World Economic and Financial Surveys

Global Financial Stability Report

A Decade after the Global Financial Crisis: Are We Safer?

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Editor's Note (October 9, 2018)

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

- On page 8 (Figure 1.6), the data in panel 1 have been corrected.
- On page 21 (Figure 1.16), the data in panel 4 have been corrected.
- On page 66 (Figure 2.5), the source "World Bank, Global Financial Development Database" was deleted.

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.

The boundaries, colors, denominations, and any other information shown on the maps do not imply, on the part of the International Monetary Fund, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.

FURTHER INFORMATION

Corrections and Revisions

The data and analysis appearing in the *Global Financial Stability Report* are compiled by the IMF staff at the time of publication. Every effort is made to ensure their timeliness, accuracy, and completeness. When errors are discovered, corrections and revisions are incorporated into the digital editions available from the IMF website and on the IMF eLibrary (see below). All substantive changes are listed in the online tables of contents.

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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 has been coordinated by the Monetary and Capital Markets (MCM) Department under the general direction of Tobias Adrian, Director. The project has been directed by Fabio Natalucci and Dong He, both Deputy Directors, as well as by Claudio Raddatz and Anna Ilyina, both Division Chiefs. It has benefited from comments and suggestions from the senior staff in the MCM Department.

Individual contributors to the report are Sergei Antoshin, Prasad Ananthakrishnan, Adolfo Barajas, Peter Breuer, Jeroen Brinkhoff, John Caparusso, Sally Chen, Yingyuan Chen, Fabio Cortes, Marc Dobler, J. Benson Durham, Dimitris Drakopoulos, Martin Edmonds, Alan Xiaochen Feng, Rohit Goel, Evrim Bese Goksu, Pierpaolo Grippa, Dirk Jan Grolleman, Tryggvi Gudmundsson, Sanjay Hazarika, Frank Hespeler, Henry Hoyle, Mohamed Jaber, David Jones, Will Kerry, Piyusha Khot, Robin Koepke, Yumi Kuramochi, Yang Li, Alejandro Lopez Mejia, Sheheryar Malik, Rebecca McCaughrin, Aditya Narain, Huyen Ngoc Phuong Nguyen, Thomas Piontek, Mustafa Saiyid, Luca Sanfilippo, Jochen Schmittmann, Katharine Seal, Juan Solé, Ilan Solot, Richard Stobo, Florina Tanase, Nour Tawk, Nico Valckx, Constant Verkoren, James P. Walsh, Froukelien Wendt, Jeffrey Williams, Peter Windsor, Juno Xinze Yao, and Akihiko Yokoyama. Magally Bernal, Claudia Cohen, Breanne Rajkumar, and Han Zaw were responsible for word processing.

Gemma Diaz from the Communications Department led the editorial team and managed the report's production with support from Linda Kean and editorial assistance from Sherrie Brown, Lucy Scott Morales, Nancy Morrison, Katy Whipple, 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, standards setters, financial consultants, pension funds, central banks, national treasuries, and academic researchers.

This GFSR reflects information available as of September 14, 2018. 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 September 20, 2018. However, the analysis and policy considerations are those of the IMF staff and should not be attributed to Executive Directors or their national authorities.

FOREWORD

Ten years since the failure of Lehman Brothers the global economy continues to grow and progress toward a safer global financial system is undeniable. New supervisory and regulatory standards, tools, and practices have been developed and implemented across the globe. Banks are now stronger because the quality and quantity of capital has increased steadily, and minimum liquidity standards have been phased in around the world. Supervisory stress testing has been broadly adopted, and many jurisdictions now have macroprudential frameworks and policy tools with which to address systemic risks. Many shadow-banking activities that contributed to the global financial crisis have been curtailed or transformed into safer market-based finance.

So, looking back, a new financial architecture has been put in place, a testament to the resolve of policymakers to work together internationally to avoid a repeat of the Great Depression. But is the financial system safe enough? Looking ahead, clouds appear on the horizon. The global economic recovery has been uneven and inequality has risen, fueling inward-looking policies and contributing to increased policy uncertainty. Trade tensions have emerged, and a further escalation may damage market sentiment and significantly harm global growth. Support for multilateralism has been waning, a dangerous undercurrent that may undermine confidence in policymakers' ability to respond to future crises. Nonetheless, despite trade tensions and continued monetary policy normalization in a few advanced economies, global financial markets have remained buoyant and appear complacent about the risk of a sudden, sharp tightening in financial conditions.

A combination of rising U.S. interest rates, a stronger dollar, and the intensification of trade tensions have already led to market pressures and capital outflows in some emerging market economies. The most vulnerable countries have faced a difficult market environment, experiencing large currency depreciations, difficulties in rolling over external debt, and sharp reversals of portfolio flows. Although emerging market exchange rates have become more correlated recently, stress has continued to be largely idiosyncratic, and there is little evidence of broader spillovers to the asset class at this point. Robust global risk appetite has so far masked the challenges emerging markets may face should global financial conditions suddenly tighten sharply. In that eventuality, the risk of contagion to the broader emerging market universe could ensue, highlighting the importance of avoiding complacency.

A more significant tightening in global financial conditions will expose financial vulnerabilities that have built over the years and will test the resilience of the global financial system. The ratio of total nonfinancial sector debt to GDP in jurisdictions with systemically important financial sectors stands at an all-time high of 250 percent, asset valuations remain stretched across several sectors and regions, and underwriting standards are deteriorating, including in many segments of market-based finance. A new market structure has emerged in the decade since the crisis. The resilience of market liquidity provision in the new institutional environment has yet to be tested under more adverse conditions, and it will affect the ability of the financial system to absorb, rather than propagate, an adverse shock.

As clouds gather on the horizon, it is crucial for countries around the world to complete and implement the global regulatory reform agenda and to resist the call to roll back reforms. To counteract rising vulnerabilities, macro- and microprudential policies should be developed and deployed, as warranted. For example, more active use of countercyclical capital buffers may have merit at this juncture. Prudential regulation and supervision need to remain attentive to, and lean against, emerging risks, including those related to cyberthreats, new technologies, and other risky activities thriving outside the regulatory perimeter. International cooperation is crucial for maintaining global financial stability and fostering sustainable economic growth. The IMF remains a key player for promoting cooperative financial policies.

Tobias Adrian
Financial Counsellor

EXECUTIVE SUMMARY

In the 10 years since the global financial crisis, regulatory frameworks have been enhanced and the banking system has become stronger, but new vulnerabilities have emerged, and the resilience of the global financial system has yet to be tested. Since the last *Global Financial Stability Report* (GFSR), near-term risks to global financial stability have increased somewhat, but financial conditions are still broadly accommodative and supportive of growth in the near term. That said, risks could rise sharply should pressures in emerging market economies mount or if trade tensions escalate. Meanwhile, medium-term risks remain elevated, as easy financial conditions contribute to a further buildup of financial vulnerabilities.

Over the past six months, global financial conditions have marginally tightened and the divergence between advanced and emerging market economies has grown. The global economic expansion continues, providing an opportunity to strengthen balance sheets and rebuild buffers, but growth appears to have peaked in some major economies, as discussed in the October 2018 *World Economic Outlook* (WEO). Yet financial conditions in advanced economies remain accommodative, particularly in the United States, with interest rates still low by historical standards, risk appetite robust, and asset valuations rising in major markets. Financial conditions have remained broadly stable in China, where authorities have eased monetary policy to offset external pressures and the impact of tighter financial regulations. In contrast, financial conditions in most emerging market economies have tightened since mid-April, driven by higher external financing costs, rising idiosyncratic risks, and escalating trade tensions.

As noted in the April GFSR, notwithstanding improved fundamentals over recent years, emerging market economies remain vulnerable to spillovers from monetary policy normalization in advanced economies and could face reduced capital inflows even under a relatively benign baseline scenario. Since then, with rising U.S. interest rates and a stronger dollar, as well as the intensification of trade tensions, a number of emerging market economies have experienced a reversal in portfolio flows. But with buoyant global risk appetite, market pressures have to date been concentrated in countries with large external imbalances and weak policy frameworks. However, the IMF's capital-flows-at-risk analysis suggests that with a 5 percent probability, emerging market economies (excluding China) could face debt portfolio outflows in the medium term of $100 billion or more over a period of four quarters (or 0.6 percent of their combined GDP), broadly similar in magnitude to the global financial crisis.

Near-term risks to global financial stability—assessed using the growth-at-risk (GaR) approach—have increased somewhat over the past six months. However, a much sharper tightening of financial conditions in advanced economies would significantly increase short-term risks. An intensification of concerns about the resilience and policy credibility in emerging markets may lead to further capital outflows and possibly rising global risk aversion. A broader escalation of trade actions may undermine investor confidence, harming the economic expansion. Political and policy uncertainty (for example, in the event of a no-deal Brexit or the reemergence of concerns about fiscal policy in some highly indebted euro area countries) could adversely affect market sentiment and lead to a spike in risk aversion. Finally, with inflation firming up, central banks may step up the pace of monetary policy normalization, which could lead to a sudden tightening of global financial conditions. Overall, market participants appear complacent about the risk of a sharp tightening of financial conditions.

Medium-term risks to global financial stability and growth remain elevated. A number of vulnerabilities that have built up over the years could be exposed by a sudden, sharp tightening of financial conditions. In advanced economies, key financial vulnerabilities include high and rising leverage levels in the nonfinancial sector, continued deterioration in underwriting standards, and stretched asset valuations in some major markets. Total nonfinancial sector debt in jurisdictions with systemically important financial sectors has grown from $113 trillion (more than 200 percent of their combined GDP) in 2008 to $167 trillion (close to 250

percent of their combined GDP). Banks have increased their capital and liquidity buffers since the crisis, but they remain exposed to highly indebted companies, households, and sovereigns; to their holdings of opaque and illiquid assets; or to their use of foreign currency funding. External borrowing has continued to rise in most emerging market economies. This poses challenges for countries that are facing external financing risks and trade shocks, but that lack adequate reserve buffers or strong domestic investor bases to cushion the impact of external shocks. Given the challenging external environment, policymakers in emerging market economies should be prepared for further capital outflow pressures.

In addition to the analysis of the key risks to global financial stability, this report takes stock of the global regulatory reform agenda over the past decade and looks at whether the global financial ecosystem since the crisis has evolved in the intended direction: that is, toward greater safety.

On the positive side, the broad regulatory agenda set by the international community has helped strengthen the global banking system. Some of the pernicious forms of shadow banking that developed in the run-up to the crisis have been curtailed, and most countries now have a macroprudential authority and some tools with which to oversee and contain risks to the financial system.

However, a number of factors may have led to some fragmentation in funding and market liquidity. Regulators are increasingly focusing on the liquidity of individual entities within international banking groups. There are benefits to greater ring-fencing of liquidity, particularly in the context of resolution during stress periods, but there is a risk that doing so could fragment liquidity in international banking groups. In capital markets, market liquidity appears to have become more segmented, for example, across different trading platforms. While there is no clear evidence of a broad-based deterioration in market liquidity, careful monitoring of liquidity conditions is warranted.

To further improve the resilience of the global financial system, the financial regulatory reform agenda should be completed, and a rollback of reforms should be avoided. To adequately address potential systemic risks, financial regulation and supervision should be used more proactively. Broad-based macroprudential tools, including countercyclical capital buffers, should be used more actively in countries where financial conditions remain accommodative and where vulnerabilities are high. Furthermore, financial stability requires new macroprudential tools for addressing vulnerabilities outside the banking sector. Finally, regulators and supervisors must remain attentive to new risks, including possible threats to financial stability stemming from cybersecurity, financial technology, and other institutions or activities outside the perimeter of prudential regulation.

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 September 20, 2018.*

Executive Directors broadly shared the assessment of global economic prospects and risks. They observed that the global expansion, while remaining strong, has lost some momentum and growth may have plateaued in some major economies. Prospects increasingly diverge among countries, reflecting differences in policy stances and the combined impact of tighter financial conditions, rising trade barriers, higher oil prices, and increased geopolitical tensions. Beyond 2019, growth in most advanced economies is expected to be held back by slow labor force growth and weak labor productivity. In emerging market and developing economies, growth is projected to remain relatively robust, although income convergence toward advanced economy levels would likely be less favorable for countries undergoing substantial fiscal adjustment, economic transformation, or conflicts.

Directors generally agreed that near-term risks to the global outlook have recently shifted to the downside and some have partially materialized. Trade barriers have risen, with adverse consequences for investment and growth. Financial conditions in most emerging market and developing countries have tightened since mid-April. Capital flows to some of these countries have declined, reflecting weak fundamentals, higher political risks, and/or U.S. monetary policy normalization. While financial conditions in advanced economies remain broadly accommodative, an inflation surprise could lead to an abrupt tightening of monetary policy and to an intensification of market pressures across a broader range of countries. In addition, most Directors saw as key risks a further escalation of trade tensions, a rise in political and policy uncertainties, and growing inequality. Meanwhile, high debt levels limit the room for maneuver in many countries.

Most Directors considered that the recent intensification of trade tensions and the potential for further escalation pose a substantial risk to global growth and welfare. They noted that unilateral trade actions and retaliatory measures could disrupt global supply chains, weaken investor confidence, and undermine broader multilateral cooperation at a time when it is urgently needed to address shared challenges. They therefore urged all countries to adopt a cooperative approach to promote growth in goods and services trade, reduce trade costs, resolve disagreements without raising tariff and nontariff barriers, and modernize the rules-based multilateral trading system. The possibility of an outcome in which trade issues could be resolved in a positive way was also pointed out. Directors noted that persistent large external imbalances continue to call for sustained efforts, mindful of countries' cyclical positions, to increase domestic growth potential in surplus countries and to raise supply or rein in demand in deficit countries.

Given a narrowing window of opportunity, Directors underscored the urgency of policy measures to sustain the expansion, strengthen resilience, and raise medium-term growth prospects. They encouraged countries to rebuild fiscal buffers where needed, and implement growth-friendly measures calibrated to avoid procyclicality and the risk of sharp drags on activity. Directors agreed that, where inflation is below target, continued monetary accommodation remains appropriate. Where inflation is close to or above target, monetary support should be withdrawn in a gradual, data-dependent, and well-communicated manner. Directors emphasized the critical role of structural reforms in boosting potential output, ensuring that gains are widely shared, and improving safety nets—including to protect those vulnerable to structural change.

Most Directors shared the assessment that near-term risks to financial stability have increased while medium-term risks remain elevated. They highlighted, in particular, the buildup of financial vulnerabilities over the past few years of very accommodative financial conditions, including high and rising public and corporate debt,

and stretched asset valuations in some major markets. Addressing these vulnerabilities remains an important priority for many countries. For some countries, priorities include cleaning up bank balance sheets, improving corporate governance, and addressing risks from the sovereign-bank nexus, although a number of Directors felt that regulatory issues pertaining to sovereign exposures would best be left to the remit of the Basel Committee on Banking Supervision, which is the standard-setting body on the matter for a number of member countries. Directors also stressed the importance of completing and fully implementing the regulatory reform agenda, and of avoiding a rollback of reforms that have contributed to a more resilient financial system ten years after the global financial crisis.

Directors agreed that financial regulators and supervisors should remain vigilant about potential threats to financial stability and stand ready to act. They called for special attention to liquidity conditions and new risks, including those related to cybersecurity, financial technology, and other institutions or activities outside the perimeter of prudential regulation. These require policymakers to further develop policy tools, including macroprudential policies, and deploy them proactively as needed, as well as enhance coordination across borders.

Directors stressed that, as monetary policy normalization proceeds in advanced economies, emerging market and developing economies need to prepare for an environment of tighter financial conditions and higher volatility. Countries need to tackle their vulnerabilities and enhance resilience with an appropriate mix of fiscal, monetary, exchange rate, and prudential policies. In certain circumstances, capital flow management measures may be appropriate but not as a substitute for macroeconomic adjustment. Directors observed that markets have so far differentiated among emerging market and developing economies based on their fundamentals and idiosyncratic factors. In this context, they underlined the importance of maintaining credible policy and institutional frameworks, strengthening governance, and improving human and physical capital. Directors noted that the current environment highlights the need for the Fund to offer granular, tailored policy advice and stand ready to provide financial support to its members as needed.

Directors underscored that priorities for low-income developing countries include building resilience, lifting potential growth, improving inclusiveness, and making progress toward the 2030 Sustainable Development Goals, while commodity exporters should also prioritize economic diversification. Stronger efforts are needed to create room for development expenditure, through broadening the tax base, improving revenue administration, and prioritizing spending on health, education, and infrastructure, while cutting wasteful subsidies. Directors also called for urgent action to contain debt vulnerabilities, which are rising in many countries. They stressed that both debtors and creditors share a responsibility for ensuring sustainable financing practices and enhancing debt transparency.

Directors agreed that public sector balance sheet analysis provides a useful tool to analyze public finances. By revealing the full scale of public assets in addition to debt and nondebt liabilities, it helps governments identify risks and manage both assets and liabilities, potentially reducing borrowing costs and raising returns on assets. Directors noted that the long-term intertemporal analysis is particularly relevant in aging societies. They also saw the benefits of the added transparency in enriching the policy debate. At the same time, Directors acknowledged that the balance sheet approach still has limitations, notably data quality and differences in accounting practices hindering cross-country comparisons, and thus it should be used with caveats to complement traditional fiscal analysis.

CHAPTER 1

A DECADE AFTER THE GLOBAL FINANCIAL CRISIS: ARE WE SAFER?

Global Financial Stability Assessment

The global economic expansion continues but it has become less even. While global financial conditions remain broadly accommodative and supportive of growth in the near term, financial conditions in some emerging market economies have tightened since the April 2018 Global Financial Stability Report *(GFSR). This tightening has been driven by a combination of country-specific factors, worsening external financing conditions, and trade tensions. As a result, near-term risks to financial stability have increased modestly, while medium-term risks remain elevated because of persistent financial vulnerabilities linked to high debt levels and stretched asset valuations. Looking ahead, a further escalation of trade tensions, as well as rising geopolitical risks and policy uncertainty in major economies, could lead to a sudden deterioration in risk sentiment, triggering a broad-based correction in global capital markets and a sharp tightening of global financial conditions.*

The Resilience of the Global Financial System Has Yet to Be Tested

Since the April 2018 GFSR, near-term risks to global financial stability have risen modestly, while medium-term risks remain elevated. The global economic expansion remains strong, but has become less balanced and with more downside risks (see the October 2018 *World Economic Outlook* [WEO]). Since mid-April, rising U.S. interest rates and a stronger U.S. dollar—coupled with intensified trade tensions—have triggered a reversal in portfolio flows, an increase in borrowing costs, and a weakening in local currencies in some emerging markets (Figure 1.1). Increased political and policy uncertainty in several countries has weighed on market sentiment as well. In some emerging markets, notably Turkey and Argentina, external vulnerabilities and country-specific risks have led to outsized currency depreciations, intensifying concerns about the health of domestic banks and possible spillovers to other countries. Increased balance of payments pressures in Argentina prompted the request for external assistance. In advanced Europe, Italian government bond spreads have widened and risky asset prices have fallen, while concerns about ongoing Brexit negotiations remain high.

Despite these developments, global financial conditions remain accommodative and supportive of near-term growth, albeit somewhat tighter than six months ago. The monetary policy normalization by a number of major central banks has advanced since the last GFSR. Nonetheless, global interest rates continue to be low by historical standards, even after accounting for the increase in some advanced economies. Over the recent years, accommodative financial conditions have supported the recovery in growth, employment, and incomes, providing an opportunity to strengthen balance sheets and rebuild buffers.

