low price of risk—to vulnerabilities in the form of household overborrowing (excessive household leverage) and overvalued house prices (which deviate from fundamentals). With heightened vulnerabilities, adverse shocks can be amplified by cutbacks in, or rising prices of, credit (reflecting binding borrowing constraints), resulting in a feedback loop of large house price declines, weakened household balance sheets, declines in real activity, increases in credit risk, and declines in the value of collateral in the banking sector, and tightening of financial conditions that mutually reinforce one another.[10]

In this framework, downside risks to house prices are closely related to variables usually considered as determinants of house prices in a nonlinear manner that may change with the horizon of analysis. These variables include financial conditions, leverage, GDP growth, and house price overvaluation (see next section for details), which are directly or indirectly related to vulnerabilities in the housing sector that make large house price declines more likely to occur. The relationship is nonlinear because an adverse shock leads to large declines in house prices only when it is amplified by borrowing constraints that are more likely to bind when vulnerabilities are high.[11] The relationship between these variables and downside risks may also change with the horizon of analysis because of the endogenous accumulation of vulnerabilities. For instance, while loose financial conditions today may make borrowing easier and thus reduce downside risks, the resulting expansion in borrowing may increase vulnerabilities in the future and increase downside risks to future house prices.

The nonlinear relationship among factors associated with the accumulation of vulnerabilities and downside risks to house prices can be modeled using quantile regressions. This statistical technique is an extension of a linear regression that describes how a

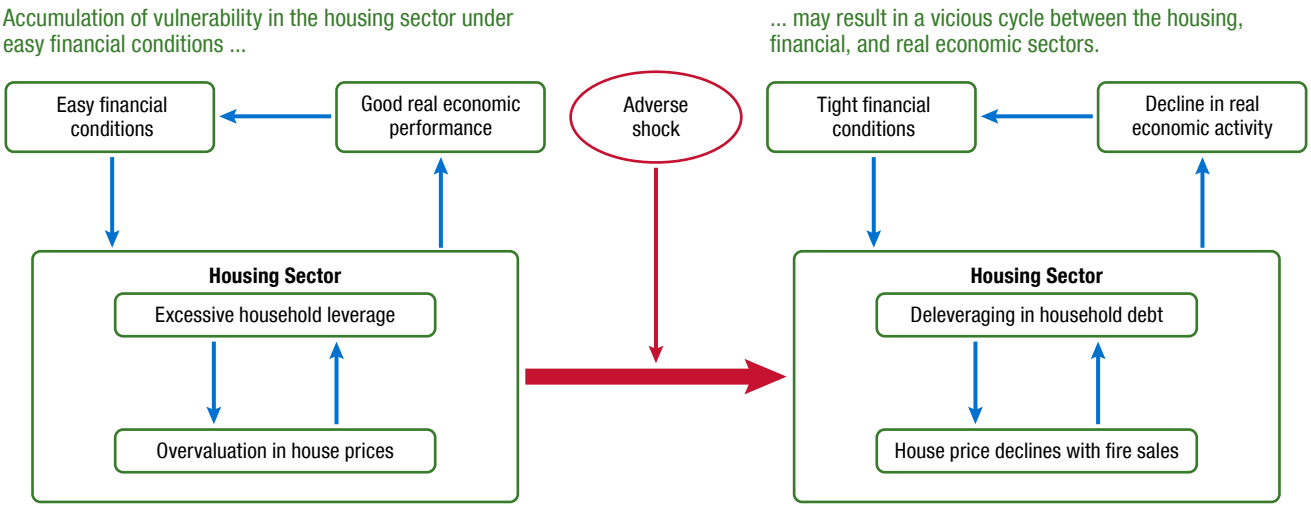
[8]A number of studies find that house price valuation is tied to household income, macro-financial conditions, and structural factors such as population growth and urbanization (see Capozza and others 2002; Girouard and others 2006; Gattini and Hiebert 2010; Saiz 2010; Algieri 2013). Others point to the role of leverage, credit constraints, and bank deregulation (Duca, Muellbauer, and Murphy 2011; Favara and Imbs 2015; Mian and Sufi 2016), and the presence of speculative bubbles in housing markets (Himmelberg, Mayer, and Sinai 2005; Black, Fraser, and Hoesli 2006; Shiller 2007; Granziera and Kozicki 2015; Cerutti and others 2017; Kholodilin, Michelsen, and Ulbricht 2017). Finally, macroeconomic policies, ranging from taxation to macroprudential regulation, monetary policy, and capital flow measures, may have an impact on house prices and housing market conditions in some cases (Poterba 1984; Dokko and others 2011).

[9]Households that extrapolate from recent trends are likely to increase their borrowing during housing booms, which may amplify house price and leverage cycles, impair financial stability, and lead to "irrational exuberance" (Shiller 2013).

[10]The key components of this mechanism can be replicated in a state-of-the-art calibrated general equilibrium model with house prices and collateral constraints, which can also be used to study the effectiveness of policies (see Online Annex 2.1 at www.imf.org/en/Publications/GFSR).

[11]This means that, for a given distribution of shocks, an increase in vulnerabilities should result in a larger shift in the left tail of the distribution of house price growth than in the central part of the distribution.

Figure 2.2. House Prices and Financial Stability



Source: IMF staff.

set of conditioning variables relates to different parts of the distribution—known as quantiles—of the variable of interest (in this case, the future growth in house prices). It can, therefore, be directly applied to study how financial conditions, leverage, GDP growth, and overvaluation relate to house prices at risk and to median house price growth, while controlling for other factors. By allowing the estimated relationship to vary across quantiles, this methodology can capture the nonlinear interaction between vulnerabilities and shocks predicted by the framework. For instance, an increase in leverage that increases vulnerability may have limited consequences for median house price growth—and therefore a weak estimated correlation with the median quantile. However, the same increase would increase the probability of large house price declines and thus result in a significant estimated correlation with the lowest quantiles captured by the house-prices-at-risk measure (see Online Annex 2.1).

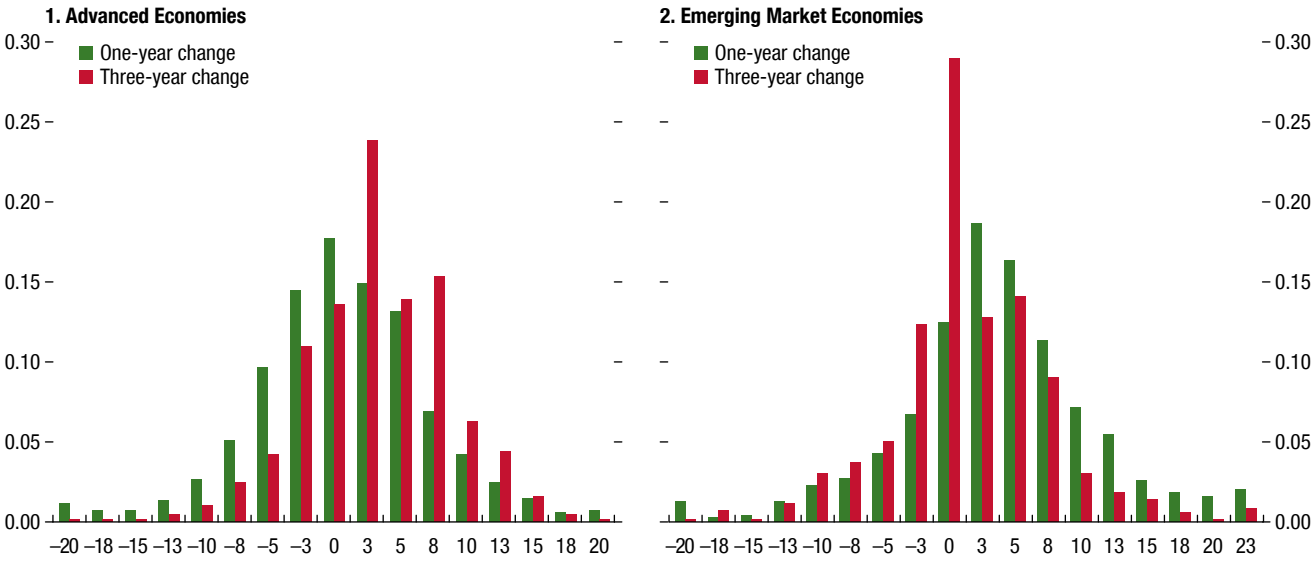
An Overview of Developments in House Prices

Real house prices tend to increase over time, but declines have occurred across a broad range of advanced and emerging market economies since the early 1990s. Data are collected for 22 major advanced economies and 10 emerging market economies (four in Latin America and three in east Asia, as well as in Russia, South Africa, and Turkey) and their major cities.[12] The average (annualized) one-year and three-year growth rates of real house prices are very similar from the first quarter of 1990 to the fourth quarter of 2017—the longest possible consistent time series for most variables—at about 2 percent a year in advanced economies and 2.6 percent a year in emerging market economies (Figure 2.3, panels 1 and 2). Negative real growth in house prices occurs in about half of the observations in advanced economies and in a third of the observations in emerging market economies over a one-year horizon. In advanced economies, a 10.5 percent decline in average (annualized) real house prices occurs once every 20 years or, put differently, is associated with a 5 percent probability of downside risk. In emerging market economies, the 5 percent greatest decline in average growth in real house prices corresponds to a 12 percent decline in real house prices.

Variables related to fundamental house price valuations and vulnerabilities are also informative about downside risks to housing. As described in the previous section, the conceptual framework relates house price risks to household leverage, financial conditions,

[12]City-level analysis includes 31 cities, which are the largest cities for each of the 32 countries in the sample, except South Africa. Cities were selected on the basis of data availability and the top 50 cities for global investors identified by Cushman and Wakefield (2017). See Online Annex 2.1 for details.

Figure 2.3. Frequency Distribution of Real House Price Growth
(Percent)



Source: IMF staff calculations.
Note: This figure shows the relative frequency of one-year and three-year quarterly real house price changes (annualized).

overvaluation, and real GDP growth.[13] A simple look at the bivariate relationship between measures of these variables and different parts of the distribution of house price growth seems to confirm these predictions (Figure 2.4):

- *Financial conditions* reflect financial factors affecting house prices and are an overall metric of the pricing of risk in the economy. Tighter financial conditions are associated with lower house prices in the future, more strongly when house price growth is most negative, that is, in the lower tail (5th percentile) of the distribution (Figure 2.4, panel 1).
- *Real GDP growth* is a proxy for development in households' real income. Lower real GDP growth is generally associated with lower house price growth (Figure 2.4, panel 2).
- *The credit-to-GDP ratio* captures movements in leverage of economic agents and is an overall metric of financial vulnerability. When the ratio is above its long-term mean, the negative relationship is more pronounced (Figure 2.4, panel 3).
- *The price-to-GDP per capita ratio*[14] is a valuation metric for housing and captures the degree of deviation from fundamental valuation levels and has a more negative relationship with future house prices than with median or high growth in house prices (Figure 2.4, panel 4).