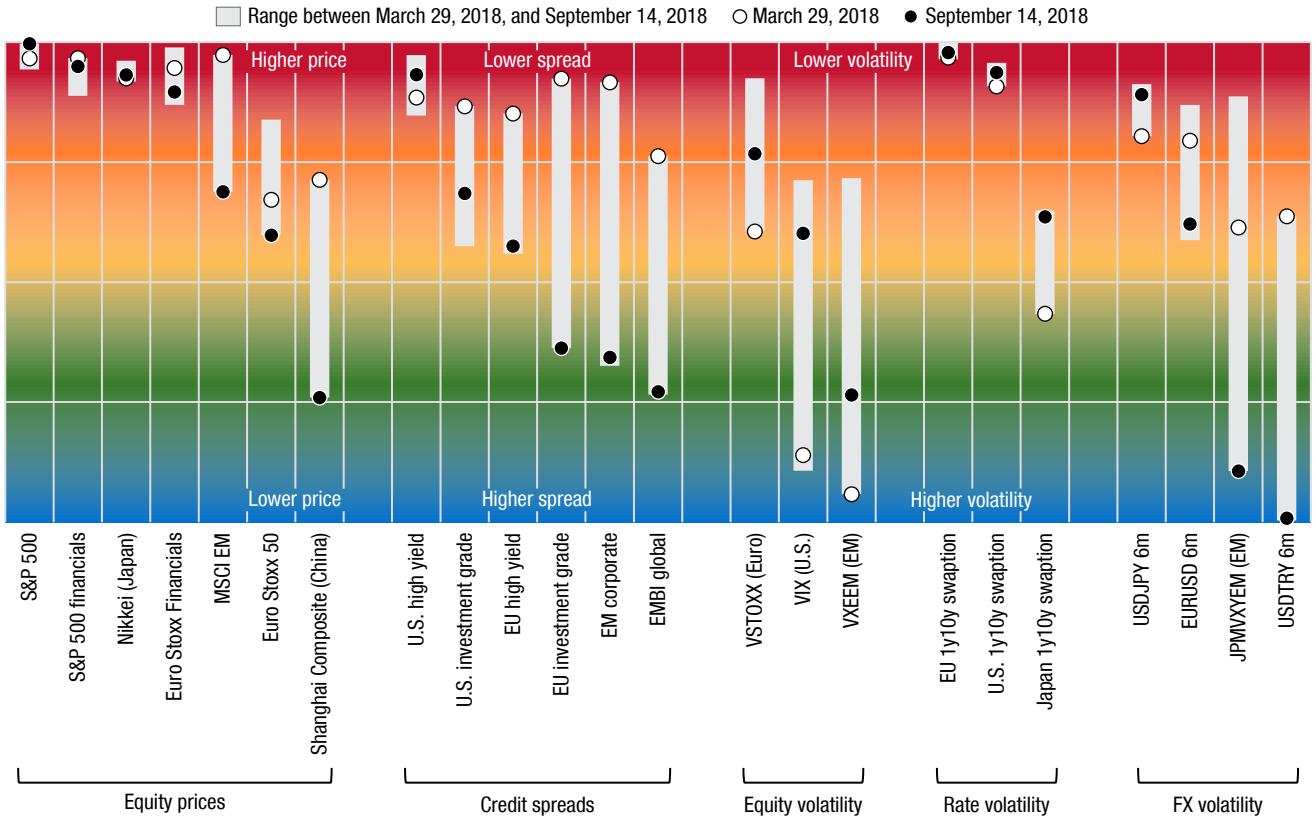
Looking ahead, market participants will be increasingly focused on how continued monetary policy normalization and escalating trade tensions will affect asset valuations and economic fundamentals. As central banks proceed with the withdrawal of monetary accommodation, financial conditions will eventually tighten. Such a tightening could reveal financial vulnerabilities that have built up over the years of accommodative policies and may also expose fragilities in the financial system that have emerged since the global financial crisis. These risks are discussed in the rest of this chapter. The second section focuses on fragilities in emerging and frontier markets. The third section highlights a number of risks faced by banks, including their exposure to nonfinancial sector debt. The final section concludes with a discussion of policies for safeguarding financial stability.

Prepared by staff from the Monetary and Capital Markets Department (in consultation with other departments): Fabio Natalucci (*Deputy Director*), Anna Ilyina (*Division Chief*), J. Benson Durham (*Advisor*), Peter Breuer (*Deputy Division Chief*), Will Kerry (*Deputy Division Chief*), Prasad Ananthakrishman (*Advisor*), Sergei Antoshin, Magally Bernal, Jeroen Brinkhoff, John Caparusso, Sally Chen, Yingyuan Chen, Fabio Cortes, Dimitris Drakopoulos, Martin Edmonds, Rohit Goel, Pierpaolo Grippa, Dirk Jan Grolleman, Tryggvi Gudmundsson, Sanjay Hazarika, Frank Hespeler, Henry Hoyle, Mohamed Jaber, David Jones, Piyusha Khot, Robin Koepke, Yumi Kuramochi, Yang Li, Alejandro Lopez Mejia, Sheheryar Malik, Rebecca McCaughrin, Aditya Narain, Thomas Piontek, Luca Sanfilippo, Jochen Schmittmann, Juan Solé, Ilan Solot, Richard Stobo, Nour Tawk, Froukelien Wendt, Jeffrey Williams, Peter Windsor, Akihiko Yokoyama, and Han Zaw.

Figure 1.1. Recent Market Developments

Risk appetite has remained strong, as reflected in low volatility and higher U.S. equity valuations. However, higher U.S. interest rates and a stronger U.S. dollar have led to lower emerging market equity prices and wider debt spreads.

Market Performance Dashboard
(Each marker is a 30-day moving average of daily percentile rank in relation to the asset's five-year history. Closer to red represents higher equity prices and lower corporate bond spreads and volatility, and closer to blue is vice versa)



Sources: Bloomberg Finance L.P.; and IMF staff estimates.
Note: EM = emerging market; EURUSD = euro-U.S. dollar; FX = foreign exchange; JPMVXYEM = JPMorgan's Emerging Market Volatility Index for foreign exchange; MSCI = Morgan Stanley Capital International; USDJPY = U.S. dollar-Japanese yen; USDTRY= U.S. dollar-Turkish lira; VIX = Chicago Board Options Exchange Market Volatility Index; VSTOXX = Dow Jones Euro STOXX 50 Volatility Index; VXEEM = Chicago Board Options Exchange Market Emerging Markets Exchange-traded Fund Volatility Index.

Financial Conditions in Advanced and Emerging Market Economies Are Diverging

Financial conditions in advanced economies have remained accommodative, while conditions have tightened in emerging markets (Figure 1.2):[1]

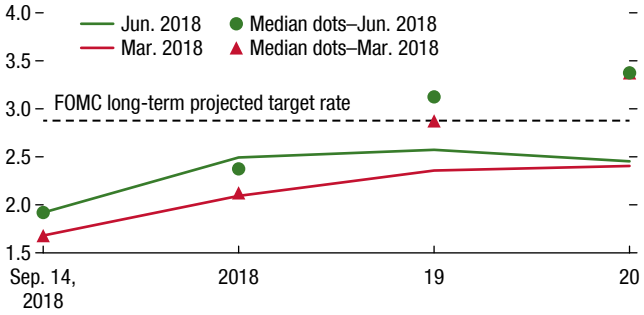
[1]Financial conditions indices are based on the methodology presented in the October 2017 and April 2018 GFSRs. Figure 1.2 shows the price-of-risk financial conditions indices, which include real short-term rates, term spreads, interbank spreads, sovereign and corporate spreads on domestic and external debt, equity market price-to-book ratios, equity market volatility, house prices, and exchange rates. The regional aggregates are calculated using purchasing-power-parity GDP weights. See Online Annex 1.1 at www.imf.org/en/Publications/GFSR for details.

- In the *United States*, the Federal Reserve has raised its policy rate 25 basis points since April, marking the seventh hike in the tightening cycle, reflecting growing confidence in the economic outlook. Near-term market-implied interest rate expectations have drifted higher, but still lag the median policy rate expectations of the Federal Open Market Committee (Figure 1.2, panel 1). The current tightening cycle remains atypical: despite monetary policy tightening, financial conditions have eased further as a result of continued strong risk appetite and rising asset valuations (Figure 1.2, panel 3). U.S. equity market performance—partly boosted by

Figure 1.2. Global Financial Conditions

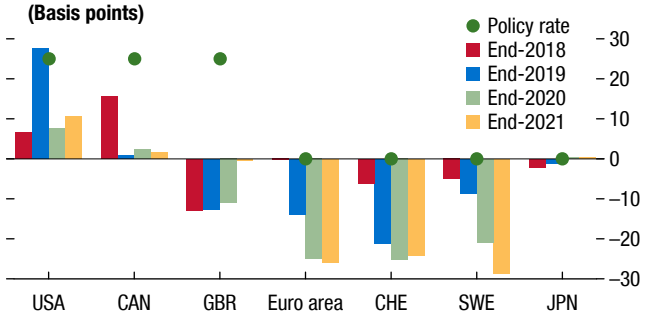
Market expectations of U.S. rates have drifted higher but remain below the Federal Reserve's dot plot.

1. FOMC Projections and Market Implied Policy Rates
(Percent)



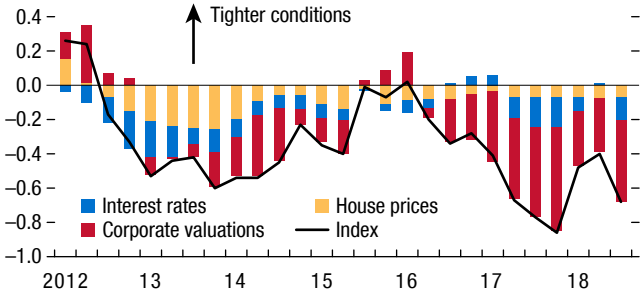
In other advanced economies, markets have pushed out the expected timing of interest rate hikes.

2. Changes in Policy Rates and in Market Expectations since April 2018
(Basis points)



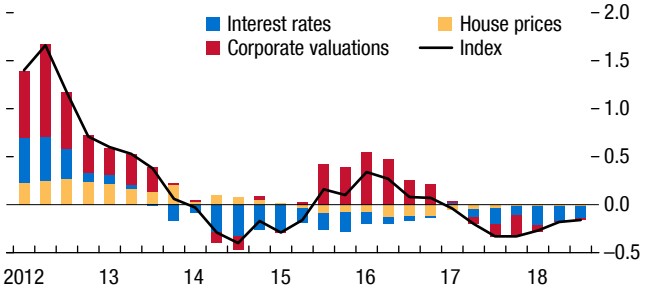
Despite continued monetary policy tightening, U.S. financial conditions have eased further.

3. Financial Conditions Index: United States
(*Z*-scores over 1996–2018:Q3)



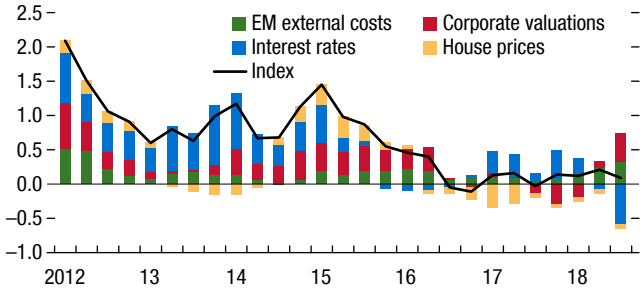
In the euro area and other systemically important advanced economies, financial conditions have remained relatively easy.

4. Financial Conditions Index: Other Systemically Important Advanced Economies[1]
(*Z*-scores over 1996–2018:Q3)



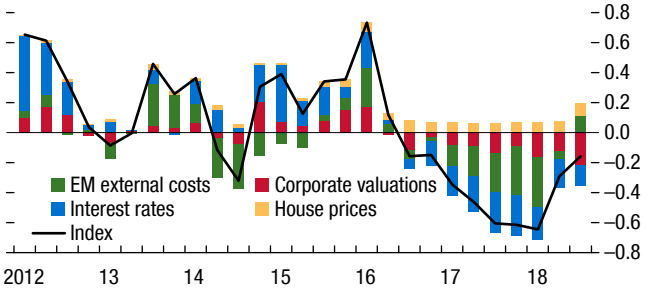
In China, monetary policy easing has offset the impact of external pressures.

5. Financial Conditions Index: China
(*Z*-scores over 1996–2018:Q3)



In contrast, financial conditions in other emerging markets have tightened.

6. Financial Conditions Index: Other Systemically Important Emerging Market Economies[2]
(*Z*-scores over 1996–2018:Q3)



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators; official sources; and IMF staff calculations.
Note: The construction of the Financial Conditions Indices is explained in Online Annex 1.1. Panel 1 projections refer to the end of the period. In panels 3–5, values less than zero represent financial conditions that are loose relative to the historical average of 1996 or earliest data available through 2018; the interest rates category includes the real short-term rate, the term spread for the United States and Germany or the sovereign spread on local currency debt for other countries, and the interbank spread; the corporate valuations category includes the equity market price-to-book ratio, the local currency corporate bond spread, and the implied volatility index, where available; and the emerging market external costs category includes the sovereign spread and the corporate spread on external debt, and the external debt-weighted exchange rate. Financial conditions relate to price of risk in 29 jurisdictions with systemically important financial sectors (https://www.imf.org/external/np/fsap/mandatoryfsap.htm). Data labels in the figure use International Organization for Standardization (ISO) country codes.
EM = emerging market; FOMC = Federal Open Market Committee.
[1]"Other systemically important advanced economies" include Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom.
[2]"Other systemically important emerging market economies" include Brazil, India, Mexico, Poland, Russia, and Turkey.

the tax reform—has been remarkably strong, with U.S. stocks seeing the longest rally in recent history. Concurrently, the slope of the U.S. Treasury yield curve has flattened to its lowest level since before the global financial crisis (Box 1.1).

- In the *euro area and other major advanced economies*, financial conditions have remained relatively easy (Figure 1.2, panel 4), primarily because of still-accommodative monetary policies and strong global risk appetite (Figure 1.2, panel 2), and despite political uncertainty. In Italy, policy uncertainty has led to a renewed focus on the bank-sovereign nexus. In the United Kingdom, with the approaching deadline for completing negotiations on the post-Brexit arrangements, market concerns about a no-deal Brexit appear to have increased, driving sterling volatility to a five-month high and suppressing corporate valuations. Given the dissipation of deflation risks, the European Central Bank (ECB) announced its intention to end its bond purchase program by the end of 2018. However, with growth momentum weakening, it said it would keep interest rates on hold at least through summer 2019, subject to incoming data. As a result, investors have pushed out the expected timing of the first ECB policy rate hike, and German long-term yields have fallen since April. In part because of weak inflation, the Bank of Japan signaled it would maintain the current extremely low levels of interest rates for an extended period, while allowing for a wider band around its long-term target for 10-year government bond yields.
- In *China*, financial conditions have remained broadly stable, with an easing in monetary policy largely offsetting the impact of external pressures (Figure 1.2, panel 5). China's equity markets have weakened on rising trade tensions. Tighter liquidity resulting from earlier regulatory efforts to de-risk and deleverage the financial system has led to pockets of stress in corporate bond markets, which prompted Chinese authorities to ease monetary policy. The central bank injected liquidity via cuts to the required reserve ratio and through lending facilities. The exchange rate weakened further, down 7 percent against the U.S. dollar (and down 5 percent compared with a basket of 24 currencies) since mid-June, prompting authorities to reintroduce a 20 percent reserve requirement for foreign exchange forwards.
- In *other systemically important emerging market economies*, a combination of country-specific political or policy uncertainties and worsening external financing conditions have led to a significant tightening of financial conditions, particularly in more vulnerable economies, though on aggregate, financial conditions are still broadly accommodative relative to historical levels (Figure 1.2, panel 6). However, the 2019 growth forecasts for emerging markets have been revised down compared to six months ago (see the October 2018 WEO). Most emerging market economies have responded to market turbulence during the U.S. dollar rally and escalating trade tensions by hiking policy rates or by effectively ending their monetary easing. In addition, some countries have intervened in the foreign exchange market, while others have allowed the exchange rate to absorb the shock (see "Fragilities in Emerging and Frontier Markets" section).

Near-Term Risks to Global Financial Stability Have Increased Modestly . . .

Overall global financial conditions have tightened a notch, on balance, relative to six to twelve months ago, despite a notable easing in financial conditions in the United States. The impact of changes in global financial conditions on future growth and financial stability is assessed using the growth-at-risk (GaR) approach (Figure 1.3).

The application of the GaR approach suggests that the near-term risks to global financial stability have increased modestly compared with the last GFSR, while medium-term risks remain elevated. The impact of the tightening of global financial conditions over the past six months (Figure 1.4, panel 1) on the estimated distribution of global growth outcomes one year ahead suggests a modest increase in near-term risks to global financial stability compared with the April 2018 GFSR (Figure 1.4, panels 2 and 3). Relative to historical norms, near-term risks are still fairly subdued (Figure 1.4, panel 4), while medium-term risks continue to be elevated (Figure 1.4, panel 5).

. . . But Financial Stability Risks Could Rise Sharply

Looking ahead, a sharp tightening of global financial conditions could be trigged by a further escalation of trade tensions or by a sudden shift in risk sentiment caused by rising geopolitical risks or policy uncertainty in major economies. Key risks include the following:

- *Growing concerns about resilience and policy credibility of emerging markets* in the face of external headwinds

could lead to further capital outflows and possibly rising global risk aversion, which could send shock waves across broader risky asset markets. In that scenario, countries with high external debt, substantial financing or rollover needs, limited policy space, and weak reserve buffers would be particularly vulnerable (see "Fragilities in Emerging and Frontier Markets" section).

- *An escalation of trade tensions* to levels deemed systemic could pose further risks to global growth (see "Scenario Box 1—Global Trade Tensions" in the October 2018 WEO). So far, the impact of trade concerns on market valuations has been limited to specific sectors. Because most of the escalating trade tensions have centered around China-U.S. relations, Chinese corporations with significant exposure to proposed U.S. tariffs have been disproportionately affected by trade announcements, and U.S. shares of companies with large exposures to China have underperformed (Figure 1.5, panels 1 and 2). Should market participants start pricing in the possibility of protracted trade tensions, financial conditions could tighten significantly, increasing the tail risk to global growth and financial stability (see Box 1.2).
- *A rise in political and policy uncertainty* could adversely affect financial market confidence. For example, uncertainty about fiscal policy in some highly indebted euro area countries could damage confidence in financial markets, while growing anxiety about a breakdown in Brexit negotiations could give rise to contractual and operational uncertainties in the United Kingdom and elsewhere in Europe (see Box 1.3).
- *Faster-than-anticipated monetary policy normalization* in advanced economies could lead to sudden tightening of global financial conditions. Such tightening could, for instance, be caused by firmer-than-expected inflation in the United States stemming from capacity constraints created by procyclical fiscal policy or increases in import tariffs. Emerging market economies will remain vulnerable to spillovers from monetary policy normalization in advanced economies.

Financial Vulnerabilities Remain Elevated, with High Debt Being a Key Challenge

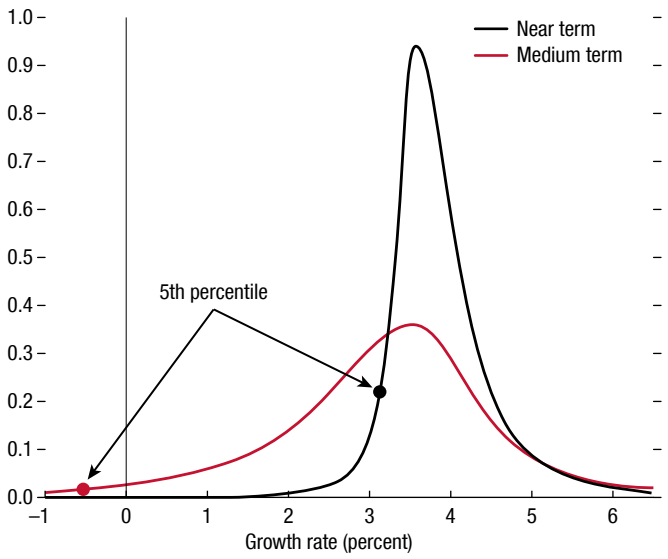
Debt levels have risen significantly across countries and sectors. The unconventional monetary policies implemented since the global financial crisis were aimed at easing financial conditions to support the economic recovery. In such an environment, total nonfinancial sector debt—borrowings by governments, nonfinancial companies, and households—has expanded at a much faster pace than the growth rate of the economy. As a result, total nonfinancial debt in countries with systemically important financial sectors now stands at $167 trillion, or over 250 percent of aggregate GDP, compared with $113 trillion (210 percent of GDP) in 2008 (Fig-

Figure 1.3. The Growth-at-Risk Approach

The growth-at-risk (GaR) approach links current financial conditions to the distribution of future growth outcomes. The forecasted range of severely adverse growth outcomes (those that occur with 5 percent probability, also called the "tail" of the distribution) provides a metric with which to assess the degree of concern about risks to growth and financial stability.

To illustrate how the GaR approach works, Figure 1.3 shows a stylized distribution of one-year-ahead growth forecasts (in black) and a stylized distribution of three-year-ahead growth forecasts (in red), conditional on current financial conditions and vulnerabilities. The medium-term growth distribution has a similar mode but a fatter left tail than the near-term growth distribution, which means that the downside risk is higher in the medium term than in the near term. Furthermore, if certain changes in financial conditions or vulnerabilities lead to a leftward shift of the forecasted growth distribution, this means that the downside risks to growth increase. For example, if a tightening of financial conditions results in a shift of the 5th percentile of the near-term growth distribution (shown by the black dot and referred to as the GaR threshold) further to the left, this implies that the GaR threshold below which growth could fall with 5 percent probability is lower and, hence, the downside "tail" risk to growth and financial stability is higher (for details, see the April 2018 GFSR).

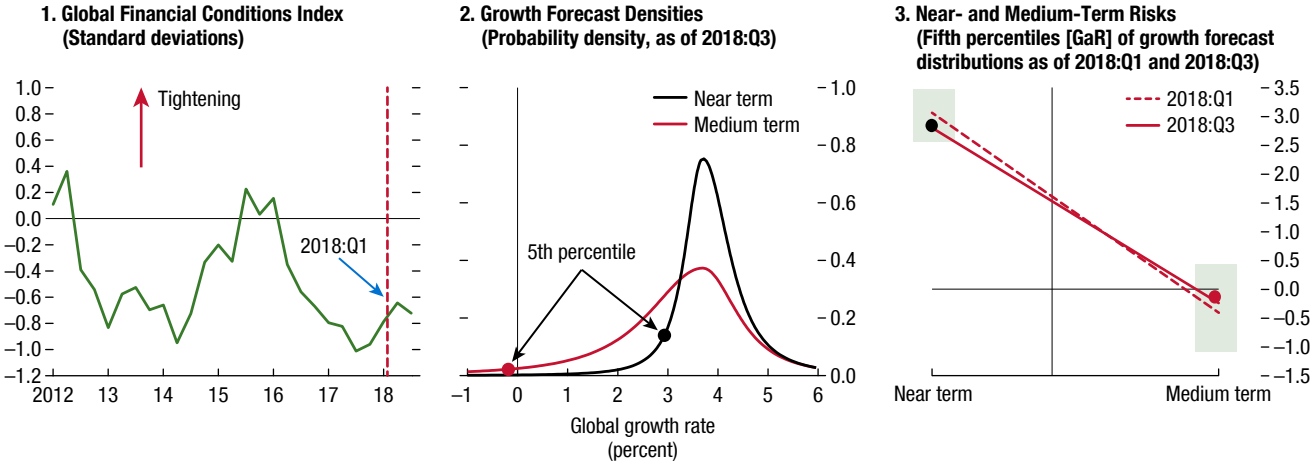
Growth Forecast Distributions
(Probability density)



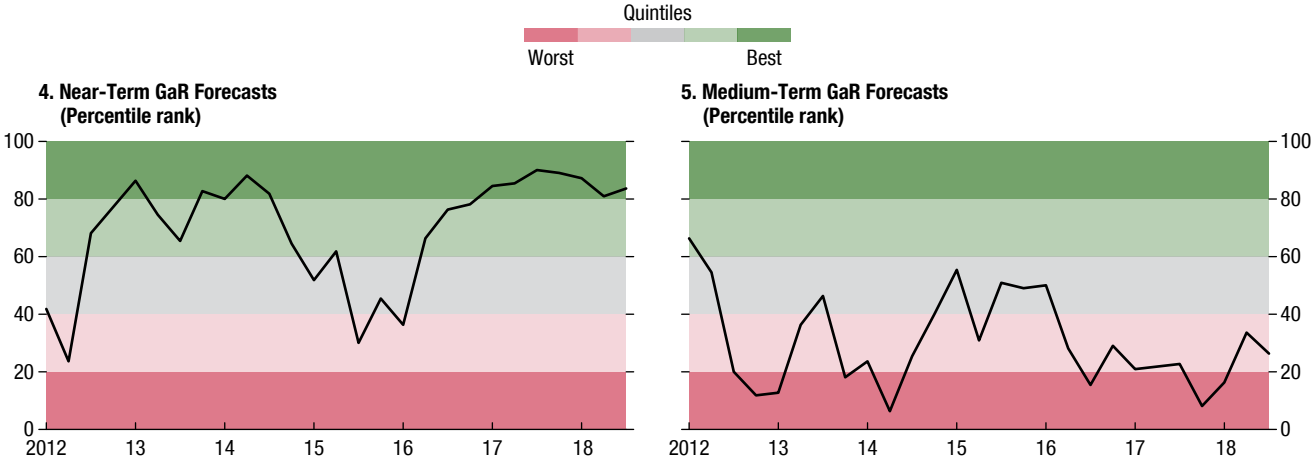
Source: IMF staff estimates.

Figure 1.4. The Growth-at-Risk Estimates

Global financial conditions have tightened somewhat since 2018:Q1. Near-term downside risks have increased modestly, while medium-term risks remain elevated compared with six months ago.



The latest near-term GaR forecast is still near historical highs, while the medium-term GaR forecast is close to historic lows.



Source: IMF staff estimates.
Note: In addition to the price-of-risk components (shown in Figure 1.2), the global financial conditions index used to estimate GaR includes two additional variables—credit growth and the ratio of credit to GDP. An upward movement reflects tightening of financial conditions. 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:Q1 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 forecast growth densities. See the April 2018 GFSR for details. GaR = growth-at-risk.

ure 1.6, panel 1).[2] Higher debt has made the nonfinancial sector more sensitive to changes in interest rates.

But the specific debt-related vulnerabilities differ across countries. Figure 1.7 highlights balance sheet leverage across six sectors—banks, nonbank financial firms, nonfinancial corporations, households, sovereigns, and the external sector (for emerging markets)—in major advanced and emerging market economies. For each jurisdiction and sector, the figure shows the percentile rank based on a pooled sample across 29 countries from 2000 through the first quarter of 2018. Some of the key debt-related vulnerabilities are highlighted below:

- In the *United States*, risks continue to build in the public sector. Public sector debt has continued to climb, with the anticipated expansion in the federal deficit further exacerbating already-unsustainable debt dynamics.[3] This contrasts with a decline in

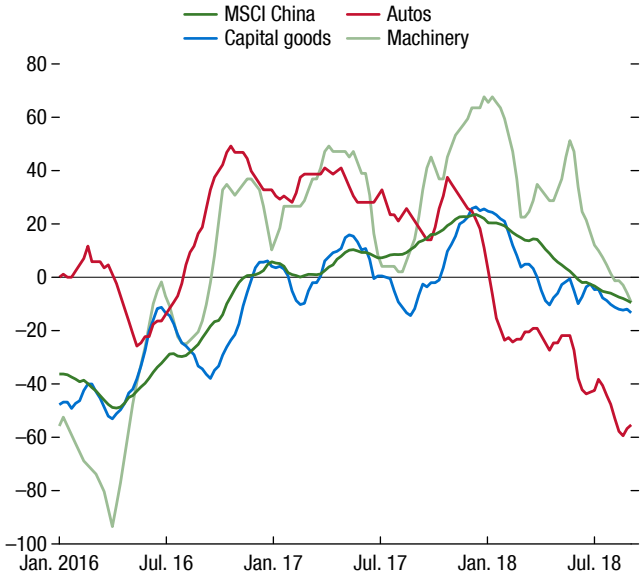
[2]The latest numbers are preliminary estimates for 2017 from the IMF Global Debt Database. For more information on the evolution of public sector balance sheets, see the October 2018 *Fiscal Monitor*.

[3]See the 2018 U.S. Article IV consultation (IMF 2018g).

Figure 1.5. Impact of U.S.-China Trade Tensions on Asset Prices

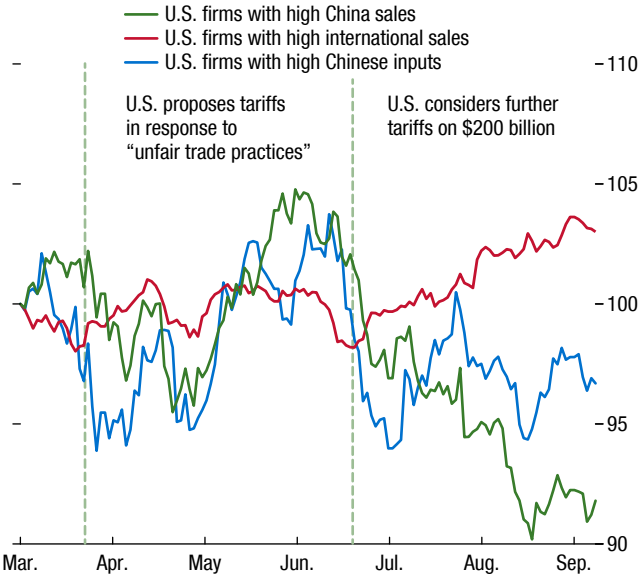
Rising trade tensions may have affected corporate earnings' expectations in selected sectors in China ...

1. Chinese Corporate Earnings Revisions
(Percent, index of upgrades relative to downgrades)



... and have started to affect selected U.S. firms.

2. U.S. Companies: Equity Price Performance
(March 2018 = 100)



Sources: Bloomberg Finance L.P.; Thomson Reuters; and IMF staff calculations.
Note: "U.S. firms with high China sales" includes the 15 large-cap U.S. public companies with the highest proportion of their revenue coming from China. "U.S. firms with high international sales" includes 15 of the largest multinational firms with the highest proportion of their revenue generated overseas. "U.S. firms with high Chinese inputs" shows the relative performance of those sectors that rely most on intermediate goods from China versus those sectors that rely least on Chinese imports. MSCI = Morgan Stanley Capital International.

household debt ratios (Figure 1.6, panel 2) and a moderation in overall corporate sector leverage since 2015–16 due to improved profitability. However, the share of highly levered and speculative-grade firms in new debt issuance has grown, fueled by strong investor demand, looser underwriting standards, and compressed spreads (Figure 1.6, panels 3 and 4). Notably, highly leveraged deals account for a growing share of new leveraged loan issuance and have surpassed precrisis highs. Bank balance sheets have strengthened (Figure 1.6, panel 5), but nonbank financial entities have increased their leverage, including through the use of derivatives.

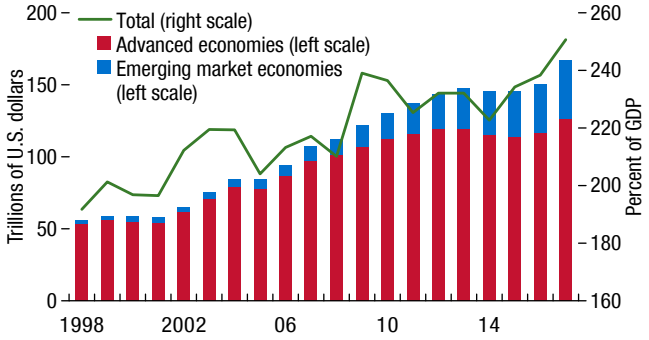
- In the *euro area,* leverage in the corporate and sovereign sectors remain elevated (Figure 1.7). The share of lower-rated companies has increased because compressed spreads have encouraged the buildup of leverage. Public sector debt, in part a legacy of postcrisis efforts at fiscal accommodation, remains elevated in several euro area economies. Capital positions among banks have improved in recent years, though some weaknesses remain, including tight sovereign-bank links and declining but still-elevated nonperforming loans in some banks (see "Banks—Stronger, but Not Yet Out of the Woods" section). Most recently, market participants have become concerned about cross-border exposures of euro area banks to vulnerable emerging market borrowers.
- In *other advanced economies*, leverage remains at moderate to high levels across several sectors (Figure 1.7). However, household leverage stands out as a key area of concern, with the ratio of household debt to GDP on an upward trajectory in a number of countries, especially those that have experienced increases in house prices (notably, Australia, Canada, and the Nordic countries).[4] In Japan, household and corporate balance sheets appear sound. But the low-profitability environment has created potential vulnerabilities in the financial sector. These include foreign currency funding positions as the search

[4]In Australia, house prices have started to reverse course in major cities and nationwide since late 2017.

Figure 1.6. Balance Sheet Vulnerabilities

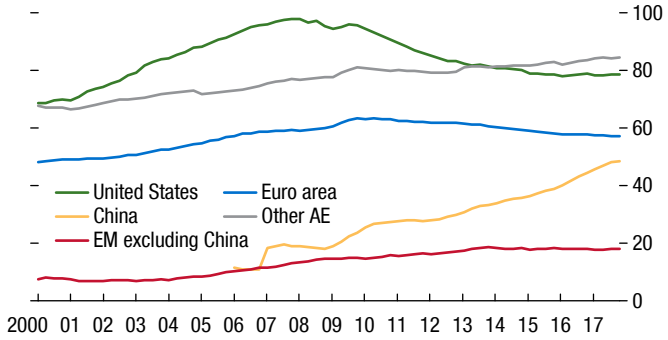
Total nonfinancial sector debt has continued to swell since the global financial crisis.

1. Total Nonfinancial Sector Debt
(Trillions of U.S. dollars; percent of GDP)



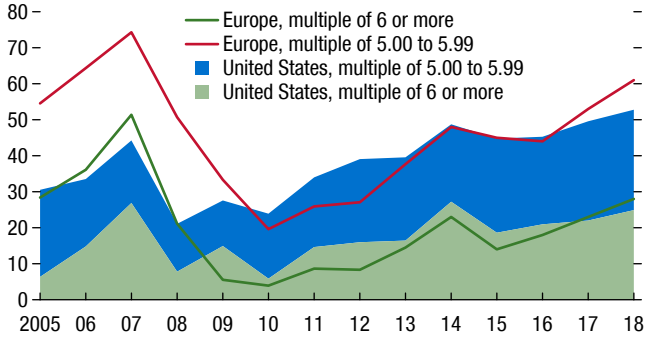
Household debt to GDP remains on an upward trajectory in a number of countries.

2. Households: Debt to GDP by Region
(Percent)



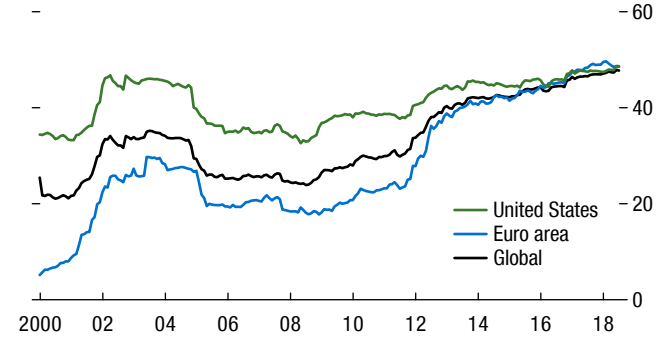
Highly leveraged loan deals have grown as a share of new corporate issuance in the United States and Europe ...

3. U.S. and European Leveraged Loan Issuance by Leverage Multiple
(Percent of issuance)



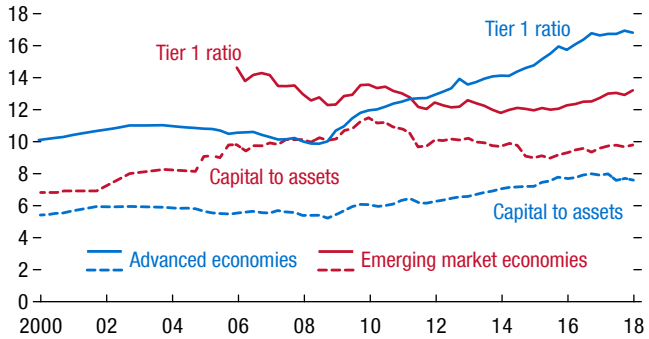
... accompanied by broad-based growth in riskier borrowing.

4. Quality Breakdown of Investment-Grade Index
(Percent of index with BBB ratings)



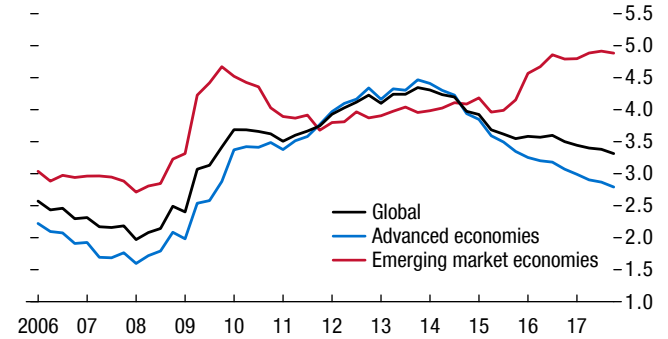
Capital positions of banks in advanced economies have improved, but are less robust in some emerging market economies ...

5. Banking System Capital Ratios by Region
(Percent)



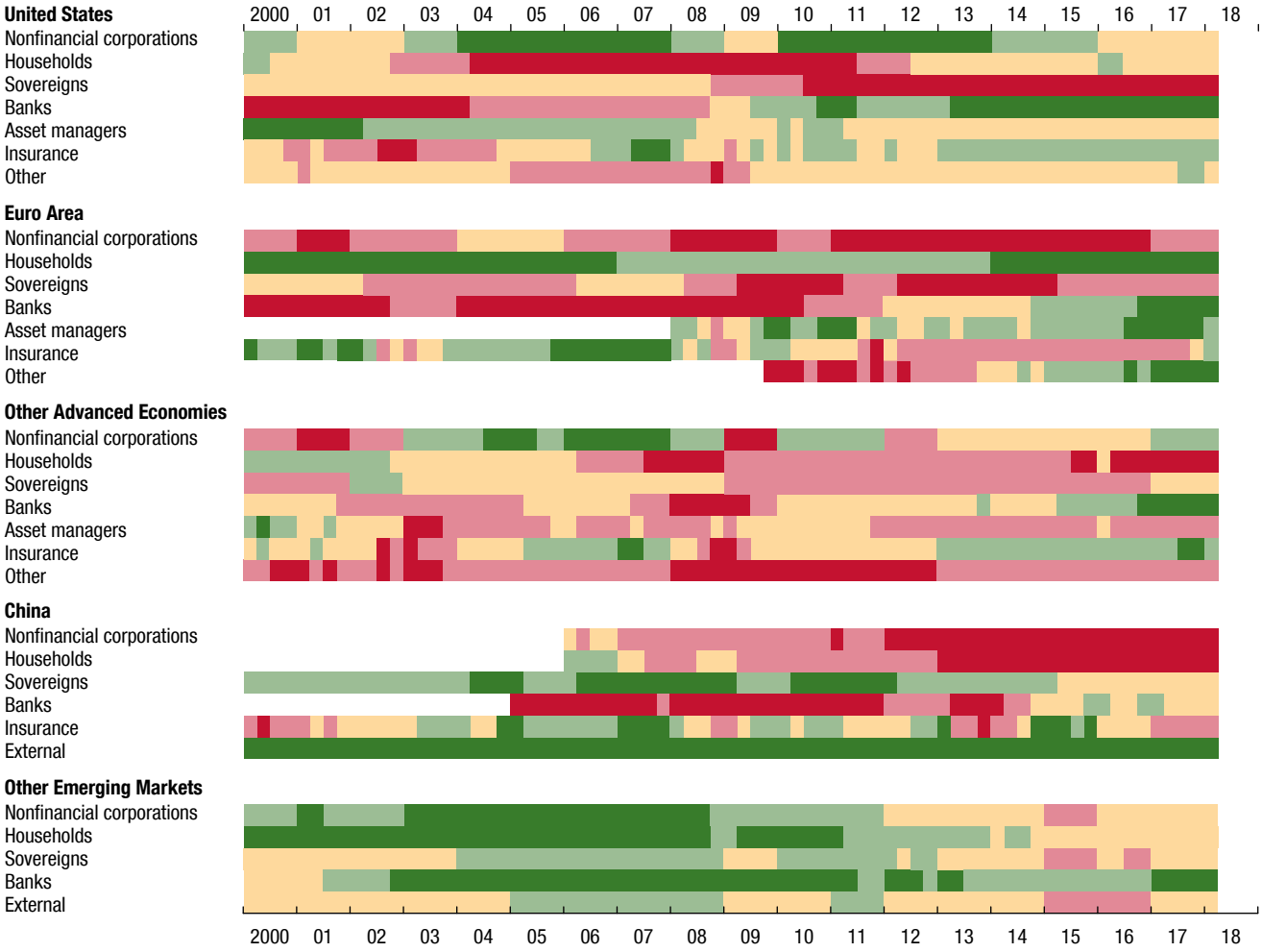
... where weak underwriting standards have led to rising nonperforming loans.