Empirical Analysis: The Behavior of House Prices at Risk

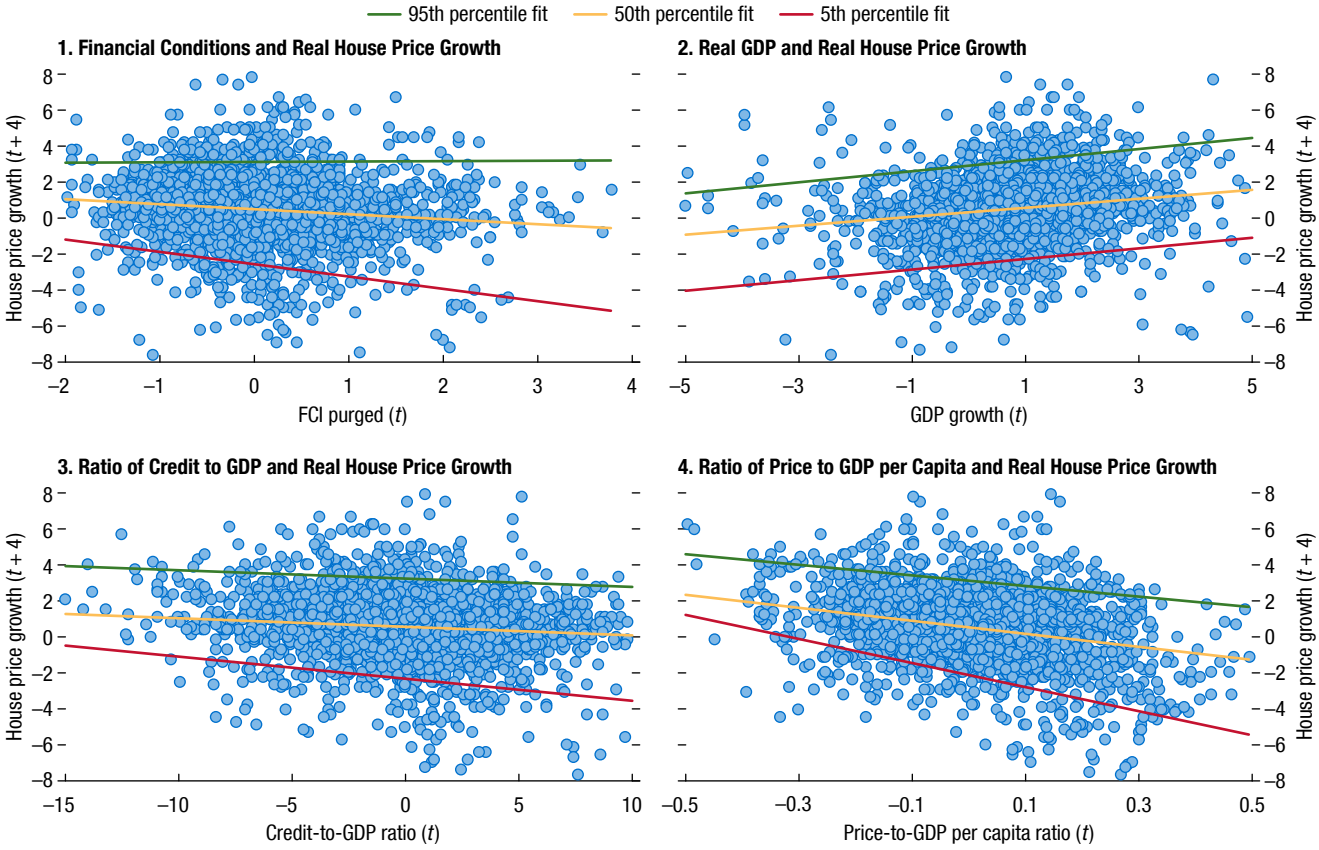
House prices at risk appear to broadly respond to past price dynamics and fundamental factors (Figure 2.5, panels 1 and 2). Separate models are run for the group of advanced and emerging market economies to maintain some homogeneity in the characteristics of countries included in each group. In addition to the four factors described in the previous section, the models also control for past growth in house prices. The latter captures momentum effects, which may also

[13]Traditional house price valuation models based on price/rent, price/income, or fundamentals also include financial factors such as interest rates and leverage; household and macroeconomic conditions, such as wage or income growth, (un)employment, and real GDP growth; and structural factors such as mortgage structures, demographics, and other factors. Differences in tax systems and geographical features may also influence fundamental values, but their quantitative effects are harder to ascertain.

[14]Results are qualitatively similar when other misalignment measures are used, such as price-rent ratio, price-income ratio, or model-based measures that capture misalignments as deviations from fundamentals.

Figure 2.4. Determinants of Real House Prices

The relationship between declines in real house prices and variables related to financial conditions, real GDP growth, household leverage, and overvaluation is generally stronger in the lower tail than elsewhere.



Source: IMF staff calculations.
Note: Panels 1–4, respectively, depict the association between one-year-ahead real house price growth and current financial conditions, real GDP growth, the detrended credit-to-GDP ratio, and the detrended price-to-GDP ratio. Lines show the estimated relationship between these variables and real house prices at the 5th (red line), 50th (yellow line), and 95th (green line) quantiles. An increase in the FCI represents a tightening of the pricing of risk in the economy. FCI = financial conditions index; t = current quarter; $t + 4$ = one-year (four quarters) ahead.

be relevant because house price cycles persist for a long time.[15,16] The results are as follows:

- *Financial conditions:* A one-standard-deviation tightening of financial conditions,[17] reflecting a higher underlying price of risk for the economy, is associated with 0.3 to 0.7 percentage point higher downside risk to house prices in the short term (with a stronger impact in emerging market economies), but diminishes to 0.1 percentage point in advanced economies and becomes insignificant for emerging market economies over longer horizons. Hence, the relationship between financial conditions and house prices at risk is much stronger in the short term than in the medium term. The medium-term

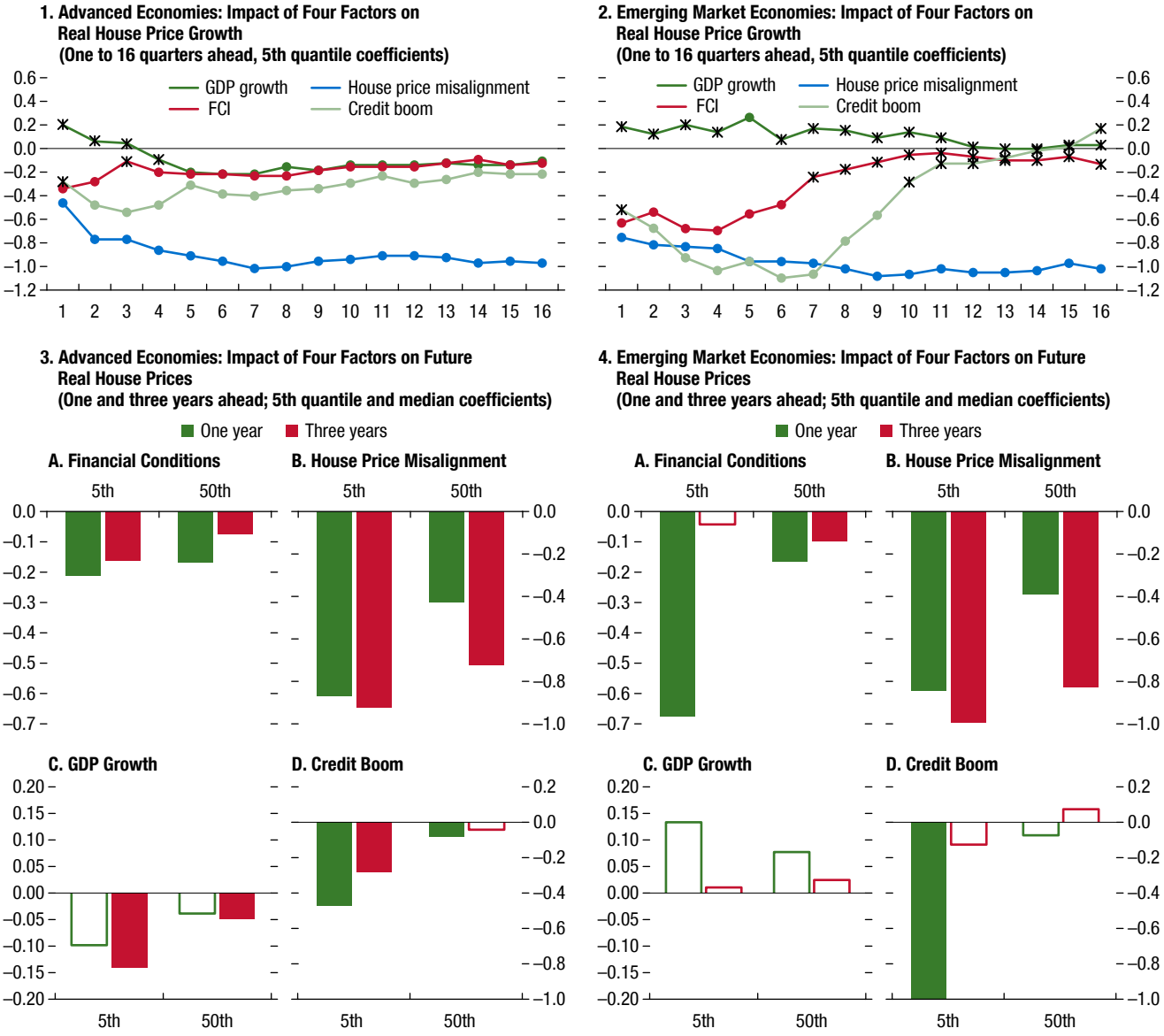
[15]Other, more structural, variables affect expected house prices and are considered in the literature but are not included because data are not available. Because some of them, such as population growth and urbanization, are slow moving, they can be partly absorbed using fixed effects. Also, lagged house prices could capture the role of persistent omitted variables, such as supply restrictions.

[16]Estimations are performed with standardized variables, which have a mean of zero and standard deviation—a measure of dispersion—equal to one. This allows for a direct comparison of the impact of these variables. Online Annex 2.1 describes the methodology in more detail.

[17]In comparison, the global financial crisis entailed a 2.3 standard deviation shock to financial conditions in advanced economies (1.4 in emerging market economies). The GDP growth shock was 2.2 standard deviations in advanced economies and 1.7 in emerging market economies, and the overvaluation shock was about 0.2 standard deviation across both groups.

Figure 2.5. House Prices and Fundamentals: Quantile Regression Results

Variables related to financial conditions, real GDP growth, household leverage, and overvaluation are informative about sharp declines in real house prices.



Source: IMF staff calculations.
Note: Panels 1 and 2 show panel quantile coefficients for four standardized variables in regression with average real house price growth over different horizons, estimated at the 5th percentile. Black markers indicate insignificant coefficients; colored circles denote coefficients significant at the 10 percent level or higher. Panels 3 and 4 (A–D) show coefficients from panel quantile regressions estimated at the 5th and 50th (median) quantiles for one- and three-year real house price growth and lagged house prices, financial conditions, house price misalignment, real GDP growth, and a credit boom dummy. All variables (except the credit boom dummy) are standardized so that magnitudes of coefficients indicate relative importance of variables. Colored bars indicate that the coefficients are statistically significant at the 10 percent level or higher. Outlined bars indicate insignificant coefficients. FCI = financial conditions index.

association between financial conditions and house prices at risk turns positive in a smaller model that excludes the measure of house price overvaluation, which suggests that easy financial conditions today increase downside risks to house prices in the future through an intermediate increase in overvaluation.[18]

- *Real GDP growth:* One-standard-deviation higher real GDP growth, reflecting an improvement in households' real incomes, is associated with an insignificant reduction in downside risks to house prices one to three quarters ahead in advanced economies, but appears to have an opposite and significant relationship over longer horizons. In emerging market economies, the association between GDP growth and downside risks to house prices is positive but not statistically significant.
- *Overvaluation (house price misalignment):* A one-standard-deviation increase in the ratio of house prices-to-GDP-per capita—a proxy for overvaluation—appears consistently and significantly related to higher downside risks to house prices over time. This is because it likely signals a correction in house prices of between 0.5 and 1.0 percentage point in advanced economies and 0.7 to 1.0 percentage point in emerging market economies.
- *Credit booms:*[19] Finally, credit booms tend to be linked with a worsening of the house-prices-at-risk measure by up to 0.5 percentage point at short horizons in advanced economies (three quarters ahead) and up to 1 percentage point at medium-term horizons (up to seven quarters) in emerging market economies.

A comparison with median house prices shows that the effects of fundamental factors and overvaluation are generally more pronounced at the lower tail (Figure 2.5, panels 3 and 4). More specifically, the analysis uncovers the following patterns:

- *Financial conditions:* A tightening of financial conditions is associated with larger negative house prices at risk in both advanced and emerging market economies than for median house prices.
- *Real GDP growth:* Higher real GDP growth is more strongly correlated with downside risks to house prices than median house prices in advanced economies, in both the short term (one year ahead) and medium term (three years ahead). In emerging market economies, on the other hand, higher GDP growth is correlated with lower downside risks to house prices, albeit not significantly.
- *Overvaluation (house price misalignment):* A shock to the ratio of house prices to per capita GDP is more strongly related to downside house prices than to median house prices.
- *Credit booms:* Credit booms tend to be more strongly related to large negative house price corrections at short- and medium-term horizons than to median house prices, in both advanced and emerging market economies.