6. Banks' Gross Nonperforming Loans by Region
(Percent)



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, Global Debt Database (2018) preliminary esimates; S&P Leveraged Commentary and Data; and IMF staff calculations.
Note: In panels 1, 2, 5, and 6, aggregates refer to 29 jurisdictions with systemically important financial sectors. Leverage multiple is defined as the ratio of total debt-to-earnings before interest, taxes, depreciation, and amortization after the issuance of the loan. AE = advanced economy; EM = emerging market.

Figure 1.7. Balance-Sheet Leverage Metrics by Sector and Region

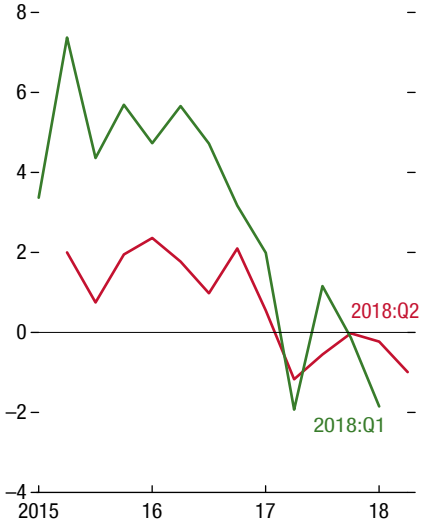


Sources: Bank of Japan; Bloomberg Finance L.P.; China Insurance Regulatory Commission; European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators; S&P Capital Market Intelligence; University of Singapore Risk Institute; and IMF staff calculations.
Note: Red shading indicates a value in the top 20 percent of pooled samples of advanced or emerging market economies for nonfinancial corporations, households, and the external sector, and of all countries for the remaining sectors shown in the figure from 2000 through 2018 (or longest sample available). Dark green shading indicates values in the bottom 20 percent. Other systemically important advanced economies include Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom. Other systemically important emerging economies include Brazil, India, Mexico, Poland, Russia, and Turkey. Leverage is measured as the ratio of net debt to earnings before interest, taxes, depreciation, and amortization (EBITDA), EBITDA to assets, interest coverage ratios, and corporate debt to GDP in the corporate sector; household debt-to-GDP and debt-service ratios (nonfinancial sector for emerging market economies) in the households sector; gross public debt to GDP in the sovereign sector; equity to assets and Tier 1 capital ratio in the banking sector; external debt to GDP in the external sector; assets to equity, credit to assets, portfolio fraction of bonds rated BBB or lower, and default probabilities within the next three years in the insurance sector; and assets to equity, credit to assets, incurred debt to assets, and loans to assets for asset management and other nonbank financial sectors. The category "other" includes broker-dealers, securitization companies, finance companies, funding companies, and holding companies depending on data availability (not all sectors are available for all countries). Indicators are aggregated within regions using GDP-weighted averages and within sectors using equal-weighted averages. Within sectors, indicators for existing subsectors are aggregated using assets to GDP as weights.

Figure 1.8. China: Deleveraging and De-risking Progress

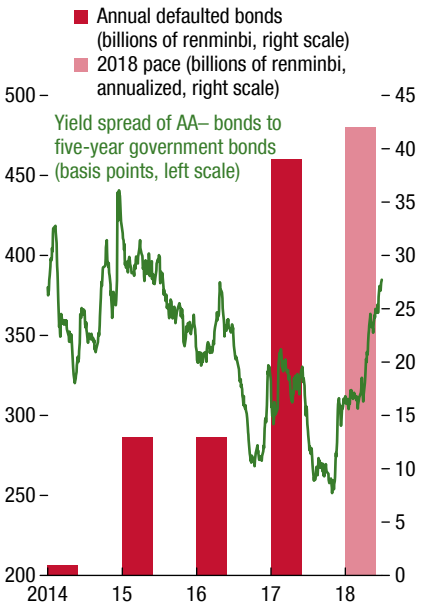
Regulatory tightening has slowed the buildup of risks in the financial sector ...

1. Investment Products and Small-to-Medium Bank Claims on Financial Institutions (Three-month change, trillions of renminbi)



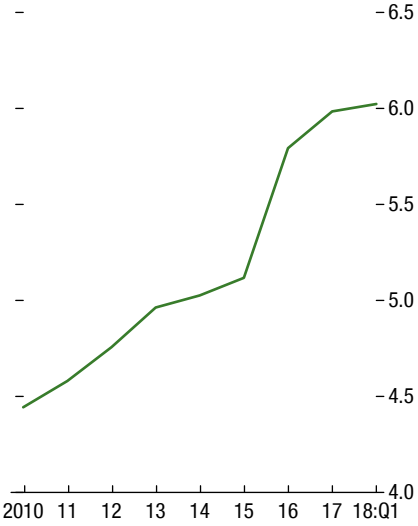
... and led to tighter credit conditions for weaker borrowers ...

2. Corporate Defaults and Corporate Bond Spreads (Billions of renminbi, basis points)



... but the deleveraging process is far from complete.

3. Leverage at Nonfinancial Traded Companies (Top 100 Chinese firms by assets)



Sources: Asset Management Association of China; Bloomberg Finance L.P.; CEIC; People's Bank of China; S&P Global Market Intelligence; and IMF staff calculations.
Note: In panel 3, leverage is measured as the ratio of liabilities to common equity.

for yield has led some banks to grow their overseas activities and to expand their foreign securities investments (see IMF 2017a).

- In *China*, nonfinancial corporate sector leverage has been rising and is currently well above global historical benchmarks (Figure 1.7). Despite low loan-to-value ratios, the rapid pace of growth of household debt, which is now at the high end for emerging markets, also raises concerns. The largest banks appear better capitalized, but vulnerabilities at small and medium-sized banks are high.[5] Strong demand for high-yielding investment products has led to rapid growth in complex investment vehicles, which the authorities tried to curb through new asset management rules. Overall, tighter financial regulation aimed at deleveraging and de-risking China's financial system has led to less favorable credit conditions for weaker borrowers (Figure 1.8). To cushion the impact of regulatory tightening on the economy, authorities have responded by easing monetary policy and softening the implementation of proposed new rules. Although these recent steps may help support economic growth in the near term in the face of rising external pressures, they may entail greater risks to financial stability over the medium term should they set back progress toward reducing financial vulnerabilities.
- In other major *emerging market economies*, credit quality remains a key concern. In the corporate sector, the share of debt at risk—debt owed by firms whose interest expenses exceed earnings—is higher in emerging markets than in other regions. Rising levels of nonperforming loans may weigh on bank capitalization going forward (Figure 1.6, panel 6).[6] Gross public debt has increased substantially in Brazil in recent years and remains elevated in India. Finally, among major

[5]For details, see "People's Republic of China: Financial System Stability Assessment" (IMF 2017c).

[6]Emerging market banks are, on average, above critical thresholds for their Tier 1 ratio and ratio of capital to assets, even though their Tier 1 ratio is lower compared with advanced economy banks. Banks in advanced economies have Tier 1 ratios well above critical thresholds, but capital-to-assets ratios are roughly in line with thresholds.

emerging market economies included in Figure 1.7, external debt buildup has been most prominent in Turkey, though external debt accumulation has also been worrisome for a broader universe of emerging and frontier markets (as discussed in the next section on "Fragilities in Emerging and Frontier Markets").

Asset Valuations Remain Stretched in Major Markets, and Could Adjust Abruptly

Asset valuations appear to be relatively high in some markets, notably in the United States. Although some asset price models suggest that global equity valuations in major markets are broadly consistent with economic and earnings prospects, these models are sensitive to the underlying assumptions related to corporate earnings, GDP growth, and inflation. A reappraisal of currently favorable conditions could lead to an increase in the compensation required by investors. With the same caveats, government bond valuations appear similarly consistent with economic fundamentals. Some cases of notable deviations of market prices from estimated fundamental values are discussed below:

- *U.S. equity market valuations appear to be stretched.* Standard valuation metrics, such as cyclically adjusted price-to-earnings ratios, show that equity valuations in the United States have continued to be elevated well beyond precrisis levels despite trade tensions (Figure 1.9, panel 1). Outside the United States, trade tensions have had a significant negative impact on equity markets, particularly in China and the rest of Asia. U.S. equity prices now appear modestly higher than their model-based values, based on alternative measures of S&P 500 earnings expectations as well as proxies for both the risk-free rate and the equity risk premium components of the discount factor (Figure 1.9, panel 2).[7]
- *Market-priced equity volatility appears to be too low relative to model-based forecasts* (Figure 1.9, panel 3). Future volatility implied by option prices across most major equity markets and over different time horizons is notably below levels consistent with model-based forecasts using realized swings in equity prices.
- *Term premiums remain at historically low levels, but they appear relatively close to fundamentals* (Figure 1.9, panel 4). Term premiums—the compensation investors demand for holding long-term government bonds in excess of risk-free short-term interest rates—in advanced economies remain very low by historical standards. However, they appear to be largely explained by fundamentals—investors' expectations for growth, inflation, the current stance of monetary policy, economic uncertainty, and the variability of returns on financial assets. Looking ahead, such models suggest that term premiums can adjust meaningfully to revisions in expectations and uncertainty around the future path of inflation, growth, and monetary policy.
- *High-yield corporate bond spreads remain close to historically low levels in absolute terms* as well as when scaled by leverage. In addition, bond spreads appear to be too low after accounting for expected default rates (Figure 1.9, panel 5). Spreads on leveraged loans have narrowed appreciably, and markets may be underpricing the deterioration in covenant quality, which is at the weakest level on record (Moody's 2018).
- *Housing market valuations are relatively high in several advanced economies.* Valuations based on the price-to-income and price-to-rent ratios, as well as mortgage costs, have been on the upswing over the past six years across major advanced economies, with valuations relatively high in Australia, Canada, and the Nordic countries (Figure 1.9, panel 6).

The New Financial Structure That Has Emerged since the Global Financial Crisis Is Untested

The postcrisis decade has witnessed notable structural changes in market liquidity. There are indications that liquidity may have become more segmented across different trading platforms, and more dependent on high-frequency trading firms, benchmark-driven institutional investors, as well as less price-sensitive market participants (such as central banks). Assessing liquidity is important because poor market conditions could amplify shocks and exacerbate asset price adjustments, potentially leading to financial instability.

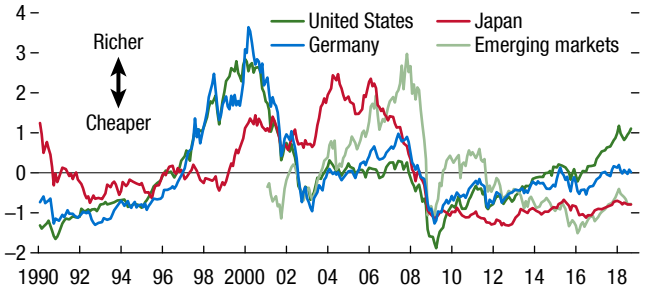
So far, there does not appear to be clear evidence of a meaningful deterioration of market liquidity in major capital markets, albeit extraordinarily accommodative monetary conditions of the past decade could be masking underlying frictions. Liquidity has evaporated briefly during a few specific events, but at least so far, such flash crashes have had minimal lasting impacts on asset prices, much less on real activity (see Box 1.4 for an analysis of such events in U.S. equity markets). Looking forward, liquidity conditions should continue to be closely monitored.

[7]For a similar approach to dividend-discount models of the S&P 500, see Durham (2013).

Figure 1.9. Asset Valuations

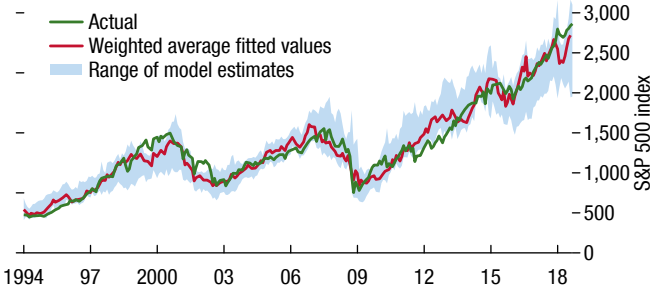
Equity valuations in the United States have continued to rise well above precrisis highs ...

1. Cyclically Adjusted Price-to-Earnings Ratio (*Z*-score)



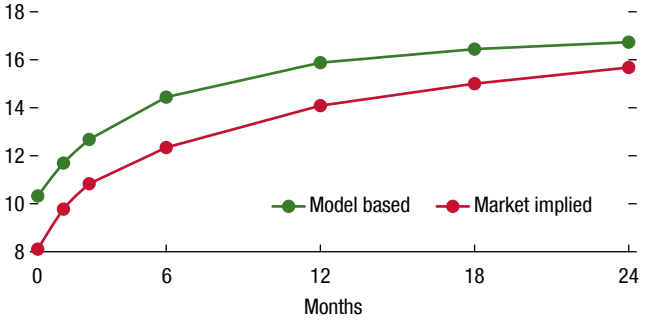
... and appear to be stretched relative to the underlying fundamentals.

2. U.S. Equity Prices versus Model-Based Fair Values



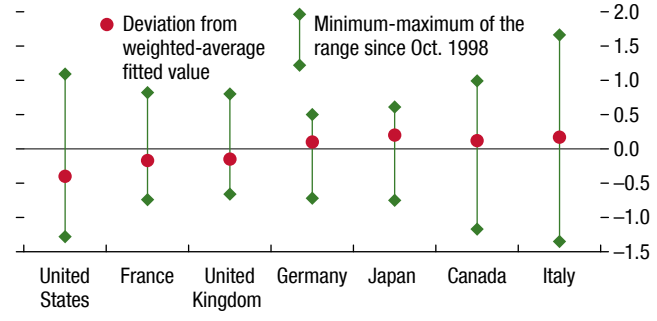
Market implied volatility is lower than that from model-based forecasts.

3. U.S. Equity Volatility: Market-Implied versus Model-Based Forecast (Over different time horizons, percent)



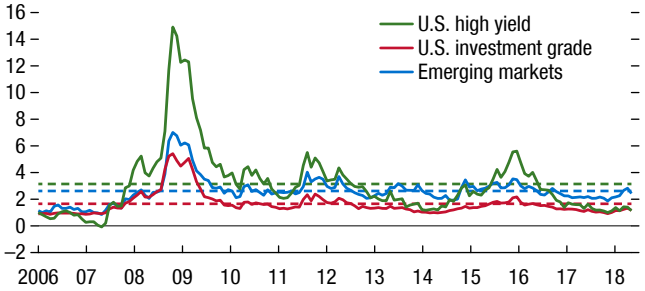
Term premiums are historically low but are mostly fairly priced based on fundamentals.

4. Deviation from Fitted 10-Year Term Premium (Percentage points)



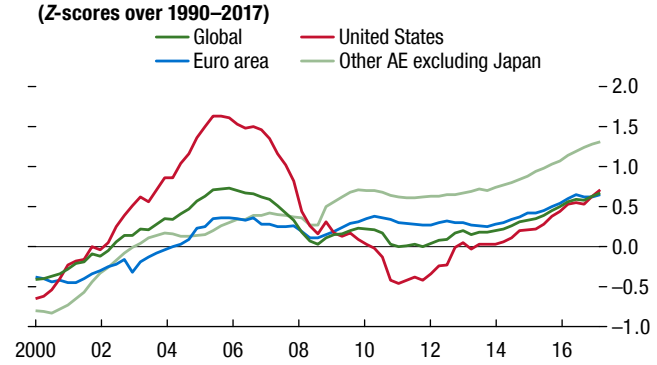
Corporate spreads remain very low, given creditworthiness of borrowers.

5. Residual Market Risk Premiums for U.S. and Emerging Market Dollar-Denominated Corporate Bonds (Difference between the corporate spread and the default risk component, percent)



Housing market valuations have surged in many advanced economies.

6. Housing Market Valuations (*Z*-scores over 1990–2017)



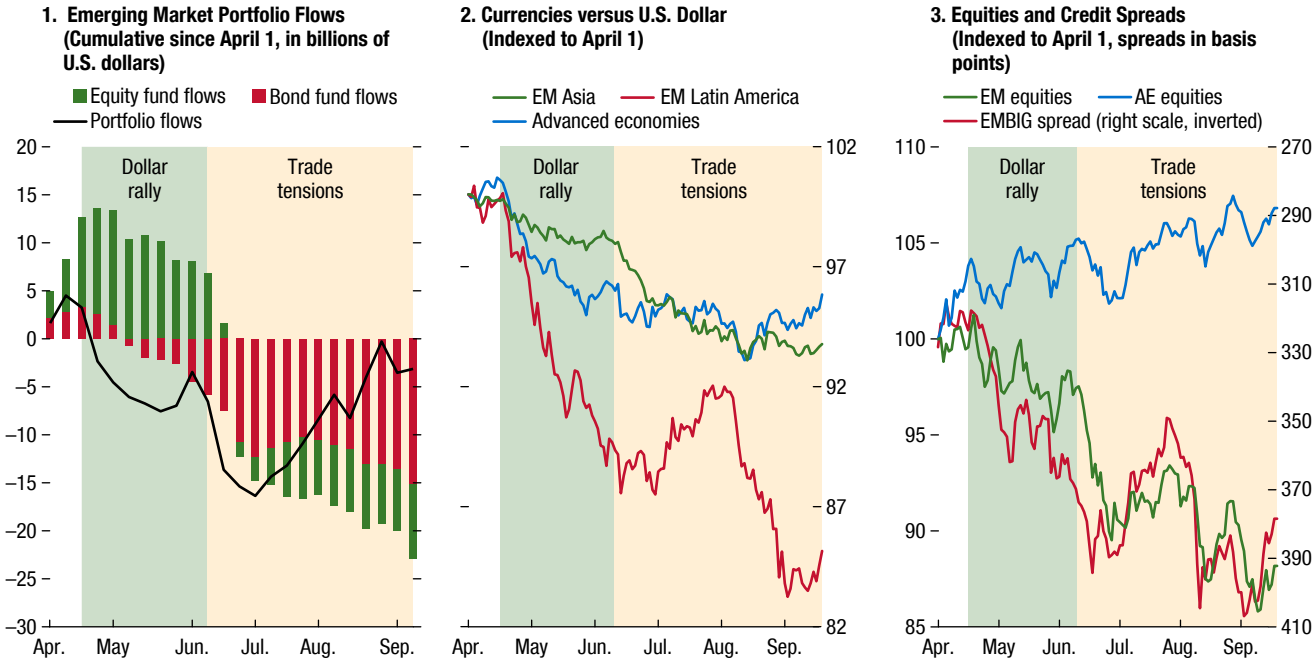
Sources: Bank of International Settlements; Bloomberg Finance L.P.; Consensus Economics; Datastream; Thomson Reuters I/B/E/S; ICE Bank of America Merrill Lynch; JP Morgan Chase & Co.; IMF, International Financial Statistics database; Standard & Poor's; and IMF staff calculations.
Note: In panel 2, the shaded bank refers to the range of estimates for a wide array of models. In panel 3, the model-based forecast is based on Glosten, Jagannathan, and Runkle (1993). Panel 4 shows spreads between 10-year term premium estimates based on the Adrian, Crump, and Moench (2013) model, and weighted-average fitted term premium based on fundamental variables. For details of the fitted model, see Box 1.2 of the April 2018 *Global Financial Stability Report* (GFSR). Panel 5 shows the estimated risk premium (see October 2017 GFSR) defined as the difference between the observed monthly bond spread and the estimated default risk compensation based on default probability by rating. Dashed lines are period averages. Panel 6 shows the average *z*-scores based on pooled data for house price-to-income ratio, house price-to-rent ratio, and inverse of mortgage rates. AE = advanced economy.

Figure 1.10. Emerging Markets: Portfolio Flows and Asset Market Performance

Portfolio outflows from EMs began in mid-April ...

... with the strengthening of the U.S. dollar ...

... but pressures shifted to equity markets as trade tensions flared up in June.



Sources: Bloomberg Finance L.P.; EPFR Global; Institute of International Finance (IIF); and IMF staff estimates.
Note: In panel 1, fund flows are net inflows into EM-dedicated investment funds, including mutual funds and ETFs, as reported by EPFR Global. Portfolio flows are net nonresident purchases of emerging market stocks and bonds, obtained from the IIF daily flows database. The main differences between these two datasets include (1) fund flows data are sample-based and mainly capture retail investors, (2) different country samples, and (3) limited coverage of hard currency flows in the IIF data. AE = advanced economy; EM = emerging market; EMBIG = JP Morgan's Emerging Market Bond Index Global; ETF = exchange-traded funds.

A less favorable macroeconomic environment, continued monetary policy normalization, and further financial stress in emerging markets may test new market structures.

Fragilities in Emerging and Frontier Markets

Financial conditions in emerging markets have tightened since mid-April, driven by a stronger dollar, rising idiosyncratic political and policy risks, and an escalation in trade tensions.[8] Market pressures have been more pronounced in countries with larger external imbalances and weaker policy frameworks, or in those more exposed to escalating trade tensions. Although overall vulnerabilities in emerging market economies remain moderate compared with historical levels, external leverage has continued to rise across most countries. Looking ahead, the external environment will likely remain challenging: with monetary policy normalization in advanced economies gaining pace, emerging and frontier markets will likely face reduced portfolio flows. In the event of a sharp deterioration in global risk sentiment, portfolio outflows could intensify.

Financial Conditions in Emerging Markets Have Tightened, Denting Their Growth Outlook

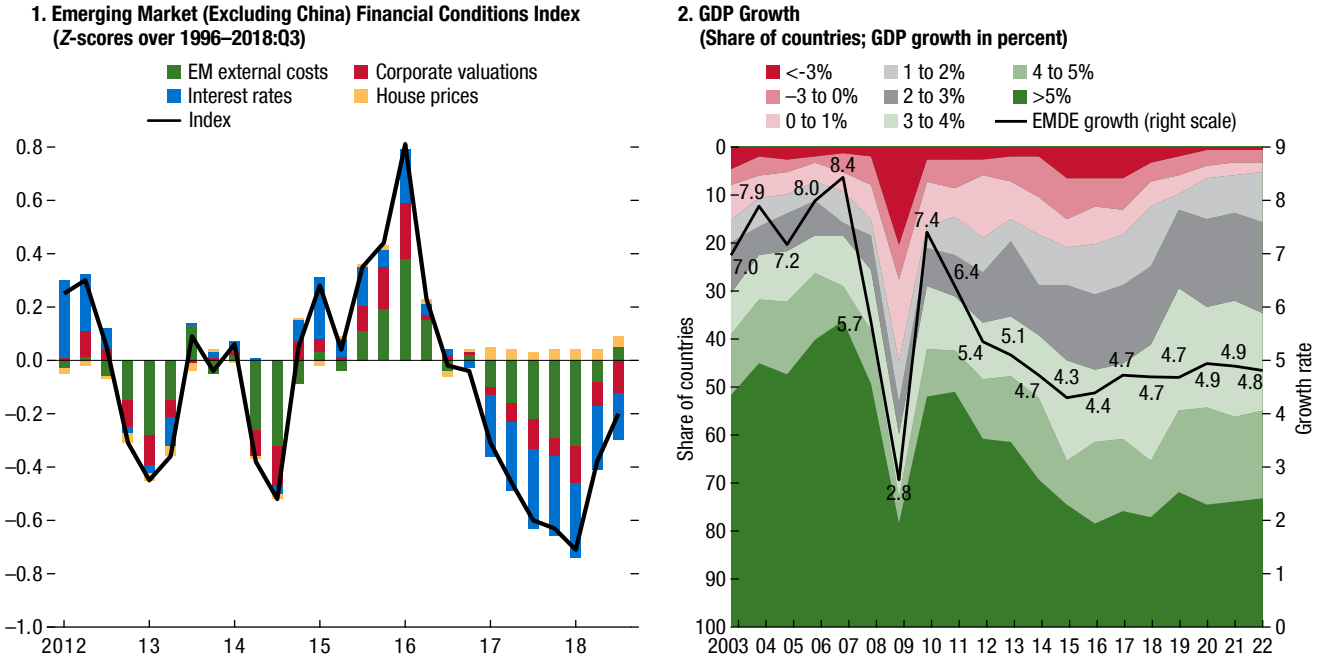
Emerging markets have come under pressure since mid-April. Initially, as the U.S. dollar rallied and U.S. long-term yields drifted higher, countries with large external vulnerabilities and weaknesses in policy frameworks (such as Argentina and Turkey) saw their currencies depreciate and external credit spreads widen more sharply than those of their peers. As trade tensions escalated in June, market pressures shifted to currencies of export-oriented economies, mostly in Asia, and emerging market equities, whose benchmark indices are more weighed toward Asia (Figure 1.10, panels 2 and 3). In August, selling pressures intensified in a few major

[8]This section focuses on emerging markets that are part of main debt benchmark indices, such as JPMorgan's EMBIG (Emerging Market Bond Index Global) index.

Figure 1.11. Emerging Market and Developing Economies: Financial Conditions and GDP Growth

External developments have led to a notable tightening in financial conditions ...

... but the growth outlook has been relatively resilient.



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, International Financial Statistics database; national statistical agencies; and IMF staff estimates.
Note: Panel 1 is based on a sample of countries including Argentina, Brazil, Chile, Colombia, Egypt, Hungary, India, Indonesia, Kazakhstan, Lebanon, Malaysia, Mexico, Nigeria, Peru, the Philippines, Poland, Russia, South Africa, Turkey, and Ukraine. Panel 2 is based on all emerging market and developing economies, as defined in the *World Economic Outlook* classification. EM = emerging market; EMDE = emerging market and developing economies.

emerging markets (Brazil, Turkey, South Africa) on increased political risks and policy uncertainty.

Nonresident capital flows to emerging markets have slowed in recent quarters. Portfolio flows reversed starting in mid-April, led by retail investors, after strong inflows in 2017 and early 2018. Since then, emerging market stock and bond funds have seen about $35 billion of outflows (Figure 1.10, panel 1), though outflow pressures eased in late July and August. Consistent with evolving market concerns, pressures were initially more pronounced in bond markets, with equity outflows accelerating in June primarily on fears of escalating trade tensions. Compared with past episodes of market stress, the recent outflows from investment funds so far have been more shallow.[9]

Facing external pressures, central banks in several emerging market economies responded with interest rate hikes and interventions in currency markets. Argentina and Turkey reacted by raising policy rates sharply, while countries already in a tightening cycle (including Indonesia, Mexico, and the Philippines) hiked rates by more than markets had expected. Foreign exchange interventions were carried out in the spot market (Argentina, Indonesia) and via derivatives (Argentina, Brazil, India, Turkey). In contrast, Chinese authorities maintained a more accommodative monetary policy by injecting liquidity via cuts in reserve requirements and by guiding short-term rates lower. However, as trade tensions increased, they also adjusted their policies to support the currency (see "Global Financial Stability Assessment" section).

While financial conditions in emerging markets remain broadly accommodative, on aggregate, the recent tightening has already had an impact on the growth outlook. The combination of a stronger dollar, higher credit spreads, weaker equity prices, and higher domestic interest rates has led to a tightening of financial conditions that is similar, on aggregate, to the taper tantrum

[9]Fund outflows during the taper tantrum episode in 2013 and the China devaluation episode in 2015 were closer to $60 billion from peak to trough.

episode in 2013 (Figure 1.11, panel 1). In contrast with other emerging markets, China's financial conditions have remained easy, following policy loosening (as discussed in the "Global Financial Stability Assessment" section). According to the October 2018 WEO, GDP growth in emerging market and developing economies is set to remain at 4.7 percent in 2018–19 (Figure 1.11, panel 2). However, the growth outlook has been revised down (about 0.3 percentage points in 2018 and roughly 0.4 percentage points in 2019) compared with the April 2018 WEO, reflecting a more subdued outlook for large economies in Latin America (Argentina, Brazil, Mexico) and a sharp slowdown in Turkey, given the ongoing market turmoil.

Investors Have Been Differentiating among Emerging Markets So Far

While global factors affected all countries, the overall spillovers across emerging markets have so far been relatively contained and idiosyncratic factors explained much of the outsized asset price moves. In credit markets, the widening of spreads on hard currency sovereign bonds has been more pronounced in lower-rated issuers (Figure 1.12, panel 1), suggesting that investors have continued to differentiate between borrowers based on economic fundamentals and other country-specific factors. Figure 1.12, panel 2 shows that the large depreciations in some emerging markets (such as Argentina and Turkey) can be largely explained by idiosyncratic factors.[10] In contrast, the currencies of some other countries benefited from positive country-specific political developments (Mexico, Colombia), which partly offset the depreciation pressures from global factors. Figure 1.12, panel 3 shows that although emerging market exchange rates have become, on average, more correlated since early July, the correlation between their idiosyncratic components remains very low. In addition, a few of the emerging market currencies have been significantly more volatile than others (Figure 1.12, panel 4). Spillover indices[11] in emerging currency and equity markets—which measure the extent to which asset returns in one emerging market are driven by shocks to other emerging markets—have picked up recently but remain below the highs seen in recent years (Figure 1.12, panels 5 and 6).

Low-Income and Frontier Market Borrowers Have Been Most Affected[12]

First-time and lower-rated international bond issuers have been hit hard during the recent sell-off. Following a record monthly pace of about $70 billion for all emerging market borrowers between January and April 2018, international bond issuance slowed, with summer issuance falling below $20 billion per month. The slowdown in issuance has been evident for low-income and other frontier market issuers (Figure 1.13, panel 1), with some having to delay their external issuance plans or turn to the international financial institutions for support. New issuers that had rapidly increased their stock of international bonds in recent years appear to have been penalized by markets during the recent sell-off, in part because foreign investors had built up overweight exposures to such issuers that had to be adjusted during the period of market stress.

Low-income and other frontier market borrowers would be most vulnerable at times when adverse external conditions coincide with spikes in their external refinancing needs. On the positive side, the amount of hard currency sovereign bonds maturing is set to rise only marginally in 2019 and remain small for many issuers until the end of 2021 (also see the October 2017 GFSR). For some frontier market sovereigns, however, a sudden tightening of global financial conditions could coincide with large external rollover needs (Figure 1.13, panel 2).[13]

[10]Exchange rate changes were fitted using a multivariable regression with systematic components driven by a carry factor and a dollar factor, and with the error terms representing idiosyncratic moves. This is based on the approach outlined in Verdelhan (2018). The carry factor measures performance of a basket of high-yielding currencies funded by short positions in low-yielding currencies. The idiosyncratic risk premiums are calculated for selected countries depending on data availability.

[11]Spillover indices are calculated using the approach in Diebold and Yilmaz (2009, 2012), in which time-varying spillovers are constructed using rolling generalized forecast error decompositions. The index is the contribution from a shock to market *X* to the overall variability in any other market *Y*. Figure 1.12 presents spillover indices for asset returns; results for asset volatility are similar.

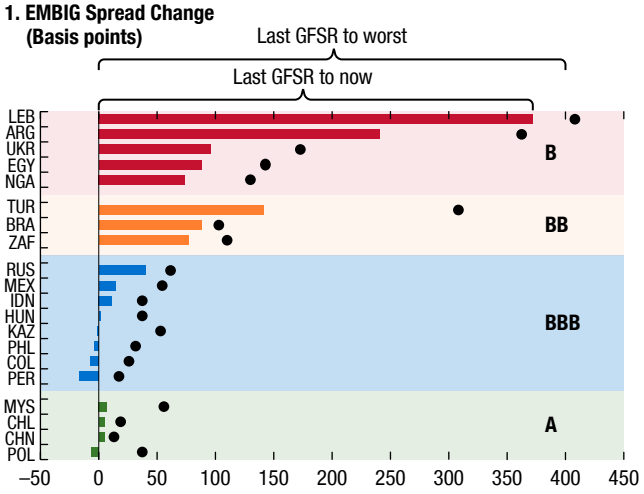
[12]The sample of frontier markets consists of countries included in the JP Morgan NEXGEM (Next Generation Emerging Markets) index.

[13]Frontier market borrowers with sizable hard-currency bond redemptions over the next five years compared with their reserve buffers include Ecuador, Pakistan, Sri Lanka, and Zambia.

Figure 1.12. Investor Differentiation among Emerging Markets

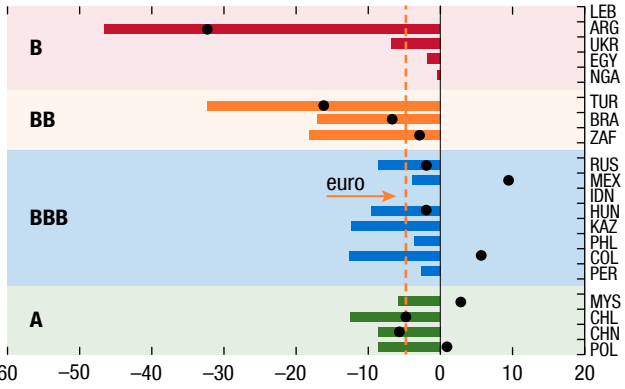
In credit markets, spreads of lower-rated borrowers have widened more than their peers.

1. EMBIG Spread Change
(Basis points)



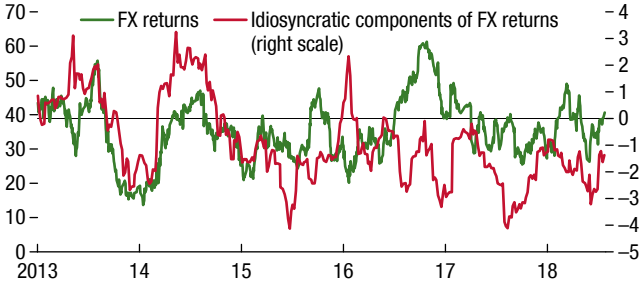
Idiosyncratic factors explain a large proportion of exchange rate changes in cases of large currency depreciations.

2. EM FX: Changes since April 2018 and Their Idiosyncratic Components
(Percent; black dots represent idiosyncratic components)



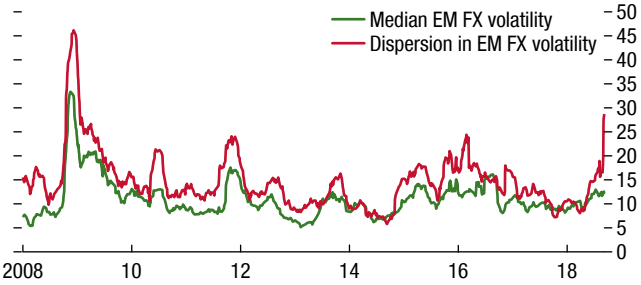
EM exchange rates have become more correlated since early July, but correlation between idiosyncratic components is low/negative.

3. EM Currencies: Correlation between FX Returns, and Idiosyncratic Components of FX Returns
(Median of pairwise correlations, percent)



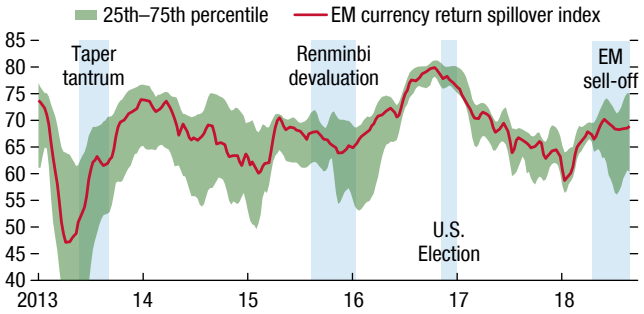
While median EM foreign exchange volatility has inched up recently, there is a significant dispersion across countries.

4. EM Currency Volatility (Median and Dispersion)
(Percentage points)



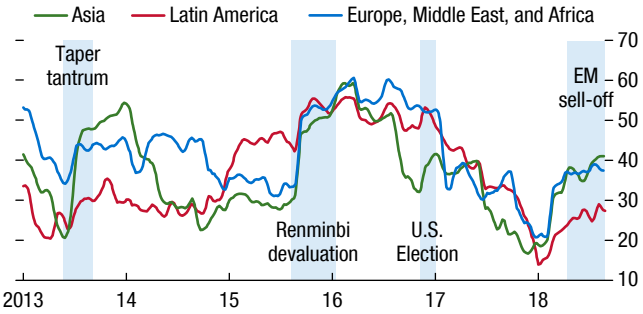
The directional spillover indices show a modest increase in the level of spillovers but a large variation.

5. Emerging Market Currency Return Spillover Index
(Percent)



Spillovers in equity markets have increased as well but have remained below levels seen in past sell-offs.