House prices at risk fluctuate substantially over time and display cyclical short-term comovement. In advanced economies, downside risks to house prices were high in the early 1990s during the Nordic banking crises, and immediately before the global financial crisis in 2008 (Figure 2.6, panels 1 and 3). At the same time, the cross-country distribution also widened during these periods—and more recently as well—which suggests greater heterogeneity in housing market downside risks. For emerging market economies, significant cross-country heterogeneity is evident in the early 1990s, around the Asian and Russian financial crises of 1997 and 1998, and before the global financial crisis of 2008. However, in the most recent period, median house prices at risk do not display a pronounced cyclical trend (Figure 2.6, panels 2 and 4). Further research indeed suggests that downside risks to house prices appear to synchronize across advanced economies before major financial crises and global recessions (see Box 2.1).[20]

Tail risks have rotated over time, and the distribution of future house price growth can provide rich information on the risk profile. Most countries where the

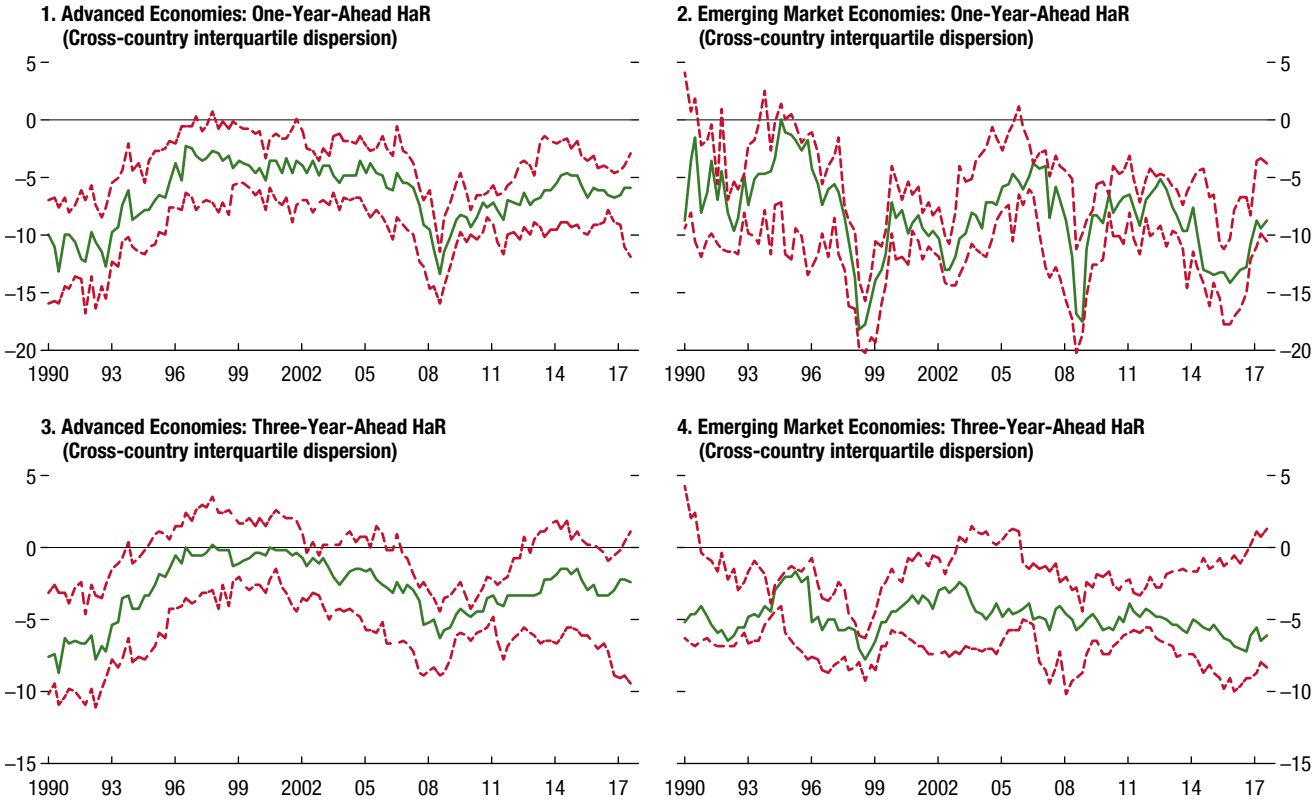
[18]When using noncumulative quarterly changes in house prices as the dependent variable, the trade-off is also more visible.

[19]Credit booms are defined as periods during which the credit-to-GDP ratio is above the long-term trend. The fact that credit booms have an immediate effect on house price risk is likely due to the definition of the boom variable, which signals overstretched household balance sheets instantaneously, rather than gradually building up.

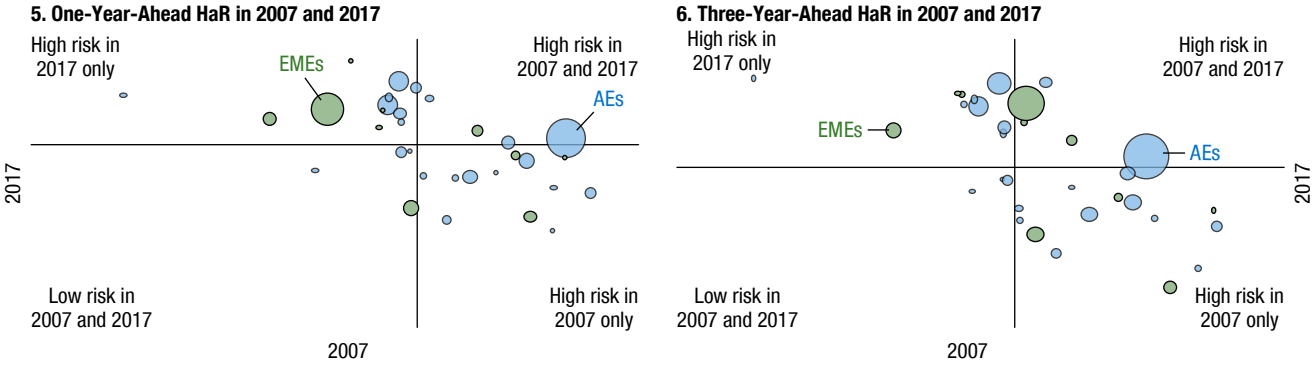
[20]While downside risks do not seem to become more synchronized over time, their cyclical short-term comovement, measured by instantaneous quasi-correlations, is similar to that of average house prices documented in Chapter 3 of the April 2018 GFSR (see Box 2.1). This suggests that global factors may play a role in downside risks to house prices.

Figure 2.6. Evolution of House Prices at Risk and Shifts in Riskiness

House prices at risk fluctuate substantially over time and across countries and display cyclical short-term comovement.



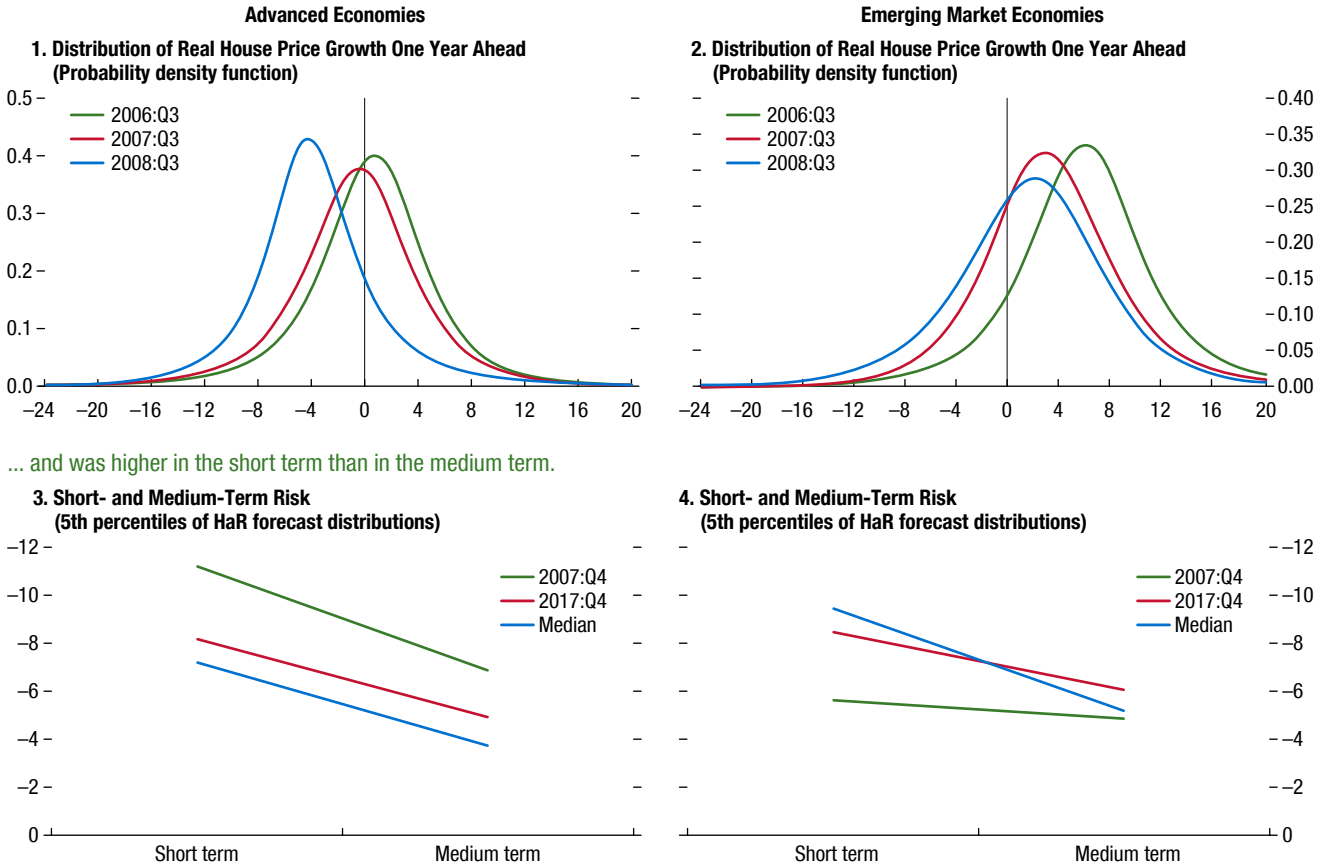
Countries that were more at risk from house price decline in 2007 seemed less vulnerable in 2017, but some remained at relatively high risk at both periods.



Source: IMF staff calculations.
Note: Panels 1–4 depict the one- and three-year-ahead HaR distribution across advanced and emerging market economies. Panels 5 and 6 show the one- and three-year-ahead HaR levels in 2007:Q4 and 2017:Q4 for advanced and emerging market economies (blue and green, respectively) relative to the overall median HaR. Bubble size indicates the country's 2017 purchasing-power-parity-weighted GDP in US dollars. Estimates are based on the panel quantile regression model used in Figure 2.5. AEs = advanced economies; EMEs = emerging market economies; HaR = house prices at risk.

Figure 2.7. Predictive Distributions of House Price Risks

House price risk increased before the global financial crisis ...



... and was higher in the short term than in the medium term.

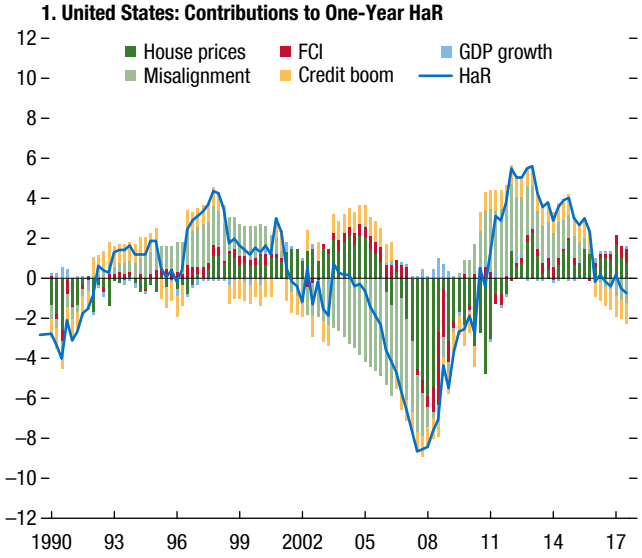
Source: IMF staff calculations.
Note: Panels 1 and 2 show skewed-*t* predictive distributions of the one-year-ahead real house price growth before the global financial crisis of 2008 (2006:Q3 until 2007:Q3 and 2008:Q3). Panels 3 and 4 show point estimates of HaR in the short term (one year ahead) and medium term (three years ahead) for 2007:Q4, 2017:Q4, and across the entire sample, based on the panel quantile regression model used in Figure 2.5, weighted by 2017 GDP in purchasing-power-parity terms.
HaR = house prices at risk.

house-prices-at-risk measure was relatively high in the fourth quarter of 2007 seem to have lower downside risk in the fourth quarter of 2017, and vice versa (Figure 2.6, panels 5 and 6). While this is true for both one- and three-year-ahead house prices at risk, the latter also shows that several countries—both large and small—remain in the high-risk quadrant in both periods. More broadly, the predicted distribution of house price growth shifts noticeably over time. For instance, both the mean and the tail of the distribution shifted progressively to the left ahead of the global financial crisis in both advanced economies and emerging market economies (Figure 2.7, panels 1 and 2). This suggests that the left tails and the overall shape of the house price distribution may serve as important early-warning signals.