6. Emerging Market Regional Equity Return Spillovers Indices
(Percent)

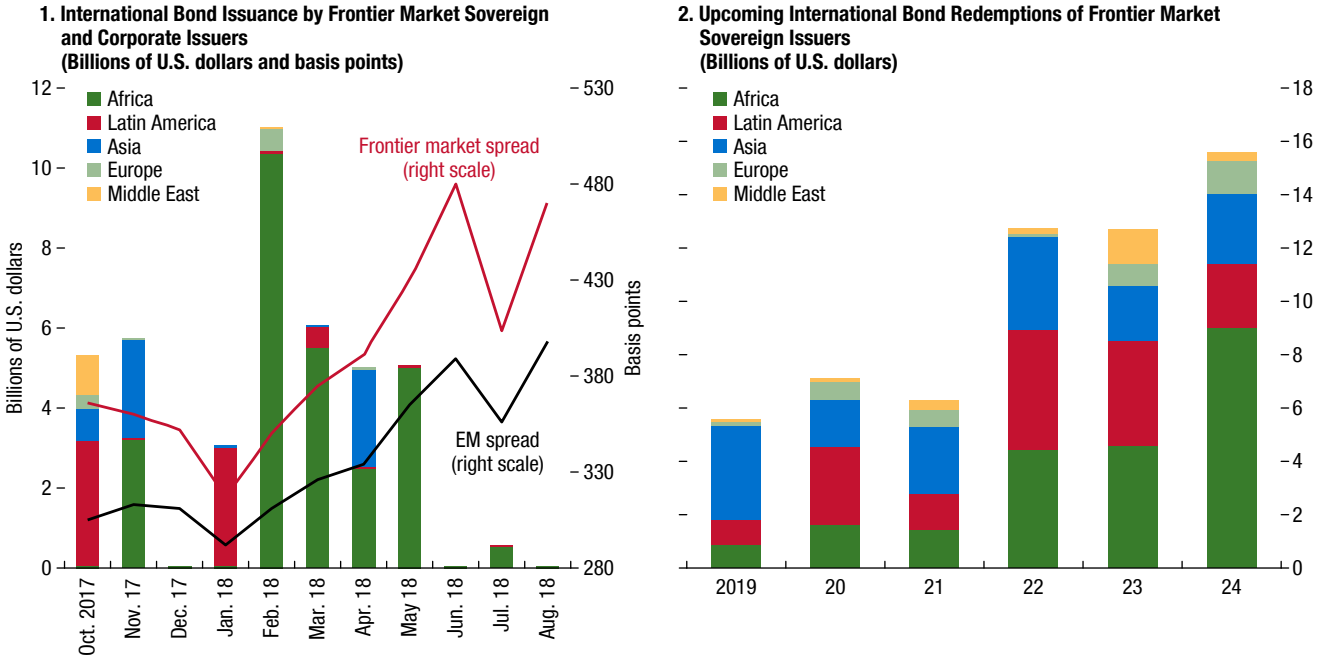


Sources: Bloomberg Finance L.P.; and IMF staff estimates.
Note: In panel 2, the idiosyncratic risk premiums are the unexplained residuals from the model, in which emerging market currency returns are regressed on two systematic factors (a carry factor and the U.S. dollar) (see footnote 10). Panel 4 plots 60-day realized volatility: dispersion is calculated as the difference between the 90th and 10th percentiles. In panels 5 and 6, the spillover indices are based on the methodology by Diebold and Yilmaz (2009), using emerging market equity returns (MSCI indices) and currency returns (local currency versus USD exchange rates), respectively (see footnote 11). Data labels in the figure use International Organization for Standardization (ISO) country codes. EM = emerging market; EMBIG = JPMorgan EMBIG Bond Index Global; FX = foreign exchange; MSCI = Morgan Stanley Capital International.

Figure 1.13. Frontier Markets: Bond Issuance and Redemptions

Frontier market debt issuance slowed down in 2018:Q3 after reaching record highs in early 2018.

Rollover needs will rise after 2021, with some countries facing more challenging redemption profiles.



Sources: Bloomberg Finance L.P.; Bond Radar; and IMF staff estimates.
Note: Frontier markets are all countries included in JPMorgan Next Generation Emerging Market Index. EM = emerging market.

The External Environment Will Likely Remain Challenging

Looking ahead, emerging markets will continue to face headwinds from the monetary policy normalization in advanced economies, as well as trade tensions and other political developments that might give rise to policy uncertainty and higher risk aversion (see Figure 1.14). These risks will weigh on capital flows and will exert greater pressures on economies with higher vulnerabilities and weaker buffers, as will be discussed below.

Emerging Markets Remain Vulnerable to Further Capital Flow Reversals

U.S. monetary policy normalization had been expected to weigh on portfolio flows to emerging markets, but actual outflows were greater than expected.[14] Retail outflows have been sizable and inflows from institutional investors have slowed considerably (Figure 1.15, panel 1). The outflow pressures observed in recent quarters were greater than anticipated in part because over the past year, market participants have substantially revised upward their expectations for the likely path of interest rates, pricing in about 90 basis points of additional interest rate hikes over the next two years. As a result, the drag from the Federal Reserve's interest rate hiking cycle is now estimated to have been more front-loaded than laid out in the baseline scenario in the October 2017 GFSR.[15] Given current market pricing for the path of interest rates relative to the WEO projections for the federal funds rate, there could be a further drag on portfolio flows

[14]In this section, portfolio flows refer to net nonresident purchases of emerging market stocks and bonds.

[15]The October 2017 GFSR baseline assumed that market pricing for the federal funds rate three years into the future would shift up by about 40 basis points over the first 12 months and another 45 basis points by the end of 2019. This assumption compares to a realized upward shift of about 90 basis points from October 2017 to August 2018. The new GFSR baseline assumes an additional upward shift in market expectations for the future federal funds rate of 50 basis points. Moreover, investor risk aversion (as measured by U.S. credit spreads) is assumed to remain unchanged going forward.

Figure 1.14. Emerging Markets: Key Risks and Vulnerabilities

Risks	Vulnerabilities	Buffers
Faster monetary policy normalization in advanced economies	• High leverage	• Sound policy frameworks
• Strong U.S. dollar	• Large external financing needs	• Foreign exchange reserves
• Rising interest rates	• Short-term foreign currency debt	• Fiscal buffers
Political risks	• Flighty investors	• Deep and liquid local markets
• Trade tensions	• Trade exposures	• Strong local investor base
• Policy uncertainty		
Contagion		

Source: IMF staff.

of about $10 billion by the end of 2019, in addition to a realized impact so far of an estimated $20 billion (Figure 1.15, panel 2).

Although the Federal Reserve's policy rate hiking cycle is already well under way, the pace of balance sheet contraction is still accelerating. This pace is to hit its maximum in the fourth quarter of 2018. Based on the estimates in Figure 1.15, the deterioration in external factors could lead to a $50 billion reduction of inflows in 2018, which will ease only modestly to an additional $40 billion in 2019. This drop in inflows will pose challenges to countries that rely heavily on external financing.

To complement the baseline scenario analysis of portfolio flows to emerging markets, this section also uses a new empirical approach to assess the tail risks to capital flows. The approach focuses on the predictive content of current financial conditions for portfolio debt flows, the dominant component of capital inflows in the postcrisis period (aside from foreign direct investment). A quantile regression framework is used to assess *capital flows at risk* over the near term (defined as the current and the next two quarters) and the medium term (defined as five to eight quarters into the future).[16] Three main factors have good predictive power for portfolio debt flows to emerging markets—risk appetite, U.S. market interest rates, and the U.S. dollar. Downside risks to capital flows (defined as the 5th percentile of the probability distribution) vary over time, reflecting fluctuations in these and other factors.

The current outlook for medium-term portfolio flows is relatively unfavorable. High downside risks to medium-term capital flows are driven by relatively elevated U.S. interest rates, a strong dollar, and favorable global risk appetite. Strong risk appetite tends to boost portfolio flows in the near term but foreshadows weaker inflows in the medium term. This explains why near-term risks to capital flows are estimated to be relatively limited, while medium-term risks are elevated. The analysis suggests that under a severely adverse scenario (namely the 5th percentile in the probability distribution), medium-term debt outflows could reach 0.6 percent of the combined GDP of emerging market economies (excluding China), on par with the outflows seen during the global financial crisis (also measured over a four-quarter period) (Figure 1.15, panel 3). This tail-risk scenario would likely have a severe impact on economic performance in emerging markets, especially for sovereign and corporate borrowers that are dependent on external financing. The estimated outflows under this scenario are much higher than, for example, in the fourth quarter of 2011, at the height of the European sovereign debt crisis, when U.S. interest rates were low and the dollar was weaker, but risk aversion was high (Figure 1.15, panel 4).

So far, the increased asset price volatility in emerging markets has not been accompanied by a spike in risk aversion in global markets. However, should there be a broad-based rise in risk aversion,[17] the near-term outlook for capital flows would deteriorate significantly, with a material risk of a sharp reversal of portfolio debt flows. Near-term capital flows at risk would drop from less than –0.1 percent of GDP to –0.7 percent of GDP (Figure 1.15, panel 5). Medium-term risks to capital flows would abate, but the magnitude of the

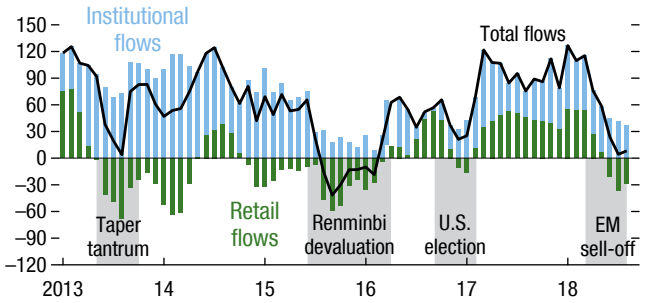
[16]See Online Annex 1.1 at www.imf.org/en/Publications/GFSR for more details.

[17]In this scenario, the spreads on U.S. corporate bonds rise by 100 basis points, while U.S. 10-year yields fall 30 basis points and the U.S. dollar appreciates by 5 percent on safe haven flows.

Figure 1.15. Emerging Market Vulnerabilities to Portfolio Flow Reversals

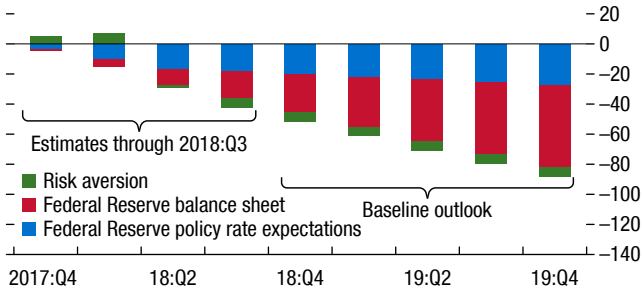
Portfolio flows to emerging market economies have been under pressure in recent months.

1. Emerging Market Portfolio Flows by Investor Type (Billions of U.S. dollars, three-month rolling sum)



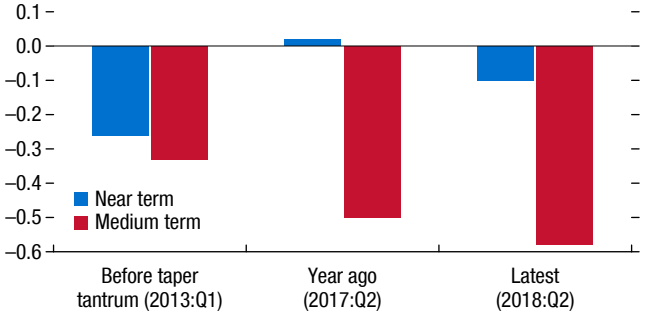
Portfolio flows are expected to remain subdued given the external backdrop.

2. Estimated Cumulative Impact of External Factors on Portfolio Flows to Emerging Markets (Billions of U.S. dollars)



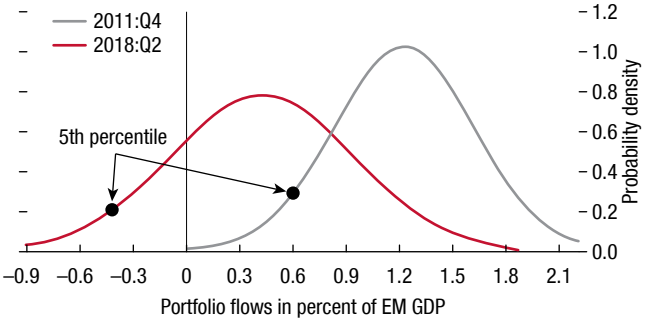
Downside risks to debt portfolio flows in the medium term have increased ...

3. Model Estimates for Debt Portfolio Flows under a Severely Adverse Scenario (Fifth percentile of probability distribution, percent of EM GDP)



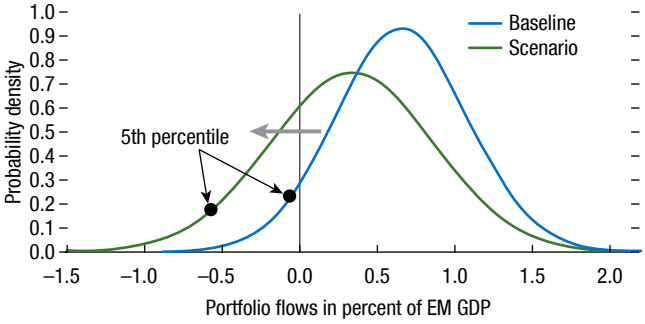
... suggesting that there would be large outflows under a severely adverse outcome.

4. Medium-Term Debt Portfolio Flows Forecast Densities (Debt portfolio inflows, percent of EM GDP)



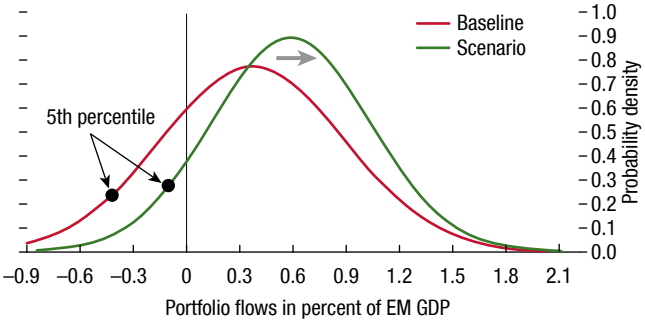
Under a scenario of a sharp rise in risk aversion, near-term risks to capital flows increase significantly ...

5. Risk-Aversion Scenario: Near-Term Debt Portfolio Flows Forecast Densities



... while medium-term risks to capital flows ease.

6. Risk-Aversion Scenario: Medium-Term Debt Portfolio Flows Forecast Densities



Sources: Bloomberg Finance L.P.; Haver Analytics; and IMF staff calculations.
Note: The sample of countries used in the capital flows-at-risk analysis comprises all emerging market and developing countries for which quarterly portfolio debt flows data are available (about 60 countries). China is excluded from this analysis because of its unique country characteristics, including its size relative to the rest of emerging markets. "Near-term" refers to the period from the current quarter to two quarters into the future; "medium-term" refers to the period five to eight quarters ahead. The fifth percentile estimates reported in the text and panel 3 are obtained from the empirical densities and may be somewhat different from the fitted densities shown in panels 4 to 6. For more details on the methodology, see Online Annex 1.1. EM = emerging market.

improvement would be more moderate compared with the adverse near-term impact (Figure 1.15, panel 6).

High Levels of External and Foreign Currency Debt Are a Source of Vulnerability

Emerging market external vulnerabilities appear moderate compared with the levels seen during the Asian crisis (1997–98) though external debt levels have increased since the global financial crisis. Figure 1.16, panel 1 shows the share of emerging market economies that failed critical threshold levels on various external vulnerability indicators, such as current account balances, total external debt relative to exports, private sector external debt, and foreign exchange reserve adequacy.[18] Looking at recent history, current account imbalances of emerging market economies have decreased since 2013, on aggregate, with China and oil exporters seeing their current account surpluses narrow, and other countries (such as Brazil, India, Indonesia, Mexico, and South Africa) shrinking their current account deficits (IMF 2018b). However, supportive global financial conditions have led to a sharp rise in external borrowing, with external debt increasing much faster than exports in many emerging markets. As a result, countries where external debt is too high relative to exports now account for roughly 40 percent of aggregate GDP of emerging markets (excluding China) (Figure 1.16, panel 1). A combination of high external debt and relatively weak reserve coverage levels would make a country particularly vulnerable to external shocks (see the shaded red area in Figure 1.16, panel 3).

The sovereign sector vulnerabilities have increased since the global financial crisis, especially in low-income countries. Figure 1.16, panel 2 shows the share of emerging markets that failed critical thresholds on a number of public sector vulnerability indicators, such as the overall level of public debt, external public debt, and foreign-currency-denominated public debt. In particular, it shows that the share of countries with high public debt in aggregate GDP of emerging markets (excluding China) has more than doubled since 2008. In addition, roughly one-third of countries exhibit a high share of foreign currency debt. On a positive side, countries that have both high public sector debt and a high share of foreign currency debt are relatively few, including Lebanon, Tunisia, and Ukraine (Figure 1.16, panel 4). In contrast, most large emerging market economies with high sovereign debt (Brazil, India) still maintain a low level of foreign currency debt. Among the low-income countries, the number of countries with debt-to-GDP ratios above critical levels has continued to rise. As of August 2018, over 45 percent of low-income countries were at high risk of, or already in, debt distress, as measured by the IMF's debt-sustainability ratings, compared with one-third in 2016 and one-quarter in 2013 (see the April 2018 GFSR).

The corporate sector leverage levels remain close to historical highs in many emerging market economies, despite moderating somewhat over the past year. Firm-level data across a sample of 14,000 nonfinancial firms suggest that high leverage has stretched debt-repayment capacity of firms in some economies—as indicated by average interest coverage ratios as well as the proportion of debt owed by firms with interest coverage ratios of less than 1—that is, debt at risk (see the April 2017 GFSR). While the median debt at risk has declined recently across regions, challenges persist in some countries in Latin America and in emerging Asia.

Strong Reserve Buffers Help Increase Resilience to External Shocks

Given the challenging external environment, having adequate buffers against potential foreign exchange liquidity drains becomes even more critical. According to the IMF's assessment of reserve adequacy (ARA) metric, countries with large stocks of external liabilities relative to their foreign exchange reserves include Argentina, South Africa, and Turkey (Figure 1.17, panel 1).[19] Looking at the composition of debt liabilities (Figure 1.17, panel 2), Turkey and Argentina stand out as having increased their shares of external foreign currency debt since 2013, further exposing them to foreign exchange mismatch and rollover risks. South Africa, by contrast, has maintained a large share of local currency liabilities. In addition, pressures on the balance of payments could come from reduced external demand, for example, because of trade tensions. In that regard, more vulnerable countries would include those that have large

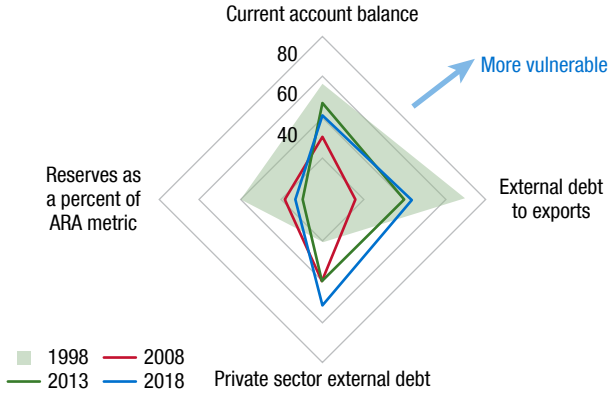
[18]The thresholds used as critical levels are chosen to minimize the combined percentages of missed crises and false alarms, in an empirical model over 1993–2013. For details on the methodology, see Ahuja, Wiseman, and Syed (2017).

[19]The assessment of reserve adequacy (ARA) metric reflects the reserve coverage taking into account potential foreign exchange liquidity needs in adverse circumstances. The relative risk weights for each component (export income, broad money, short-term debt, and other liabilities) are based on the 10th percentile of observed outflows from emerging markets during exchange market pressure episodes (see IMF 2015a).

Figure 1.16. Emerging Market Vulnerabilities

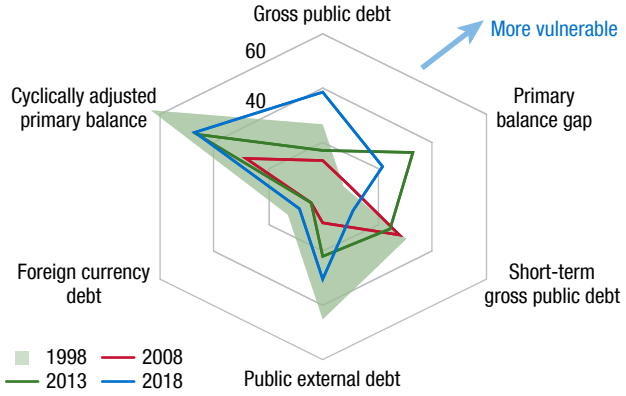
Current account imbalances have declined since 2013, but external leverage has increased.