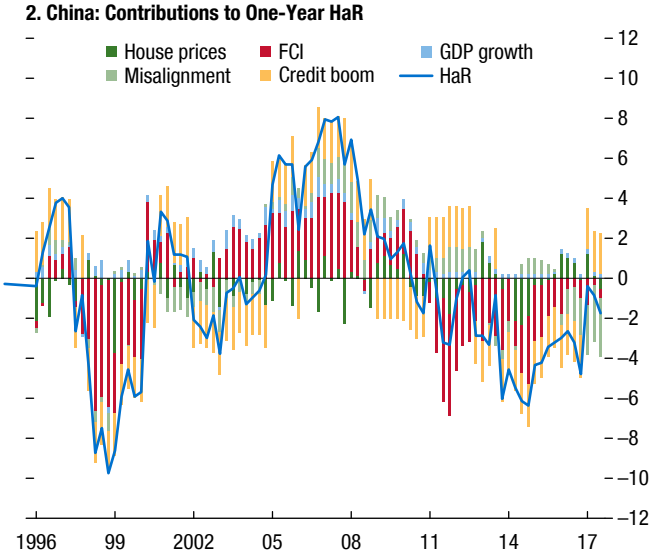
The one- and three-year-ahead house-prices-at-risk measures suggest a different rotation of short- and medium-term risks in advanced and emerging market economies. Generally speaking, downside risks to house prices appear higher in the short term than in the medium term in both country groups (Figure 2.7, panels 3 and 4). That said, on a GDP-weighted basis, the level of both short- and medium-term house price risks seems to have decreased in advanced economies and increased in emerging market economies between the fourth quarter of 2007 and the fourth quarter of 2017, especially in the short term. Yet in advanced economies, the level of downside house price risk in the fourth quarter of 2017 is above the overall median.

Figure 2.8. Factors Affecting House Prices at Risk in the United States and China
(Annual percent change)

Since late 2016, US HaR appears to have deteriorated gradually ...



… whereas HaR was more volatile in China and was driven mainly by financial conditions.



Source: IMF staff calculations.
Note: The figure shows the decomposition of the estimated one-year-ahead HaR at the 5th percentile into contributions of past house prices, financial conditions, real GDP growth, house price misalignment, and credit boom. The (negative) constant term is not shown. FCI = financial conditions index; HaR = house prices at risk.

These fluctuations in house prices at risk over time are explained by the evolution of several factors. The effects of changes in the fundamentals on house prices at risk can best be illustrated by concrete examples, such as the one-year-ahead house-prices-at-risk fluctuations for the United States and China, as the largest advanced and emerging market economies, respectively (Figure 2.8). Specifically,

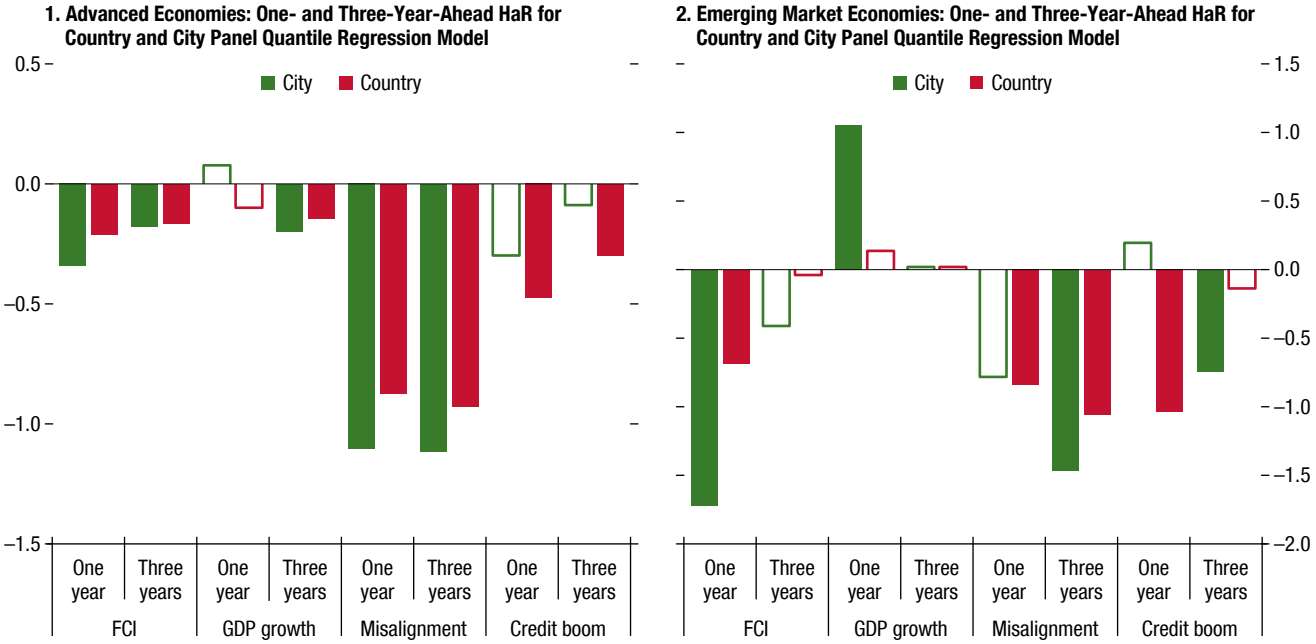
- *In the United States,* house prices at risk gradually deteriorated beginning in the early 2000s, leading up to the global financial crisis. This pattern was initially related to house price overvaluation. Over time, past house price movements and credit also started to have a negative effect, partially offset by relatively loose financial conditions. Once the global financial crisis set in, the tightening of financial conditions weighed negatively on house prices at risk. Since late 2016, US house prices at risk appear to have deteriorated gradually due to overvaluation concerns and high credit growth, but they have been partly offset by still-easy financial conditions and past house price momentum.
- *In China,* house prices at risk seem more volatile, partly following the volatility in house price growth. Easy financial conditions kept house price risks contained until 2010. After 2010, high credit-to-GDP gaps and tightening of financial conditions contributed to increased downside risks. Since 2016, house price overvaluation has also contributed to the deterioration of house prices at risk.

The findings are valid when applied to city-level data, although the magnitude of the response to various factors differs from the country-level analysis. A comparison of city- and country-level results finds that the relationship between financial conditions and house prices at risk is larger at the city level than at the country level (Figure 2.9), especially among emerging market economies. This result may reflect the fact that most cities included are also major financial centers in each of the countries in the sample, and as such are more responsive to financial factors than the rest of the country. It could also reflect the fact that major cities' housing markets tend to face more supply constraints, such as regulations and land shortages (Paciorek 2013).

Analysis with new data shows that the house-prices-at-risk model can be used for forecasting and surveillance. A model that forecasts well in the data sample

Figure 2.9. City- and Country-Level Comparisons of House Prices at Risk
(Coefficients)

The effect of financial conditions on house prices at risk is larger at the city level than at the country level.



Source: IMF staff calculations.
Note: Panels show coefficient estimates of alternative panel quantile regressions for HaR at the 5th percentile, for one year ahead and three years ahead, in advanced and emerging market economies and major cities. Red bars depict the magnitude of the effects of the four factors in the model estimated at the country level, and green bars depict the city-level effects (for major cities in each country, except for South Africa, for which no major city data were available). Colored bars indicate that the coefficients are statistically significant at the 10 percent level or higher, whereas outlined bars indicate insignificant coefficients.
FCI = financial conditions index; HaR = house prices at risk.

used to estimate it does not necessarily do so when applied to new data, or out of sample. However, the latter is crucial for the model's usefulness for surveillance, where it will be applied to future data. One way to evaluate how well the model performs out of sample is to compare the quantiles of the distribution estimated using the full sample with those using information only up to a given point in time. Such a comparison for the United States and China shows that these out-of-sample predictions closely track the in-sample predictions for one-year-ahead growth in house prices (Figure 2.10). This result suggests that the model accurately signals downside house price vulnerabilities in real time, even in light of well-documented changes in financing structures in the United States and elsewhere in the run-up to the financial crisis. Similar results are obtained for the other countries in this study and for other more sophisticated out-of-sample methods.[21]

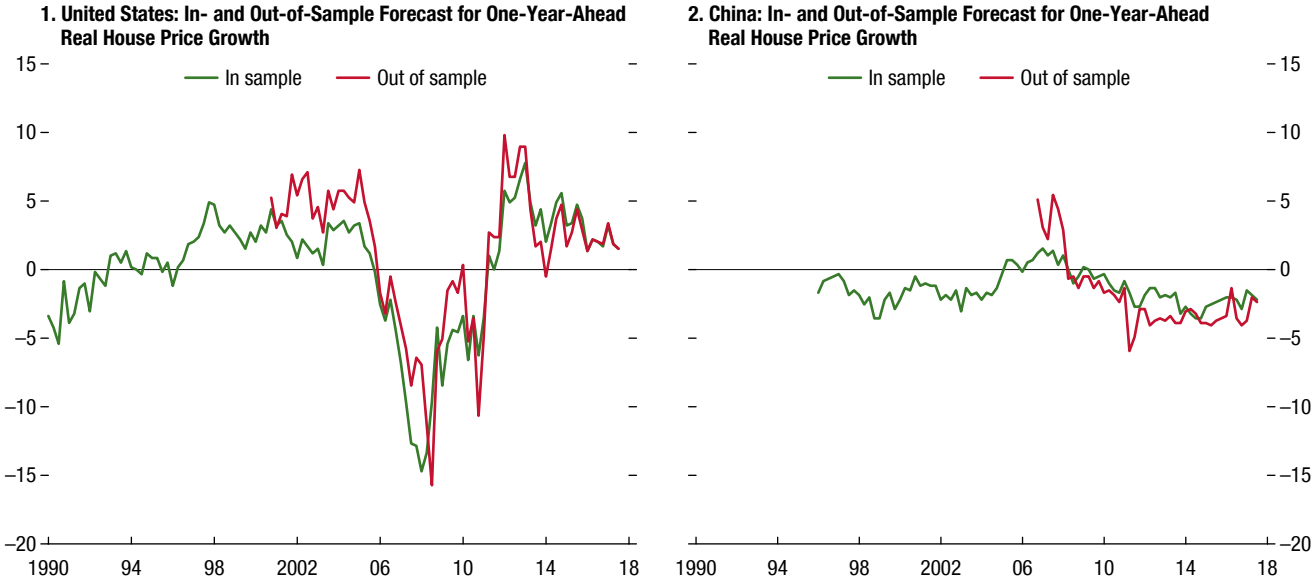
[21]Additional robustness exercises for the out-of-sample performance of house prices at risk included pseudo-R^2 measures that measure the predictive power of house prices at risk in out-of-sample analysis relative to the historical quantiles, and the estimation of the empirical cumulative distribution of the probability integral transformation at the country level, as in Adrian, Boyarchenko, and Giannone (forthcoming). In most countries, the predictive distribution was well within the critical values given by Rossi and Sekhposyan (2017).

House Prices at Risk and Financial Stability

Sharp declines in house prices help forecast risks to real GDP growth. Growth at risk measures the degree to which future GDP growth faces downside risks, and its relationship with measures of financial vulnerabilities, including in the housing sector, is a metric for financial stability (see Chapter 3 of the April 2018 GFSR and Adrian and others 2018). Given that large declines in house prices are associated with contractions in GDP growth and financial stability risks (see "Conceptual Framework" section), a deterioration in house prices at risk should help forecast downside risks to GDP growth, over and above other measures of house price imbalances that are only indirectly related

Figure 2.10. Out-of-Sample Forecasting Accuracy
(In-sample versus out-of-sample forecasts, annual percent change)

Out-of-sample predictions closely track the in-sample estimates for one-year-ahead house prices at risk.



Source: IMF staff calculations.
Note: The figure compares in-sample and out-of-sample forecasts, using the real house price baseline model from Figure 2.5 (green lines) and using recursive estimation for the out-of-sample model (red lines). The out-of-sample analysis shown in this figure uses a country-specific model instead of the panel model to illustrate the fit of the model in a concrete application. This reduces the degrees of freedom of the estimation and the robustness of the results when applied to low quantiles of the distribution. For that reason, the figure shows results for the 20th and 25th percentiles for the United States and China, respectively.

to future risks. The empirical findings confirm this hypothesis (Figure 2.11, panels 1 and 2).[22] An increase in downside risks to house prices (a lower, more negative house-prices-at-risk measure) is associated with an increase in future downside risk to GDP growth. Furthermore, the association with downside risks is stronger than with median growth, consistent with studies on booms and busts in house prices and recessions (see Introduction). The highest impact of house prices at risk is four to eight quarters into the future, with a 1 percent improvement in the house-prices-at-risk measure preceding on average a 0.3 percentage point improvement in growth at risk. This association is robust to adding various credit quantity measures to the growth-at-risk model, indicating that it is not simply capturing the correlation of growth at risk with credit, and to adding indirect measures of house price imbalances, such as the growth in house prices or overvaluation metrics. Thus, the house-prices-at-risk measure serves as a leading indicator for financial stability risks as captured by the growth-at-risk model.

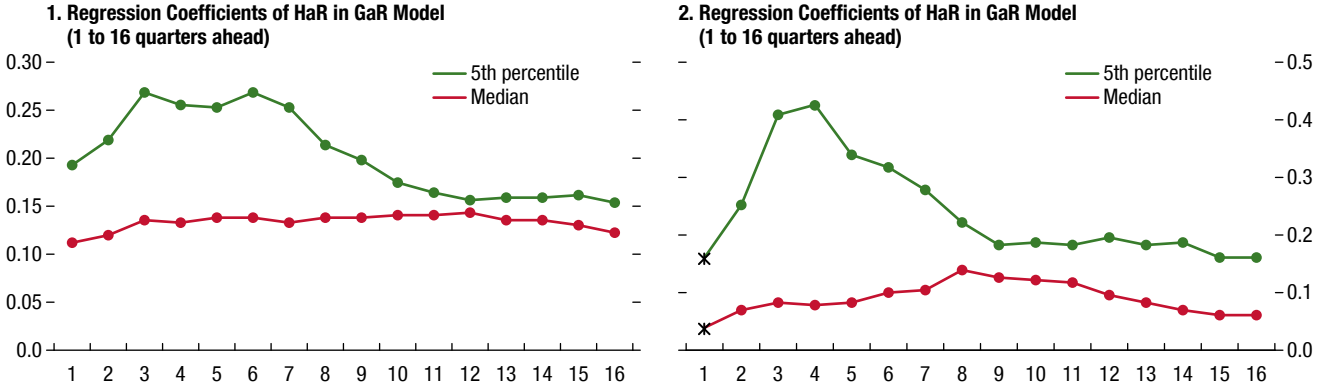
The house-prices-at-risk measure also helps predict episodes of financial crisis. Another way of evaluating the usefulness of the house-prices-at-risk measure for financial stability surveillance is to study whether a more adverse measure today helps predict the occurrence of financial crises.[23] The analysis shows that adding the house-prices-at-risk measure to standard statistical models for crisis prediction that relate the probability of a crisis to GDP growth, financial conditions, and the credit-to-GDP gap helps improve the accuracy of the models. This occurs across all horizons (one, two, and three years) and for both advanced

[22]The house-prices-at-risk measure also reduces the impact effect of the financial conditions index on growth at risk. When the effect of the financial conditions index on growth at risk is looked at alone, the downside risk of the financial conditions index in the short term is higher. However, when the house-prices-at-risk measure is added to the growth-at-risk model, the downside risk from financial conditions indices is mitigated in the short term, indicating that the house-prices-at-risk measure is absorbing some of the effect of the financial conditions index.

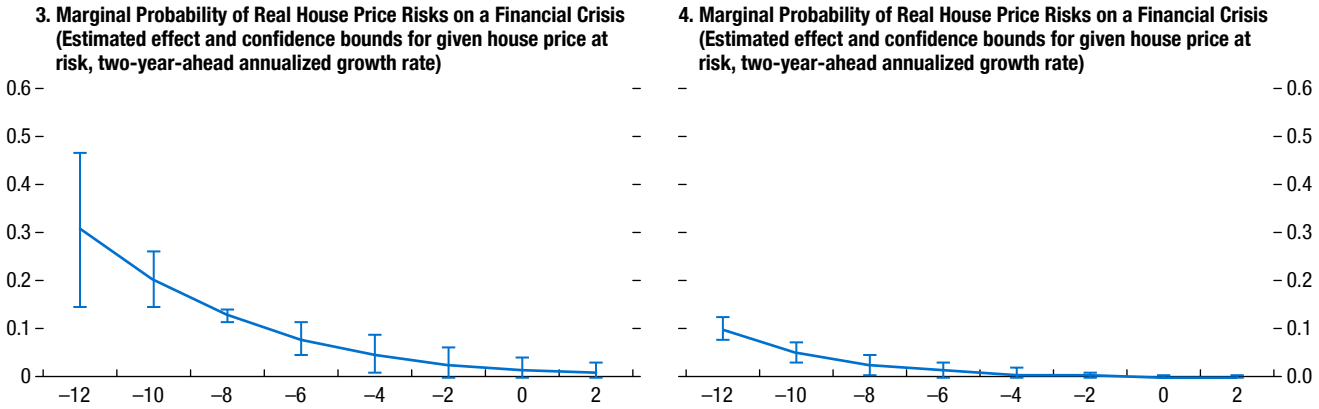
[23]Financial crises correspond to systemic banking crises, as identified by Laeven and Valencia (2018). Crises are rare and need to be identified carefully through qualitative and quantitative criteria. The growth-at-risk framework, as used in Adrian and others (2018), provides an alternative approach.

Figure 2.11. House Prices at Risk and Financial Stability

The house-prices-at-risk estimate used in this chapter significantly helps predict future growth at risk ...



... and the largest downside risks to house prices substantially raise the probability of a financial crisis.



Source: IMF staff calculations.
Note: Panels 1 and 2 depict a positive and significant association between GaR and HaR, at the 5th quantile and at the median over different projection horizons. Black markers indicate insignificant coefficients; colored circles denote coefficients significant at the 10 percent level or higher. Panels 3 and 4 show marginal probabilities of real house price declines (HaR) at given values on the occurrence of a financial (banking) crisis from a model with fixed effects, output growth, the financial conditions index, credit-to-GDP gap, and HaR. Vertical lines delineate the 95 percent confidence bounds around the point estimates. GaR = growth at risk; HaR = house prices at risk.

and emerging market economies. According to the estimates, an annualized house-prices-at-risk measure of –12 percent—that is, an estimated 5 percent probability of a 12 percent decline in real house prices two years ahead—implies a 31 percent probability of a financial crisis two years ahead in advanced economies and a 10 percent probability in emerging market economies (Figure 2.11, panels 3 and 4).

Policies and House Prices at Risk[24]

By taming the accumulation of vulnerabilities or increasing buffers, policymakers can also reduce downside risks to house prices. Macroprudential policy can be used to reduce systemic risks by, among other things, taming the accumulation of vulnerabilities arising from housing market valuation risks or household financial vulnerabilities. Macroprudential measures can also be used to build buffers in financial intermediaries to allow them to absorb initial shocks and break negative feedback loops (Adrian, Boyarchenko, and Giannone, forthcoming; Alam and others, forthcoming). Monetary policy is mainly focused on inflation risk but may implicitly consider house prices because housing market developments underpin risks

[24]The analysis also tested for effects of fiscal policy measures (results not reported) pertaining to changes in property tax rates, the tax base, and interest deductibility in personal income taxation, based on the Tax Policy Reform database from Amaglobeli and others (2018). However, results were not significant, which may be partly due to the smaller sample size (across countries and time).

to the general economic and inflation outlook. Fiscal policy measures may also affect housing markets as they pertain to property taxation, interest deductibility, housing subsidies, and the like. Foreign buyers may be attracted to investing in housing abroad, but foreign governments may impose capital flow measures to restrict their effect on local house prices. More broadly, a surge in capital flows reflecting strong global risk appetite for a country's assets could also contribute to unsustainable credit expansions, which under certain circumstances could be curtailed by capital flow management measures.

In a theoretical model, macroprudential policy is more effective than monetary policy to reduce growth at risk. In the model,[25] household debt generally surpasses the socially optimal level because no individual household takes into account the consequences of selling its house at fire sale prices on overall house prices, collateral values, and macroeconomic performance (a so-called pecuniary externality). Simulations of this model under different policy reactions suggest that tightening macroprudential policy in response to higher household debt can prevent a housing crisis, or mitigate its adverse effects, by curbing run-ups in household debt before the crisis. Monetary policy that deviates from output-inflation stabilization and responds to high credit-to-GDP ratios before the crisis can also mitigate the adverse effects of housing crises on GDP, but to a lesser extent than macroprudential policy. This is because monetary policy fails to fully curb the rise of household debt before the crisis and affects other components of output beyond the housing sector. These results indicate that containing the accumulation of vulnerabilities through macroprudential policy more effectively reduces downside risks than monetary policy. In practice, however, if the macroprudential toolkit is incomplete, or the decision-making process is imperfect, monetary policy might still have to take downside risks to house prices into consideration, even when it is not the preferred policy tool from a theoretical perspective. In addition, the fact that there is significant information value in house prices at risk for growth at risk suggests that house prices at risk impact monetary policy objectives directly.

Empirical results show that macroprudential policies help reduce downside risks to future house prices. Macroprudential policy measures may affect house prices at risk in three ways. First, they may have a direct effect where tightening these measures reduces house prices at risk—consistent with macroprudential policy measures leading to the accumulation of buffers, so that house prices at risk are lower for any combination of factors.[26] Second, macroprudential policies may change how other factors, such as financial conditions or credit, are related to house prices at risk. This could occur if, for instance, a credit expansion in the presence of macroprudential policy measures were to flow to less-leveraged households. Third, macroprudential policy measures may affect the variables that are related to house prices at risk—previous studies find, for instance, some evidence that macroprudential policy measures reduce credit growth. The evidence indicates that a tightening of borrower-based macroprudential policy measures, such as restrictions on loan-to-value and debt-service-to-income ratios, affects house prices at risk directly, but the relationship does not depend on financial conditions or credit. Macroprudential policy measures shift the entire term structure of house prices at risk upward (Figure 2.12, panels 1 and 2). In advanced economies, the effect seems to have a maximum impact between four and eight quarters ahead, while in emerging market economies, the impact is highest in the short term, but remains mostly steady until about 12 quarters ahead.[27] Specifically, a one-unit tightening of macroprudential measures during a credit boom could lower the one-year-ahead average house prices at risk by up to 2 percentage points (annualized), from –9.4 percent to –7.4 percent. Results are qualitatively similar for broader credit-related measures in advanced economies, but not significant in emerging market economies. That said, the use of

[25]See Online Annex 2.2 at www.imf.org/en/Publications/GFSR for details.

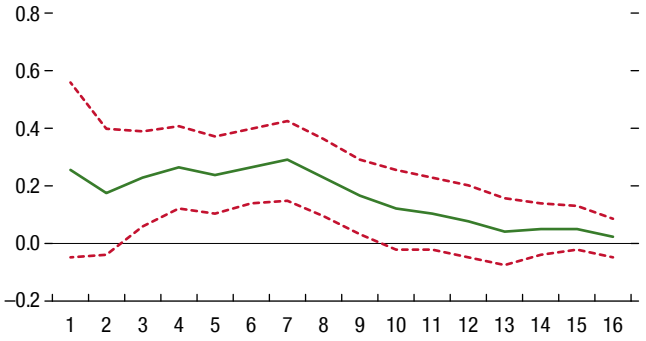
[26]As a measure of macroprudential policy, the chapter uses the IMF's Integrated Macroprudential Policy (iMaPP) database, which has data on tightening and loosening for a range of macroprudential policy measures (see Alam and others, forthcoming). While not directly reflecting the level or intensity of the measures, cumulative and rolling-window scores proxy that to some extent (where tightening increases, and loosening lowers, the measures' unit scores). The measure used here combines information on loan-to-value and debt-service-to-income ratios, which are the most relevant measures for the housing sector and are often employed together (Kuttner and Shim 2016).

[27]According to Choi, Kodres, and Lu (2018), tightening nine macroprudential policies on annual house prices from a broad set of countries appeared to take two years to have the intended effect, and in the first year after implementation real housing prices rose instead of falling. For European countries, the November 2018 *Regional Economic Outlook: Europe* finds mixed evidence on the ability of macroprudential policies to contain house price growth amid accommodative monetary policy.