1. External Sector Heatmap
(Share of countries failing the critical threshold for each metric as a percentage of EM GDP)



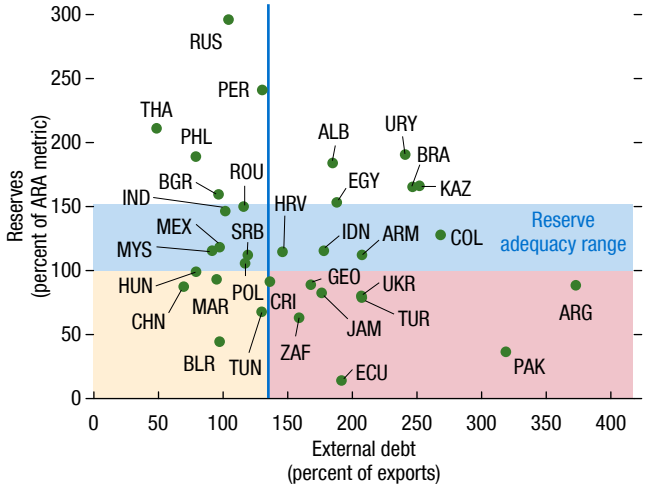
Public sector debt has increased in many emerging market economies in recent years.

2. Public Sector Heatmap
(Share of countries failing the critical threshold for each metric as a percentage of EM GDP)



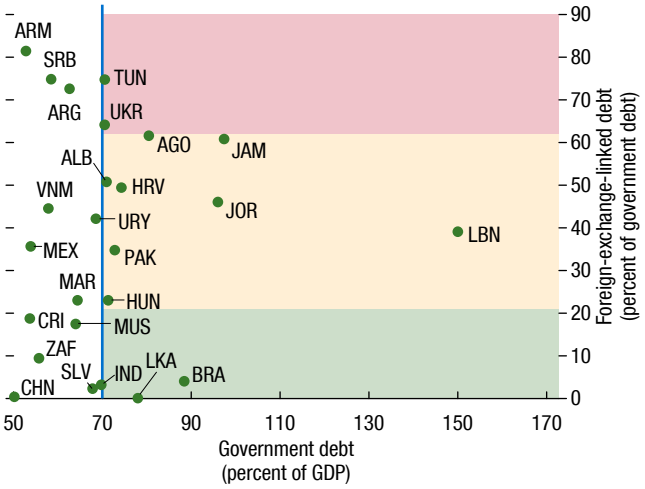
Several countries have both high external debt and low foreign exchange reserves ...

3. External Debt versus Foreign Exchange Reserve Coverage
(Percent; vertical line = median; 2018 estimated)



... but it is mostly frontier markets that have both high public debt and a high share of foreign currency debt.

4. Sovereign Debt versus Foreign Exchange Linked Debt
(Percent; lines = 25th and 75th percentiles; 2018 estimated)

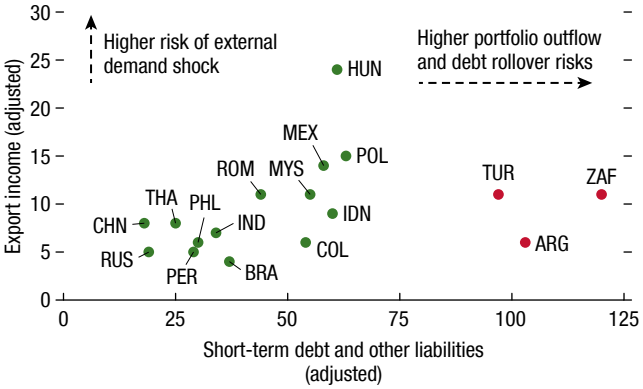


Sources: Haver Analytics; national central banks; and IMF staff estimates.
Note: In panels 1 and 2, vulnerability indicators and thresholds are chosen to minimize the combined percentages of missed crises and false alarms, based on an empirical model estimated over the period of 1993–2013 (see Ahuja, Wiseman, and Syed 2017). All indicators are scaled by GDP, unless specified otherwise. The sample includes 50 emerging market and developing economies. Both panels 1 and 2 show the combined GDP of those countries that failed the thresholds in percent of aggregate GDP of all sample countries, excluding China. For panel 2, data as of end-2017. The ARA metric (panels 1 and 3) reflects potential balance-of-payment foreign exchange (FX) liquidity needs in adverse circumstances and is used to assess adequacy of FX reserves against potential FX liquidity drains (see IMF 2015a). The metric used is not adjusted for capital control measures. In panel 3, the blue vertical line corresponds to the 50th percentile for the entire sample. In panel 4, the blue vertical line corresponds to the 75th percentile. Yellow shading corresponds to the values between the 25th and 75th percentiles. Data labels in the figure use International Organization for Standardization (ISO) country codes. ARA = assessment of reserve adequacy; EM = emerging market.

Figure 1.17. Reserve Buffers and Potential Foreign Exchange Liquidity Needs

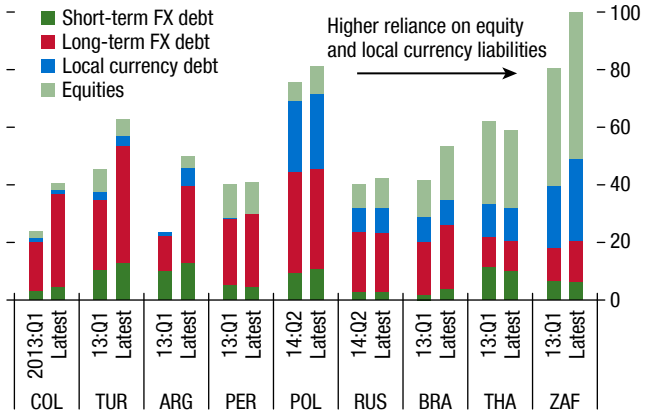
Large short-term debt liabilities to foreigners or a loss of export income could lead to substantial foreign exchange liquidity needs.

1. Potential Balance of Payment Drains
(Percent of gross foreign exchange reserves; countries in red have reserves below 100 percent of ARA metric)



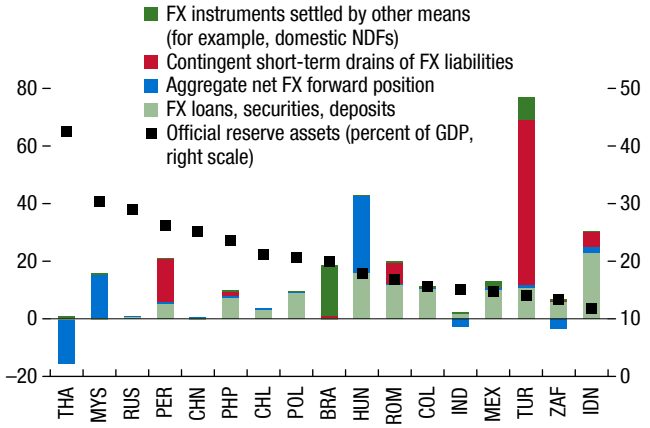
Countries with a high share of short-term foreign currency debt liabilities are most vulnerable to portfolio outflows.

2. Composition of External Liabilities
(Percent of GDP)



Derivatives-related liabilities not captured by reserve adequacy metrics could lead to a sudden increase in foreign exchange liquidity needs.

3. Reserves and Potential Foreign Exchange Drains Due to the Use of Derivatives
(Percent of gross foreign exchange reserves, latest 2018 figures)



Sources: Bloomberg Finance L.P.; Haver Analytics; and IMF staff estimates.
Note: In panel 1, the indicators are adjusted using the ARA weights. The numbers are as of end 2017. The ARA metric (panel 1) reflects potential balance-of-payment FX liquidity needs in adverse circumstances and is used to assess the adequacy of FX reserves against potential FX liquidity drains (see IMF 2015b). In panel 3, NDFs are nondeliverable forwards where counterparties settle the difference between contract rate and the prevailing rate without exchanging the notional value. Data labels in the figure use International Organization for Standardization (ISO) country codes. ARA = assessment of reserve adequacy; FX = foreign exchange.

export-to-GDP ratios or those that are tightly integrated into global supply chains (Figure 1.17, panel 1).

Further potential drains on foreign exchange reserves could stem from contingent liabilities of the central bank or its operations in the derivatives markets.[20] Foreign exchange reserves linked to derivatives transactions (such as reserves borrowed through a short-term foreign exchange swap) or to provisions that allow banks to meet their reserve requirements in foreign currency may not be available for balance of payments purposes during stress periods. Potential foreign exchange liquidity drains linked to derivatives exposures may pose risks, especially for countries with low reserve adequacy (Figure 1.17, panel 3).

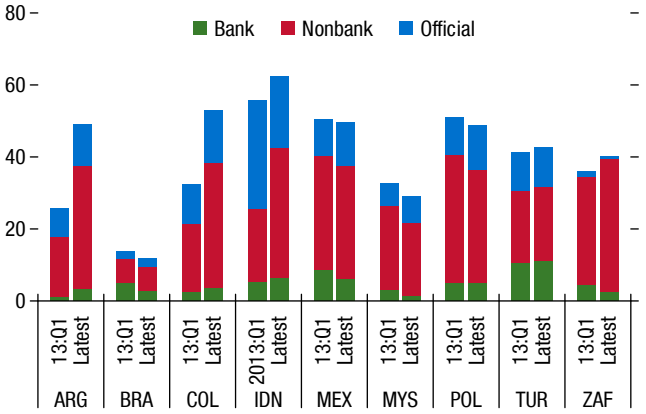
Over the past year, several countries (such as Argentina, Brazil, Mexico, and Turkey) have increased the use of derivatives settled in local currency to provide hedg-

[20]The IMF's data template on International Reserves and Foreign Currency Liquidity is useful in assessing these risks.

Figure 1.18. The Investor Base for Emerging Market Sovereign and Corporate Debt

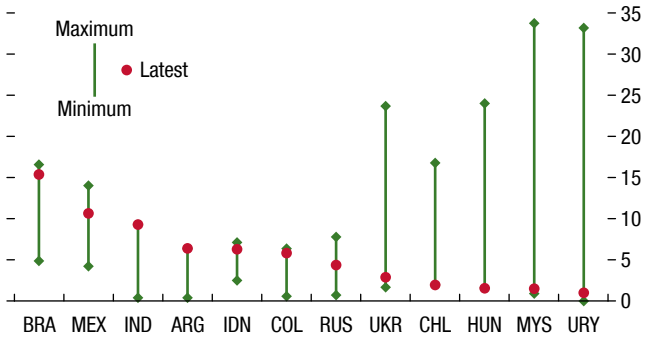
The share of nonbank foreign holders of sovereign debt has increased in many emerging markets since 2013.

1. Foreign Holders of Sovereign Debt, by Type (Percent of total)



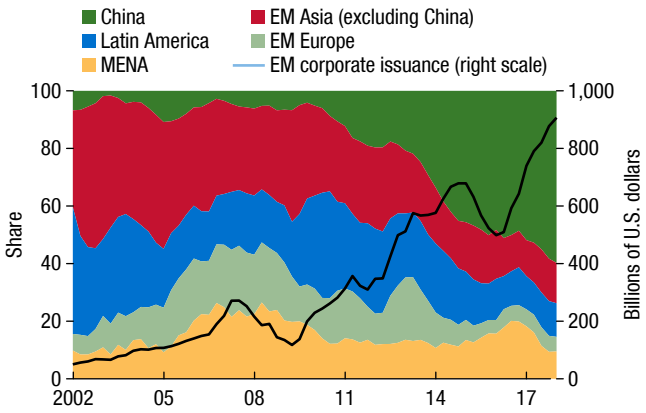
Among them, multisector bond funds hold concentrated positions in some emerging markets.

2. Multisector Bond Fund Exposure to Emerging Market Sovereign Debt (Percent of total foreign holdings, since 2010:Q1)



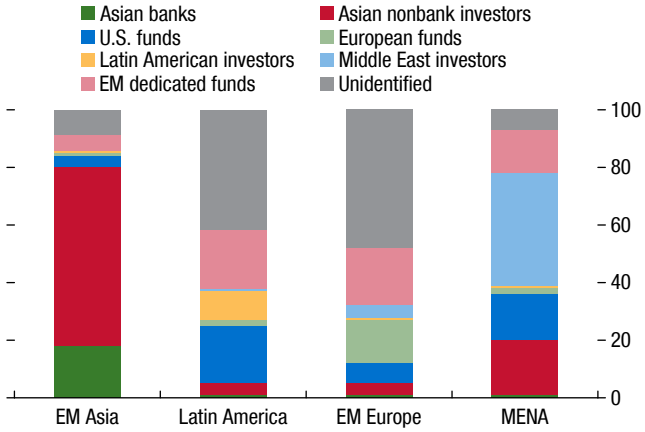
International corporate debt issuance in emerging markets has reached new highs, led by China and the rest of EM Asia ...

3. Total EM Corporate Issuance and Share of Issuance by Region (Four-quarter rolling in billions of U.S. dollars; share)



... where the investor base is dominated by regional investors.

4. Holders of Hard-Currency Corporate Debt, by Type (Percent)



Sources: Arslanalp and Tsuda (2014, update); Asian Development Bank; Bank for International Settlements; Bloomberg Finance L.P.; Bond Radar; JPMorgan Chase & Co; and IMF staff estimates.
Note: The data in panel 2 are calculated using Bloomberg's PORT function for a sample of 40 multisector bond funds. Data labels in this figure use International Organization for Standardization (ISO) country codes. EM = emerging market; MENA = Middle East and North Africa.

ing instruments against foreign exchange risk to market participants, thereby alleviating pressures on reserves. Although evidence so far suggests that the effectiveness of such operations can be comparable to spot market foreign exchange interventions (for example, see Nedeljkovic and Saborowski 2017), this is the case insofar as market participants remain confident that convertibility and fiscal solvency risks are low. Under a scenario of a sharp tightening of global financial conditions, this assumption may not hold, especially for countries with high overall external and sovereign vulnerabilities. In that case, selling pressures in the foreign exchange spot market may resume.

The Composition of the Investor Base Matters, Particularly in Periods of Market Stress

The share of foreign nonbank investors in sovereign debt markets has been rising in recent years, making emerging markets potentially more susceptible to a reversal of capital flows (Figure 1.18, panel 1).

However, different types of nonbank investors (such as pension funds, insurance companies, and mutual funds) have different risk appetites and investment mandates. As highlighted in the April 2018 GFSR, an increasing proportion of investors are now operating through mutual funds and exchange-traded funds (ETFs). Such funds, in particular, could increase the volatility of portfolio flows because of their greater sensitivity to global financial conditions. In contrast, large institutional investors tend to be more sticky, but can also react more strongly to large shocks than retail investors (as discussed in the April 2014 GFSR).

In addition, some opportunistic global funds have built up large positions in certain emerging markets, increasing the risk of dislocations if these fund managers suddenly shift their asset allocations. Among foreign holders with large concentrated positions, the assets of multisector bond funds have more than doubled since the global financial crisis to well over $1 trillion (more than 10 percent of the entire bond mutual fund sector globally). Their aggregate emerging market investment stands at more than $150 billion and, unlike most dedicated emerging market investors that track emerging market benchmark indices, these funds can have highly concentrated positions, which are currently at historical highs in a few countries (Figure 1.18, panel 2). Sudden shifts in asset allocations of the multisector bond funds may amplify asset price comovements across bond markets.[21] In addition, concentrated positions in certain segments of the local sovereign bond market can render parts of the domestic yield curve illiquid, which could potentially impair monetary policy transmission and exacerbate market pressures.[22] On the flip side, to the extent that large positions may be hard to unwind, such funds may turn out to be more sticky—albeit temporarily and not by choice—during periods of low liquidity.

In contrast with sovereign bond markets, investors in corporate bond markets tend to be mainly local or regional. Hard currency corporate bond markets have grown rapidly in recent years, with issuance dominated by Asian and, in particular, by Chinese firms (Figure 1.18, panel 3). The investor base in emerging Asia largely consists of either local or regional Asian accounts, whereas global and out-of-region investors play a larger role in Latin America, emerging Europe, and to a lesser extent in the Middle East and North Africa region (Figure 1.18, panel 4). In local currency corporate bond markets, which are larger than hard currency markets and are growing fast, especially in Asia (Figure 1.19, panel 1), investors remain predominantly domestic. Data from emerging Asian economies with large domestic corporate bond markets suggest a growing role of local institutional investors, including pension funds and insurers, relative to banks. A deep domestic or regional investor base provides stability, given that such investors often act as buyers of last resort. However, the buy-and-hold approach of these investors can also contribute to low market liquidity. Low liquidity can be a potential source of risk in times of stress because less-liquid domestic markets can amplify the price impact of capital outflows. Low liquidity could also lead to other negative externalities, such as amplification of shifts in financial conditions (see Box 1.5 for a discussion of these issues in the context of China's bond market).

Deeper and More Liquid Domestic Markets Could Be a Buffer against External Shocks

Empirical evidence indicates that the impact of global risk factors on emerging markets could be mitigated by the existence of large banking sectors, deeper capital markets, and broader domestic institutional investor bases (see the April 2014 GFSR). That said, there are also speed limits to the pace of deepening. Deepening too quickly can lead to economic and financial instability. Developing sound institutional and regulatory frameworks can help mitigate these challenges (IMF 2015c). In addition, an overreliance on holdings of sovereign debt by domestic banks may lead to increased risks in times of stress as bank solvency may become challenged.

The lack of deep local markets or local institutional investor base could compound market pressures in times of stress (Figure 1.19):

- Countries like South Africa and Malaysia have relatively large domestic investor bases and liquid currency markets (compared with the size of their local bond markets). These features make asset

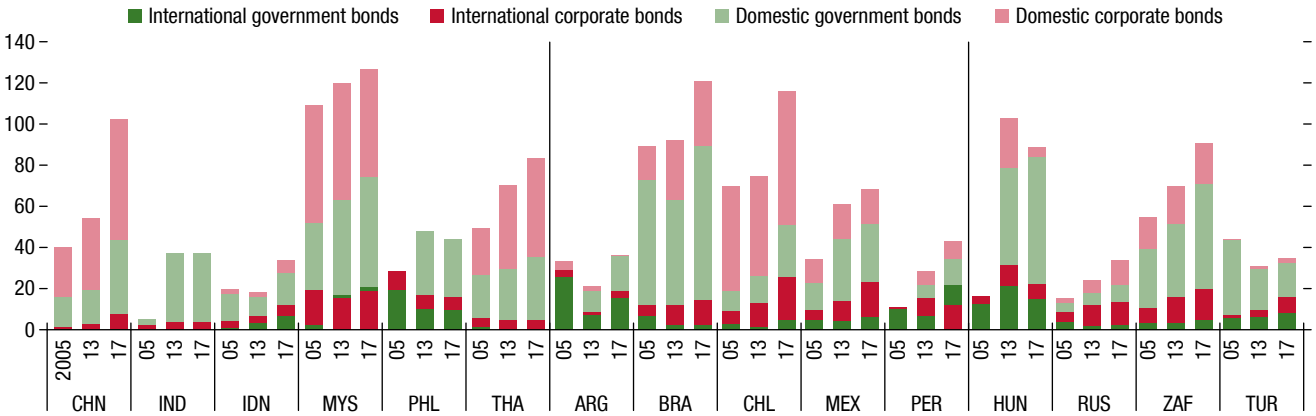
[21]This potential risk of contagion may be exacerbated by their active use of derivatives with embedded leverage. Over two-thirds of the investment in emerging markets of a sample of 40 large multisector bond funds is managed by funds that have derivatives leverage in the 90 percent to 850 percent range. Excess leverage in their derivatives positions could further amplify the impact of losses from emerging market investments and spill over to other fixed-income exposures when managers have to unwind investments to meet redemptions. See Chapter 1 of the April 2018 GFSR for further explanation of the risks associated with derivatives leverage.

[22]See Lu and Yakovlev (2018) for analysis of concentrated foreign holdings in selected countries in specific segments of the local currency yield curve.