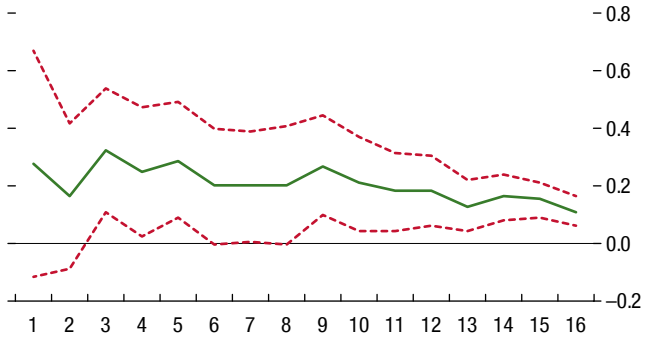
Figure 2.12. Effects of Macroprudential and Monetary Policy and Capital Flows on House Prices at Risk

Tightening of macroprudential policy seems to improve the house prices at risk measure.

1. Advanced Economies: Macroprudential Policy

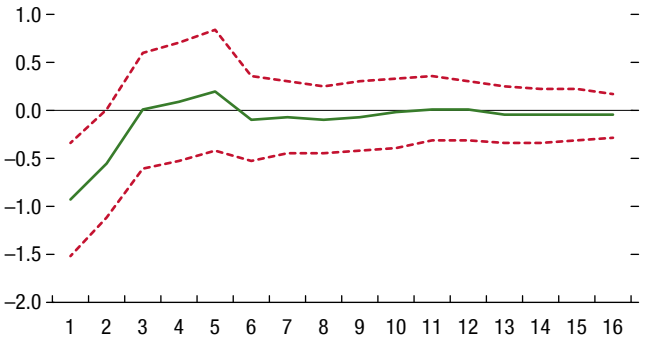


2. Emerging Market Economies: Macroprudential Policy

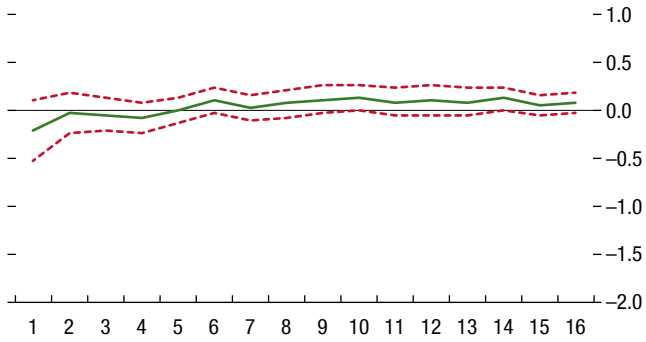


Monetary policy shocks have no significant impact on house prices at risk over longer horizons, nor in emerging markets.

3. Advanced Economies: Monetary Policy

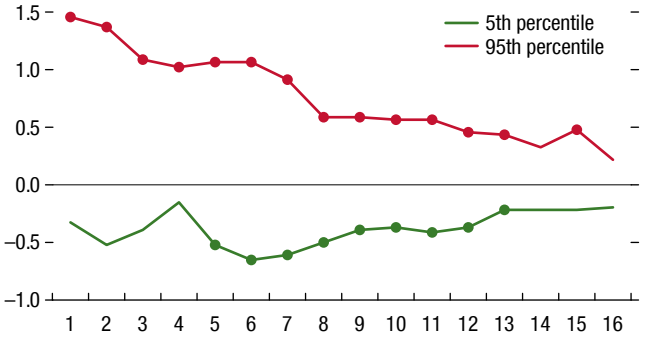


4. Emerging Market Economies: Monetary Policy



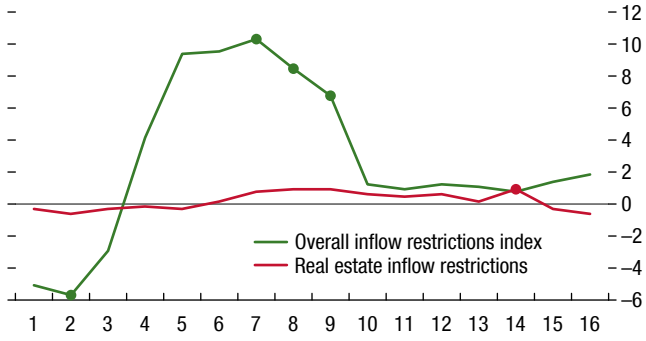
Capital inflows increase downside risks in advanced economies ...

5. Advanced Economies: Capital Inflows



... but tightening of capital flow management measures may improve house prices at risk temporarily.

6. Advanced Economies: Capital Inflow and Real Estate Restrictions at the 5th Percentile



Source: IMF staff calculations.
Note: Panels show the effect of various policies on the house-prices-at-risk estimation. In panels 1 and 2, macroprudential policy measures have a statistically significant level-shifting effect on house prices at risk (reducing downside risk). The macroprudential policy variable used here is based on a three-year rolling window of debt-service-to-income and loan-to-value measures, and is purged for credit to GDP to remove potential endogeneity. In panels 3 and 4, for advanced economies, monetary policy, as captured by predicted residuals of a feedback rule (see Online Annex 2.1), has a significant effect (initially increasing downside risks, but less so over time). In panel 5, total capital inflows (as a percentage of GDP) at the 95th percentile tend to increase upside risks to house prices, and at the 5th percentile, they tend to increase downside risks to house prices. In panel 6, proxies for changes in capital flow management measures appear to reduce downside risks to house prices over some intermediate horizons. Dashed lines in panels 1–4 denote 95 percent confidence bounds for statistical significance and dots in panels 5 and 6 show statistical significance at the 10 percent level or higher.

macroprudential policies should not be targeted to house price levels but to the buildup of financial vulnerabilities signaled by downside risks to house prices. Their application should be mindful of broader implications for systemic risk, to avoid downward spirals in credit and prices when the economy and the housing market are in a fragile state.

Monetary policy tightening contributes to a deterioration of house prices at risk over a short horizon in advanced economies.[28] Isolating the role of monetary policy from that of financial conditions is difficult because the latter is a key channel through which monetary policy operates. The analysis focuses on "shocks" to traditional monetary policy, understood as unexpected deviations of the short-term policy rate from an expanded Taylor rule.[29] The analysis shows that these shocks have a short-lived, negative relationship with house prices at risk only in advanced economies (Figure 2.12, panels 3 and 4). This may be because these housing markets are more developed and integrated with capital markets than in emerging market economies, such that changes in the short-term policy rate would directly pass through to house prices. The fact that monetary policy shocks could influence house prices at risk might affect the way monetary policymakers think about this transmission channel. Moreover, the inclusion of these monetary policy shocks weakens the short-term relationship between financial conditions and house prices at risk, indicating that part of this relationship was associated with changes in the short-term policy rate.

Capital inflows seem to increase downside risks to house prices in advanced economies. Capital inflows may contribute to systemic risk through a number of channels, including credit and asset price booms, larger foreign currency exposures and noncore bank funding, and increased interconnectedness (IMF 2017). Among their potential consequences for asset price booms, capital inflows have come under scrutiny for potentially affecting house prices.[30] In this context, the analysis indicates that, in advanced economies, an increase in capital inflows raises the likelihood of high house price growth—upside risk captured by the 95th percentile—in the short term and downside risks to house prices in the medium term (two to three years ahead) (Figure 2.12, panel 5). An increase in capital inflows of 1 percent of GDP would raise upside risks by 1.5 percent one quarter ahead and downside risks by 0.5 percent eight quarters ahead. Among emerging market economies, the analysis reports no robustly significant relationship between capital inflows and downside or upside risks to house prices, although when opening by type of capital, there is some evidence that portfolio flows reduce and foreign direct investment increases downside risks to house prices at some horizons. The weaker relationship between overall capital inflows and downside risks among emerging markets is consistent with these housing markets being less globally integrated (see Chapter 3 of the April 2018 GFSR and Box 2.2). Finally, an in-depth analysis shows that, even among advanced economies, the consequences of various types of capital flows for downside risks to house prices vary across groups of countries, with a clearer relationship with those most highly financially integrated.[31] This heterogeneity across types of flows and groups of countries indicates the convenience of assessing the relationship on a case-by-case basis when data are available. Boxes 2.2 and 2.3 include detailed analysis for Canada and the United States, and China, respectively.

The tightening of capital flow management measures might improve house prices at risk in advanced economies at some horizons. Financial stability concerns arising from capital inflows can be adequately addressed through macroprudential policies, such as those discussed in this section. Capital flow management measures, on the other hand, can support macroeconomic policy adjustment and financial stability in certain circumstances, such as during capital inflow surges, when other policy options are limited or timing is crucial (IMF 2017). Within this broad context, the relationship between capital flow management measures and downside risks to house prices may

[28]Monetary policy shocks are identified by regressing a country's short-term policy rate on a set of controls and using the residuals as the identified shocks. The set of controls includes contemporaneous and lagged values for inflation, log GDP, and log foreign GDP (to capture external risks), as well as lagged values of the short-term rate and a quadratic time trend.

[29]A Taylor rule is a reduced-form approximation of the response of the central bank's policy rate to changes in inflation, output, or other economic conditions.

[30]Recent examples where foreign buyers have played a role in housing markets include Australia, Canada, Hong Kong Special Administrative Region, New Zealand, and the United Kingdom.

[31]Box 2.1 also shows that downside risks are more synchronized among more integrated economies.

provide additional information on their likely consequence along this specific dimension. Results show that, in advanced economies, a tightening of capital flow management measures seems to briefly increase downside risks to house prices in the very short term (one to three quarters ahead)—possibly because of reverse causality—and reduce downside risks (improve house prices at risk) between one and two years ahead by about 3 percent (annualized) in each quarter, with no significant effect at longer horizons (Figure 2.12, panel 6). While the overall indicator of capital flow management measures used does not distinguish those tightened for macroprudential reasons (so-called capital flow management/macroprudential measures), tightening of real estate inflow restrictions, which is more likely to be motivated by these considerations, is not significantly related to downside risks to house prices, although the lack of significance could reflect fewer instances of such restrictions.[32]

Conclusion and Policy Recommendations

This chapter lays out a new methodology to estimate downside risk to house prices and finds it to be a useful early-warning indicator that can be used for financial stability surveillance. Using panel quantile regression techniques based on the growth-at-risk model of Adrian and others (2018), the chapter finds that house prices at risk—associated with the likelihood of large house price declines—reflect fundamental factors and overvaluation, as well as past price dynamics. The most recent data seem to point to an increase in downside risks to house prices over the next one to three years in some countries. This may be a cause for concern for financial stability and for the global macroeconomic outlook over the medium term. The latter concern is borne out by the fact that house prices at risk have a significant impact on growth at risk—a summary measure for financial stability used in Chapter 1 of this report and previous GFSRs. As such, the current analysis enhances the financial stability framework by adding downside risks to house prices to the financial stability monitoring toolkit. Policymakers can use or adapt the framework laid out in this chapter for surveillance of financial stability risks from the housing sector. Episodes of increased synchronization of downside risks also appear to strengthen the case for international policy coordination to mitigate adverse spillovers from house price downside risks.

Some macroprudential policies appear to be effective in reducing house prices at risk. Although macroprudential policy focuses on building buffers and reducing vulnerabilities and should not target house prices, heightened downside risks to house prices signal a build-up of systemic risks and could complement other indicators for the activation of macroprudential policies, which appear to have a significant additional effect on house prices at risk. The effectiveness of macroprudential policy measures is also consistent with the small theoretical model laid out in the chapter. The relationship between macroprudential policy measures and house prices at risk is especially significant for so-called borrower-based measures, such as restrictions on loan-to-value and debt-service-to-income ratios, which is another reason countries should add these types of measures to their macroprudential policy toolkit and monitor their development over time. This is in line with a risk management approach to macroprudential policy, which should target some level of downside risk. However, it is important to make the distinction between targeting downside risks and targeting levels of asset prices, as the former can be directly influenced by building macroprudential buffers, while the latter are difficult to target. Moreover, macroprudential policymakers should be mindful of broader implications for systemic risk to avoid precipitating declines in house price levels when the economy and the housing market are in a fragile state.

The ability of monetary policy to mitigate downside risks to housing prices, beyond its relationship with financial conditions, seems more limited. Financial conditions, which are partly driven by monetary policy actions, have a clear relationship with downside risks to house prices. Beyond this indirect effect, conventional monetary policy shocks seem to have only a short-term influence in advanced economies, where an unexpected loosening reduces the house-prices-at-risk measure for a few quarters. Thus, in general, monetary policy would influence downside risks to house prices mainly through its impact on financial conditions—an issue that has been much discussed recently (see the April 2017 GFSR). That said, the short-term association documented in advanced economies may be a useful consideration in cases where the macroprudential toolkit

[32]There are only 12 episodes of tightening of real estate restrictions in the data. The analysis does not yield significant results for interactions between the level or tightening of restrictions and capital inflows.

is incomplete or the macroprudential decision-making process is inadequate, especially given the association between house prices at risk and downside risks to GDP growth, a traditional objective of monetary policy.

Capital inflows seem to be associated with higher house prices in the short term and more downside risks to house prices in the medium term in advanced economies, which might justify capital flow management measures under some conditions. The aggregate analysis finds that a surge in capital inflows tends to increase downside risks to house prices in advanced economies, but the effects depend on the types of flows and may also be region- or city-specific. At the city level, case studies for Canada, China, and the United States find that flows of foreign direct investment are generally associated with lower future risks, whereas other capital inflows (largely corresponding to banking flows) or portfolio flows amplify downside risks to house prices in several cities or regions. Altogether, when nonresident buyers are a key risk for house prices, contributing to a systemic overvaluation that may subsequently result in higher downside risk, capital flow measures might help when other policy options are limited or timing is crucial. As in the case of macroprudential policies, these measures would not amount to targeting house prices but, instead, would be consistent with a risk management approach to policy. In any case, these conditions need to be assessed on a case-by-case basis, and any reduction in downside risks must be weighed against the direct and indirect benefits of free and unrestricted capital flows, including better smoothing of consumption, diversification of financial risks, and the development of the financial sector.[33]

[33]IMF (2012) notes that (1) capital flows should be handled primarily through macroeconomic policies, in turn supported by sound financial supervision and regulation and strong institutions; (2) in certain circumstances, capital flow measures can be useful to support macroeconomic adjustment and safeguard financial stability; and (3) capital flow measures should not substitute for warranted macroeconomic adjustment (see also Group of Twenty 2018).

Box 2.1. Synchronization of House Prices at Risk across Countries

This box examines whether and how downside risks of house prices move in tandem across countries; that is, whether there is significant cross-country synchronicity in house prices at risk. Results indicate sharp increases in the synchronization of downside risk across countries immediately before global recessions, especially among advanced economies. Differences in financial openness and in the use of capital controls targeting the real estate sector seem to affect the synchronization of downside risks to house prices.

Short-term cross-country comovement in downside risks to house prices increases sharply immediately before major recessions or financial crises among advanced economies. Panel 1 of Figure 2.1.1 depicts the instantaneous quasi-correlation (a measure of short-term comovement used in Chapter 3 of the April 2018 *Global Financial Stability Report*) of three-year-ahead house prices at risk among all countries. This synchronicity measure increases sharply before major economic downturns or financial crises. This may reflect common shocks affecting the tail risk of housing markets propagating across countries. The increase in short-term comovement before recessions is present only within advanced economies (Figure 2.1.1, panel 2).

Greater financial openness is associated with higher synchronization of downside risk. When countries are differentiated by the degree of de facto financial openness (as proxied by the stock of foreign assets plus foreign liabilities in percent of GDP) (Figure 2.1.1, panel 3), the short-term comovement of downside risks increases sharply around global recessions among open pairs—that is, when both countries are classified as having a high degree (above the median) of financial openness. Closed pairs with a low degree of financial openness (below the median), in contrast, do not display significant short-term comovement.

Capital flow management measures related to real estate may help mitigate the synchronization of downside risk around major recessions and financial crises. International capital flows are sometimes criticized for spreading economic disturbances across countries or are cited as a channel through which foreign investors may speculate for excessive profits. In this regard, a large body of empirical research emphasizes the ineffectiveness and potential costs of capital controls.[1] However, a new strand of—mostly theoretical—research suggests that capital flow management measures may actually contribute to financial stability and sound macroeconomic management.[2] Panel 4 of Figure 2.1.1 indicates that the short-term comovement of downside risks around major recessions/crises is much lower among country pairs with restrictions in place than among country pairs without such restrictions on capital flows related to real estate.[3] This suggests that well-targeted capital controls may mitigate the synchronicity of the downside risk of house prices during such extreme events.

The author of this box is Peichu Xie.

[1]See, for example, Prati, Schindler, and Valenzuela (2012); and Klein and Shambaugh (2015).

[2]See, for example, Farhi and Werning (2012); Jeanne (2012); and Korinek (2018).

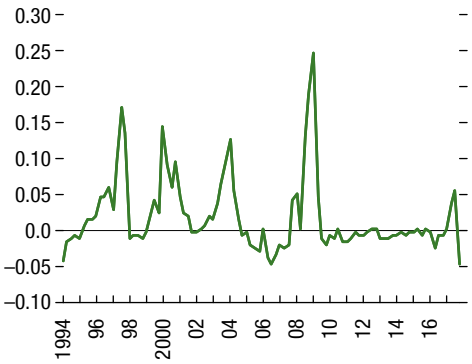
[3]Fernández and others (2016) use the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions database to construct capital controls by inflows and outflows for 10 asset categories in 100 countries over the period 1995–2013. Here, three of their real estate measures are used: purchase abroad by residents, purchase locally by nonresidents, and sale locally by nonresidents.

Box 2.1 *(continued)*

Figure 2.1.1. Instantaneous Quasi-Correlation of Downside Risks in House Prices
(Global median)

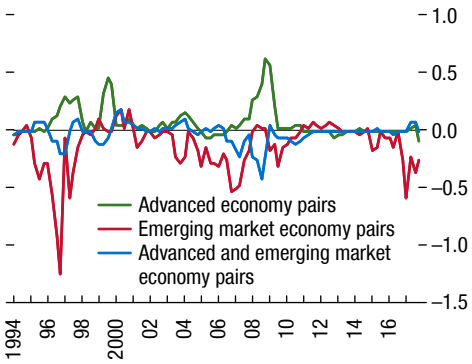
Short-term comovement of downside risks increases sharply around global recessions ...

1. Synchronization of HaR at Global Level



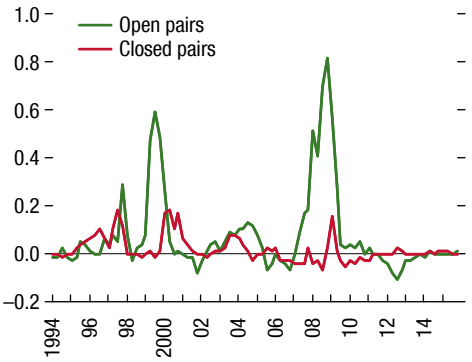
... and mostly among advanced economies.

2. Synchronization of HaR within Different Country Groups



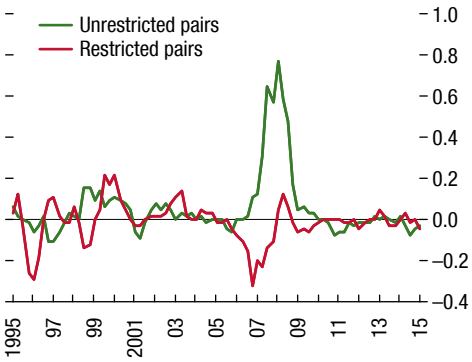
The degree of financial openness may partly contribute to this synchronization.

3. Synchronization of HaR by Level of Financial Openness



Capital flow management measures can help mitigate the synchronization of downside risks around recessions.

4. Synchronization of HaR by Level of Capital Flow Controls to Real Estate Sector



Source: IMF staff calculations.
Note: Panels 1 and 2 show the global median of the instantaneous quasi-correlation of downside risk of housing prices (HaR) within all countries and among different country groups. Panel 3 shows the global median of the instantaneous quasi-correlation of HaR within pairs with different levels of financial openness. Panel 4 shows the global median of the instantaneous quasi-correlation of HaR within pairs with different levels of strictness in capital controls over the real estate sector. In panel 3, open pairs are those in which foreign assets plus foreign liabilities/GDP for both countries in the pair are higher than the median in a given quarter; otherwise, they are grouped as closed pairs. In panel 4, restricted pairs are those in which both countries in the pair have stricter restrictions in capital flows related to the real estate sector than the average; otherwise, they are grouped as unrestricted pairs. The HaR measure and countries comprise 22 advanced economies and 10 emerging market economies (see Online Annex 2.2). HaR = house prices at risk.

Box 2.2. City-Level House Prices at Risk in the United States and Canada

This box applies the house-prices-at-risk concept to a number of cities in the United States and Canada, using quarterly data from 1980 to 2018. Downside risks to house prices in the United States appear to have fallen over the past decade while having increased over the past two years in Canada. Capital flows are significantly associated with downside risks to key residential housing markets, but the net effect depends on the types of flows and cities.

Across US and Canadian cities, downside risks to house prices have changed substantially over time, with US housing markets generally being riskier. Over the past four decades, downside risks[1] across US cities show larger swings on average than in Canada, suggesting that US housing markets are more susceptible to abrupt booms and busts (Figure 2.2.1, panels 1 and 2). Nonetheless, in Canada, there is considerable dispersion in downside risks to house prices in several cities, as reflected by the volatility of the lower bound (5th percentile). Over the past two years, however, overall Canadian downside risks have deteriorated, approaching levels seen around the global financial crisis.

Among other factors, city-level overvaluation, proxied by the house-price-to-income ratio, is associated with a deterioration in one-year-ahead house prices at risk (Figures 2.2.1, panels 3 and 4). Housing markets in such US cities as Miami, Tampa, and Phoenix seemed particularly overvalued before the global financial crisis, which made them more prone to large declines. In 2018, US house prices seemed less overvalued, judging from the price-to-income ratio, which would make a potential bust of the housing market much more contained than in 2008. In contrast, the housing market in Canada headed in the opposite direction, especially in such cities as Hamilton, Toronto, and Vancouver, where valuations look overstretched, much as in 2008. At the same time, tail risks to Canadian house prices have generally increased, reflecting tighter financial conditions, overvaluation, and different types of capital flows (see discussion that follows).

The dynamics of housing markets in global cities are partially driven by capital flows, which seem to both amplify and mitigate downside risks to house prices across US and Canadian cities (Figure 2.2.1, panels 5 and 6).[2] More specifically, sensitivity to capital flows seems to differ for inflows of foreign direct investment and other types of investment:

- Foreign direct investment, which is typically long-term investment, is generally associated with less future risk to several US and Canadian housing markets (Figure 2.2.1, panels 5 and 6). For example, a 1 percentage point increase in foreign direct investment inflows to the United States is significantly associated with a reduction of about 1–2 percentage points in house prices at risk in US tech-friendly cities such as San Francisco, Seattle, and Portland, Oregon.
- Other capital inflows (that is, not foreign direct investment or portfolio flows), which are generally attributed to foreign bank transactions, are found to amplify downside risks to house prices in such cities as Las Vegas, Miami, Los Angeles, Toronto, Vancouver, and Calgary. In Canada, the effects are most pronounced for the major cities in Alberta, a province sensitive to oil price fluctuations and where real house prices almost tripled over the past four decades but have recently seen a correction.

Against this backdrop, capital flow management measures could alleviate house price downside risks. For instance, additional property taxes on foreign home buyers were recently introduced in Vancouver and Toronto. Given that downside risks to house prices in several cities are sensitive to capital inflows other than foreign direct investment or portfolio flows, measures targeted at these regional inflows might alleviate overvaluation pressure in these housing markets and reduce downside risks, but the heterogeneity of the city-level effects also suggests that their broader impact may be limited.

The authors of this box are Adrian Alter and Elizabeth Mahoney.

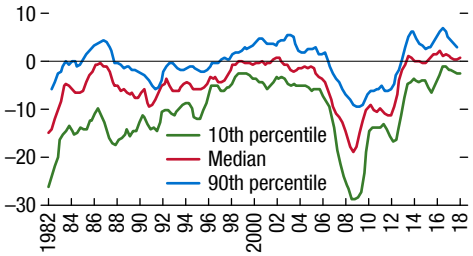
[1]Downside risks are defined as the 5 percent value at risk for a one-year-ahead horizon (see Online Annex 2.2 for details).

[2]Recent studies have found compelling evidence that housing markets in global cities such as London and New York may be affected by foreign capital (Sá and Wieladek 2015; Badarinza and Ramadorai 2018; Sá 2016).

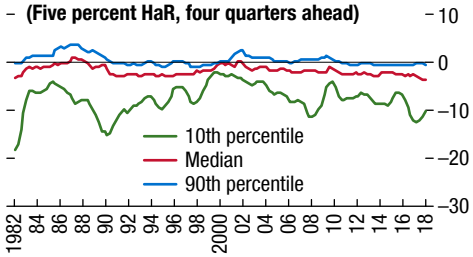
Box 2.2 *(continued)*

Figure 2.2.1. Downside Risks to House Prices in the United States and Canada

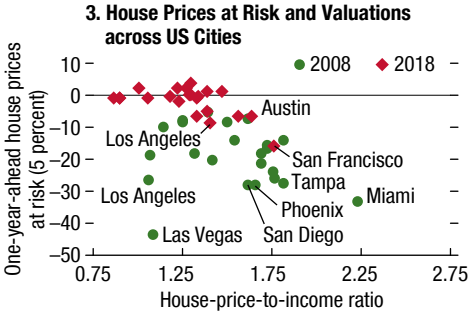
Housing downside risks across US cities are more volatile, with a large drop around the GFC.



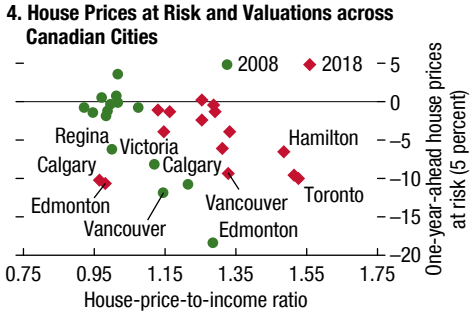
On average, cycles of downside risks across Canadian cities are relatively stable.



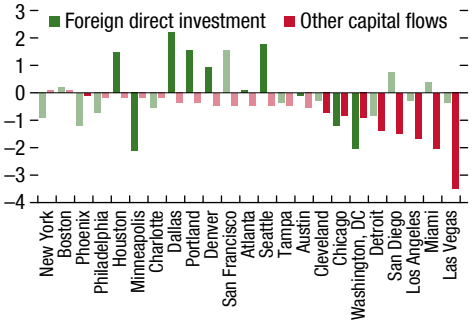
Valuations came down for most US cities in 2018 compared with 2008, partially mitigating tail risks.



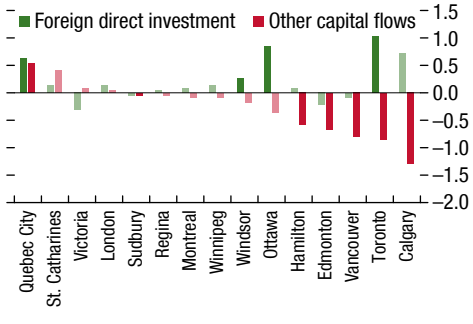
Amid stretched valuations, several Canadian cities were particularly vulnerable to downside risks in 2018.



FDI inflows have a positive role in mitigating risk ...



... whereas other capital inflows are a negative driver.



Source: IMF staff calculations.
Note: Panels 1 and 2 show the 10th and 90th percentiles of the cross-sectional city distribution in each period. In panels 3 and 4, one-year-ahead estimates of 5 percent HaR refer to 2019:Q1 and 2009:Q1, respectively. City-level house-price-to-income ratios refer to 2008 and 2018, respectively. Other capital flows refers to capital flows other than foreign direct investment or portfolio capital flows. Dark green and red bars refer to coefficients significant at the 10 percent level. FDI = foreign direct investment; GFC = global financial crisis; HaR = house prices at risk.

Box 2.3. Province-Level House Prices at Risk in China

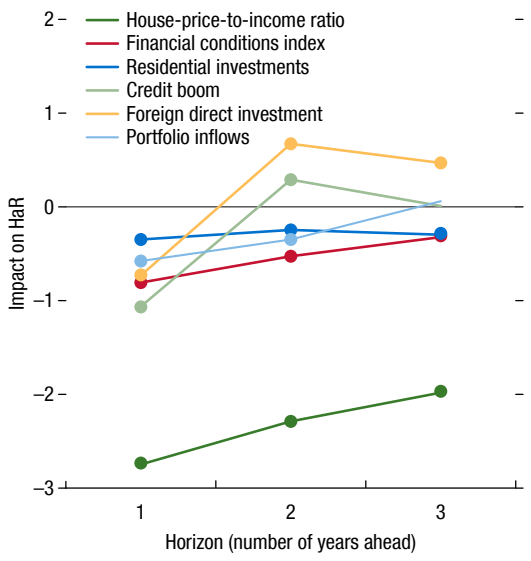
This box estimates house prices at risk for 31 provinces and municipalities in China and finds that both countrywide macro-financial conditions and province-specific developments matter. The most recent data show slightly worsening downside risks to house prices since late 2015 as a result of overvaluation and tightening financial conditions.

China has experienced rapid growth in housing investment and house prices over the past two decades. Real estate investment grew from about 4 percent of GDP in 1997 to 13 percent in 2018 (with a peak of 15 percent of GDP in 2014). Residential investment accounts for more than two-thirds of total real estate investment. Bank lending to the real estate sector, through mortgages and loans to property developers, accounts for 25 percent of total bank loans and about half of all new loans in 2016.

Large downside risks to house prices may adversely affect economic and financial stability in China. Based on quarterly provincial data from 2005 to 2017, panel quantile regressions confirm that China's provincial downside housing risks and global house prices at risk are related to the same factors (Figure 2.3.1). Across all provinces, a deterioration in house prices at risk is associated with credit booms, tighter financial conditions, increases in provincial price-to-income and in residential-investment-to-GDP ratios; the latter reflects an expansion in the supply of housing. Foreign direct

The authors of this box are Sohaib Shahid and Peichu Xie, with assistance from Janice Yi Xue.

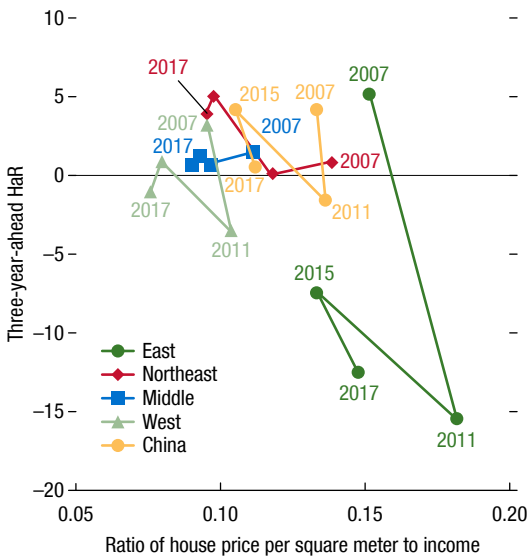
Figure 2.3.1. Impact of a One Standard Deviation Factor Shock on House Prices at Risk across China's Provinces



Sources: Haver Analytics; IMF, World Economic Outlook database; and IMF staff calculations.
Note: House-prices-at-risk determinants include province-level house price growth, price-to-income ratio, real GDP growth, credit boom, financial conditions index, foreign direct investment, and portfolio investments. Colored circles = significant at 10 percent level. HaR = house prices at risk.

Figure 2.3.2. Three-Year-Ahead House Prices at Risk and Valuation across Regions in China

(Median HaR, in percent and price-per-square-meter-to-income ratio)



Sources: Haver Analytics; and IMF staff calculations.
Note: HaR = house prices at risk.

Box 2.3 *(continued)*

investment has an overall positive effect on house prices at risk, while portfolio flows are associated with increased downside risks.[1]

Over the past decade, China has undergone frequent house price cycles, and provincial house prices at risk seem to have an important early-warning dimension. Three-year-ahead house prices at risk reached all-time lows in 2011 with the rapid pace of increases in property prices, which had led to high price-to-income valuation ratios, especially in eastern provinces. Since 2015, house prices at risk started to deteriorate again after an easing cycle ended, pointing to renewed downside risks.[2] That said, loosening financial conditions and lower price-to-income ratios cushioned some of the deterioration of house prices at risk until 2015 (Figure 2.3.2). Nevertheless, large regional differences in downside risks to house prices are apparent, likely reflecting the fragmented housing market and policies across regions. This may justify targeted policies from a regional risk management perspective, including long-term, structural policies, such as household registration reforms and social security (Ding and others 2017).

[1]Similar to the US and Canadian city-level house price analysis (Box 2.2), the effect of capital inflows varies by type and region: when panel quantile regressions are estimated by region, foreign direct investment—driven by long-term commitments—is associated with less downside risk from the second year onward, especially for the East and Northeast. Portfolio investment—reflecting more speculative sentiment—is associated with significantly higher downside risks to house prices in the short term for all regions, except the Northeast.

[2]Easing and tightening periods are identified from year-over-year growth of sales, prices, and inventory momentum, following Ding and others (2017).

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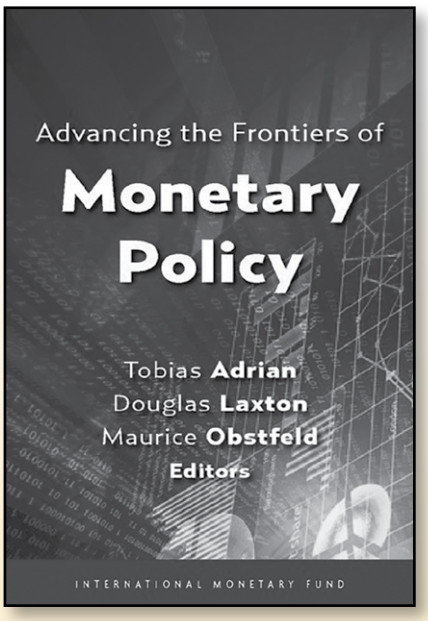

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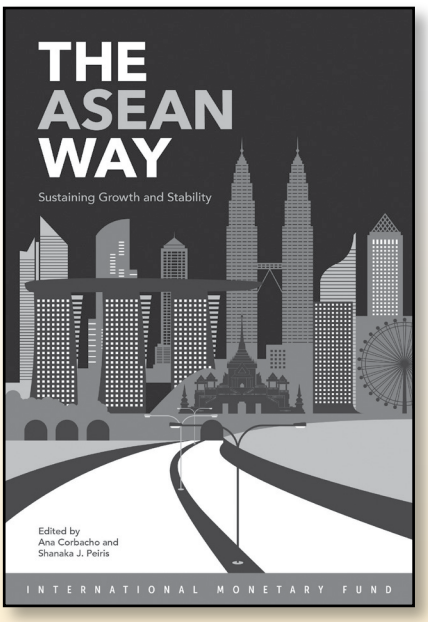

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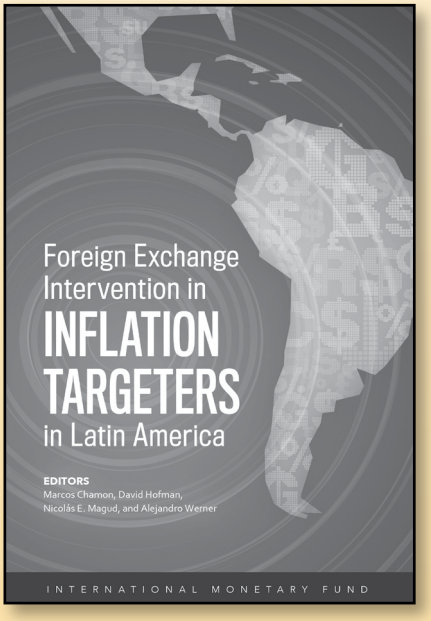

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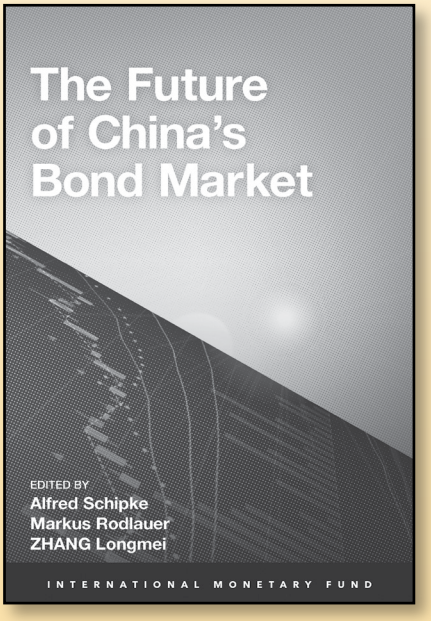

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