Figure 1.19. Market Size and Domestic Investor Base

While bond markets in many emerging market economies have grown significantly ...

1. Size of International and Domestic Bond Markets (Percent of GDP)



... overall financial deepening varies across countries.

2. Foreign Investors, Domestic Investor Base, and Market-Liquidity Measures

	Foreign Investors		Domestic Investor Base				Market Liquidity/Depth			
	Debt	Equities	Mutual funds	Insurance	Pension funds	Banks assets	FX turnover *(Spot)*	FX turnover *(Forwards, Swaps, Options)*	Equity turnover	International debt trading volume
	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP	% Mkt Cap	% GDP
	2018:Q1	**2018:Q1**	**2017**	**2016**	**2016**	**2017**	**Apr. 2016**	**Apr. 2016**	**2017**	**2018:Q1**
China	3	6	14	20	1	308	0.3	0.4	192	1
India	4	6	12	17	1	75	0.7	0.9	43	1
Indonesia	16	11	3	4	2	57	0.3	0.2	18	10
Malaysia	29	26	60	20	60	188	0.5	2.3	28	3
Philippines	8	17	2	8	4	101	0.4	0.4	12	12
Thailand	9	29	30	22	6	186	1.0	1.6	59	1
Argentina	22	4	5	5	…	34	0.2	0.0	7	30
Brazil	11	18	60	13	13	191	0.4	0.7	70	10
Chile	25	12	20	22	70	114	1.6	1.4	12	10
Colombia	25	3	…	7	22	70	0.7	0.6	11	18
Mexico	32	13	10	7	14	67	0.6	1.3	27	19
Peru	19	11	4	6	21	63	0.4	0.4	6	20
Hungary	29	13	12	8	4	99	0.6	2.1	32	14
Poland	25	10	8	10	8	94	0.4	1.5	34	12
Russia	5	11	0.2	2	4	90	1.5	2.0	23	7
South Africa	26	57	52	66	100	114	1.0	6.1	31	17
Turkey	15	6	2	5	2	105	0.8	1.8	172	14
Median	**19**	**11**	**11**	**8**	**7**	**99**	**0.6**	**1**	**28**	**12**

Sources: Bank for International Settlements; CEIC; EMTA; IMF, International Financial Statistics database, World Economic Outlook database; Investment Company Institute; national authorities; World Bank, Global Financial Development database; World Federation of Exchanges; and IMF staff calculations.
Note: Pension fund data include private and funded plans. Mutual fund data exclude closed-end funds and exchange-traded funds. For each indicator, the "best" and the "worst" quartile values are highlighted in green and red, respectively, across a snapshot of different countries, with the assumption that it is better to have deeper domestic investor base and market liquidity. In panel 2, FX turnover is quoted on a daily basis. Data labels in panel 1 use International Organization for Standardization (ISO) country codes. FX = foreign exchange; Mkt Cap = market capitalization.

prices in these markets generally less sensitive to global conditions. However, having a deep local financial market in the emerging market space could entail temporary spikes in capital flow volatility if investors use these markets as "proxies" for scaling back their overall emerging market exposures during periods of emerging market stress.

- In Asia, despite substantial progress in financial deepening since the early 2000s, foreign exchange liquidity remains low compared to the size of the economy or of the local debt market (including in China, India, and Indonesia), while in some cases the size of their domestic mutual, insurance, and pension funds is also among the lowest. In such cases, a significant foreign investor presence may result in higher volatility of capital flows and asset prices, including the exchange rate. As a counterbalancing factor, central banks typically aim to maintain a high level of reserves and tend to be more active in their foreign exchange interventions.
- The lack of market depth and limited size of local institutional investor base compared to the size of countries' bond and currency markets may compound market stress in vulnerable countries. For example, Argentina and Turkey have narrow domestic investor bases and Argentina has low foreign exchange liquidity, but unlike economies in Asia, they also have low reserve buffers, making it more challenging for them to absorb external shocks.

Banks—Stronger, but Not Yet Out of the Woods

Banks have strengthened their balance sheets since the global financial crisis: they now have higher levels of capital and more liquidity in aggregate. But weaknesses in the global banking system are still apparent. Increasing debt in the household and corporate sectors has left banks in some countries exposed to borrowers with high debt-service burdens. The combination of some highly indebted sovereigns and bank holdings of government bonds risks reigniting the sovereign bank nexus. In addition, some banks are exposed to opaque and illiquid assets, or are reliant on foreign currency funding.

Bank Balance Sheets Are Stronger, but Some Weak Links Remain

In the 10 years since the onset of the global financial crisis, a number of reforms have been implemented to strengthen the banking system. The new regulatory, supervisory, and market environment that has developed over the past decade has boosted capital buffers, as discussed in Chapter 2 (Figure 1.20, panel 1).

However, market measures point to some concerns about banks. In the euro area, China, Japan, and the United Kingdom, bank aggregate price-to-book ratios are less than one (Figure 1.20, panel 2). This means that the market value of equity is less than the amount of capital booked on bank balance sheets. If market valuations are used to calculate capital ratios—in place of the balance sheet value of capital used in the regulatory ratios—a number of banks would have a market-adjusted capitalization of less than 3 percent, the minimum level in the Basel III framework (Figure 1.20, panel 3).[23]

Another way to assess bank health is through simulations of bank capital ratios in periods of stress. Such an exercise (see Online Annex 1.1 for more details) estimates bank capital needs in stress scenarios through simulations of bank profits and losses. Figure 1.20, panel 4, shows the proportion of banks in the sample, by assets, that have a 20 percent or higher probability of a capital need in the simulations (dark shaded areas in panel 4 of Figure 1.20).[24] Although the latest simulated capital needs are now far lower than before and during the crisis, the results suggest that some bank balance sheets could be strengthened further. Overall, institutions representing 7 percent of sample bank assets have a simulated stress capital need in 2018; most of these institutions are in the euro area.[25]

Banks Face a Series of Different Vulnerabilities

Banking systems in some countries are exposed to a highly indebted nonfinancial private sector. As

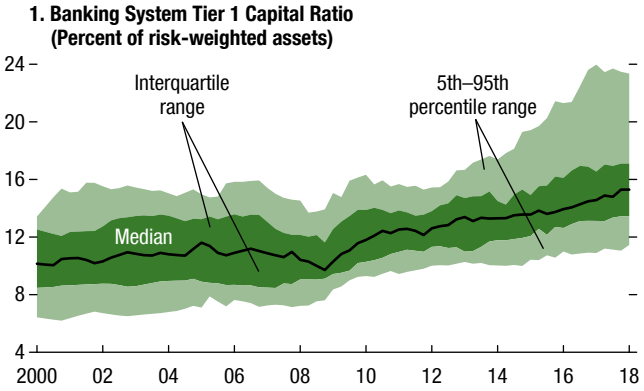
[23]Bank market valuations can be affected by differences in business models and expectations of bank profitability, as discussed in previous GFSRs. A low price-to-book ratio is also likely to make it more difficult for banks to raise capital in markets if they needed to do so.

[24]Capital needs are assessed against a common equity Tier 1 ratio of 4.5 percent (plus the capital surcharge for the global systemically important banks in the sample) and a leverage ratio of 3 percent. These thresholds are used over time so that the results are comparable, although these were not the standards in place in the precrisis and crisis years.

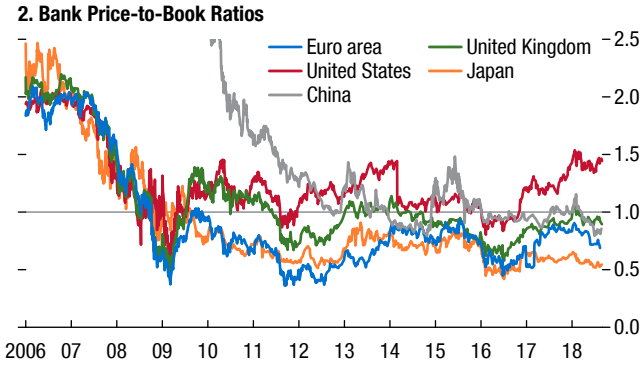
[25]The results for the euro area are broadly consistent with the latest Financial Stability Assessment (IMF 2018a), which found that the capital buffers are, in aggregate, sizable relative to immediate threats, but some banks are especially vulnerable to credit risk and others to market risks, including a substantial rise in risk premiums.

Figure 1.20. Banking Sector Resilience

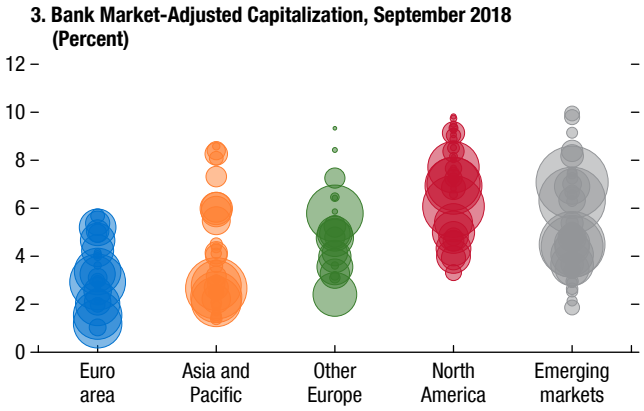
Banks have more capital relative to the precrisis period ...



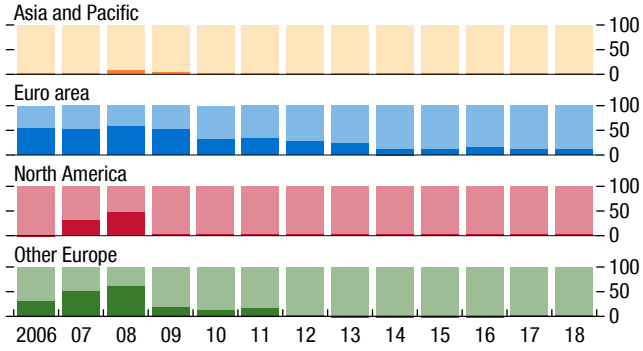
... but equity market valuations are mixed.



Some banks have a low market value of equity.



Simulations find there are still some weak banks.



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators; Organisation for Economic Co-Operation and Development Banking Statistics database; S&P Global Market Intelligence; and IMF staff estimates.
Note: Panel 1 shows ratios for banking systems in 29 systemically important countries. In panel 3, market-adjusted capitalization = (min {price-to-book ratio, 1} × tangible common equity)/adjusted tangible assets. U.S. bank assets are adjusted for derivatives netting. The size of the circles is proportional to adjusted tangible assets. The dark shaded areas in panel 4 show the simulated fraction of banks in a sample of about 600 advanced economy banks with a 20 percent or higher probability of a capital shortfall measured against a common equity Tier 1 ratio threshold of 4.5 percent and a leverage ratio threshold of 3 percent. See the Online Annex 1.1 for details. Asia and Pacific = Australia, Hong Kong SAR, Japan, Korea, New Zealand, and Singapore; North America = Canada and the United States; Other Europe = Denmark, Norway, Sweden, Switzerland, and the United Kingdom; Emerging markets = Brazil, China, India, Mexico, Poland, Russia, South Africa, and Turkey.

discussed in the October 2017 GFSR, debt-service ratios—nonfinancial private sector interest and debt repayments relative to income—are already higher than their long-term average in a number of economies (particularly in Belgium, Canada, China, France, Hong Kong SAR, Russia, and Turkey, where the current debt-service ratio is more than 1 percentage point above each country's long-term average).[26] The credit provided by banks in these countries amounts to more than $30 trillion, or about half of total borrowing from banks by the nonfinancial private sector of major economies (Figure 1.21, panel 1).

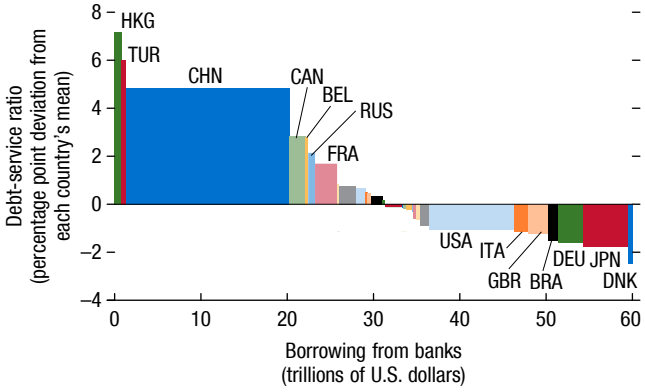
Borrowers with stretched debt-service ratios are likely to have greater difficulty paying their debts if interest rates rise or if incomes fall. This difficulty could foster a further rise in nonperforming loans, in addition to the increases discussed in the "Global Financial Stability Assessment" section (Figure 1.21, panel 2). Moreover, some companies have borrowed

[26]Some authorities have taken action in response to these risks. For example, in China steps have been taken to reduce credit growth (see the April 2018 GFSR), and the French authorities have implemented macroprudential measures to limit large exposures to indebted corporations (also see IMF 2018c for a discussion of corporate risks in France).

Figure 1.21. Banking System Exposures to the Nonfinancial Sector

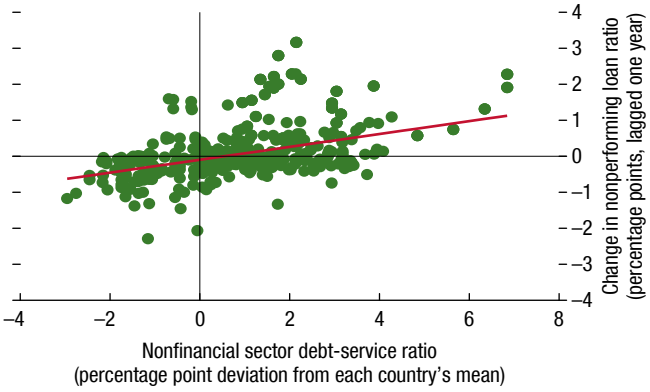
Banks are exposed to countries with high debt-service ratios.

1. Private Nonfinancial Sector Debt-Service Ratios and Debt Levels, 2017:Q4



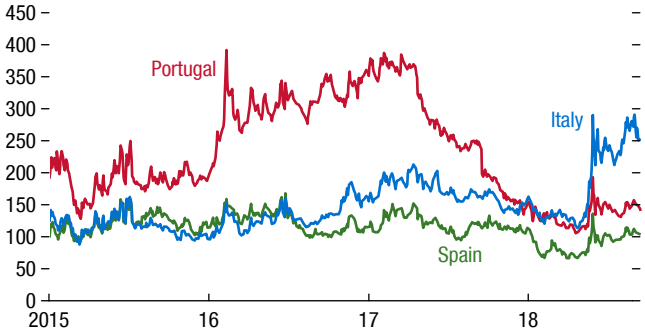
Asset quality could deteriorate as a result.

2. Private Nonfinancial Sector Debt-Service Ratios and Nonperforming Loans, 2006:Q1–2017:Q4



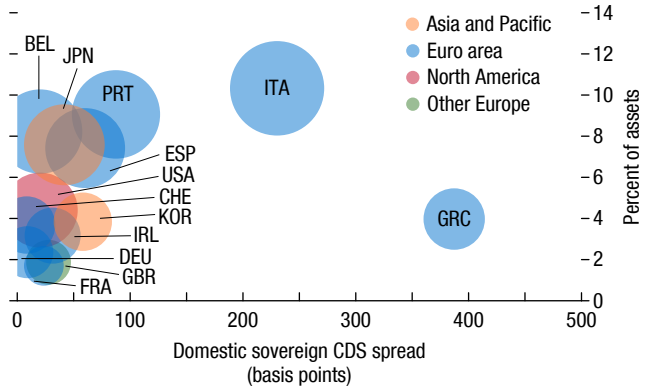
Sovereign risk has risen in Italy ...

3. Ten-Year Sovereign Spreads to German Government Bonds (Basis points)



... and could spill over to banks.

4. Banking System Exposure to Domestic Governments, 2018



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators; national central banks; and IMF staff calculations.
Note: Panel 2 presents historical data for a sample of 17 advanced economies. Panel 4 is based on the latest available data in 2018. The size of the circles is proportional to the banking systems' exposure to their domestic government (relative to assets). Data labels in the figure use International Organization for Standardization (ISO) country codes. CDS = credit default swap.

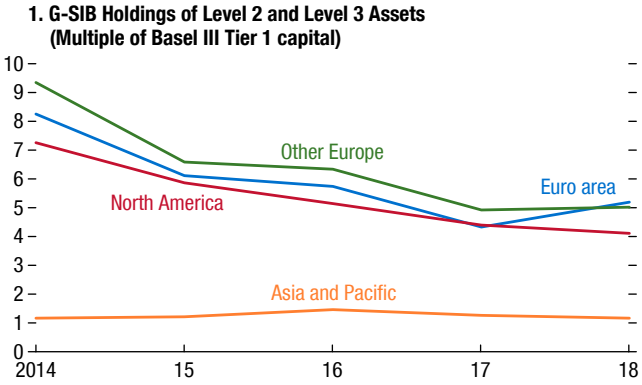
from banks in foreign currencies and may find it difficult to pay back those loans, especially when they are experiencing a sharp currency depreciation (as seen recently in Turkey). These risks are first and foremost likely to affect local banks, but they could also spill over to foreign banks that have lent to highly indebted companies and households in other countries. For example, the market has recently focused on the exposures of a number of European banks to Turkey.

Bank holdings of bonds issued by highly indebted domestic sovereigns are another potential vulnerability. The dangers of the sovereign-bank nexus were clearly demonstrated in the euro area crisis. Since then, changes to regulations have, on the one hand, increased incentives for banks to hold government bonds (which count as liquid assets under the Basel III liquidity coverage ratio), and, on the other hand, reduced incentives for banks to hold additional government bonds through the introduction of the leverage ratio. Moreover, several measures have sought to reduce the sovereign-bank nexus and the likelihood of government bail-outs.

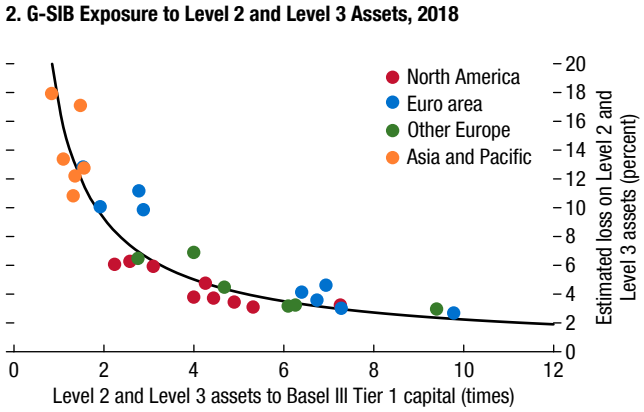
Recent events in Italy suggest that the sovereign-bank nexus remains an important risk transmission channel. Government bond spreads rose sharply in May, reflecting market concerns about sovereign risks (Figure 1.21, panel 3). This induced a rise in Ital-

Figure 1.22. Bank Exposures to Opaque and Illiquid Assets, Interconnectedness, and Funding

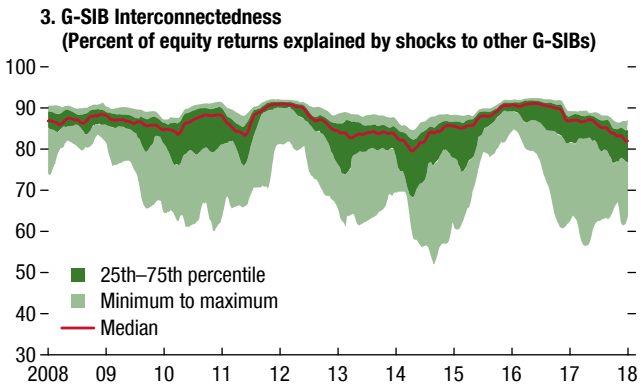
G-SIB holdings of Level 2 and Level 3 assets have fallen ...



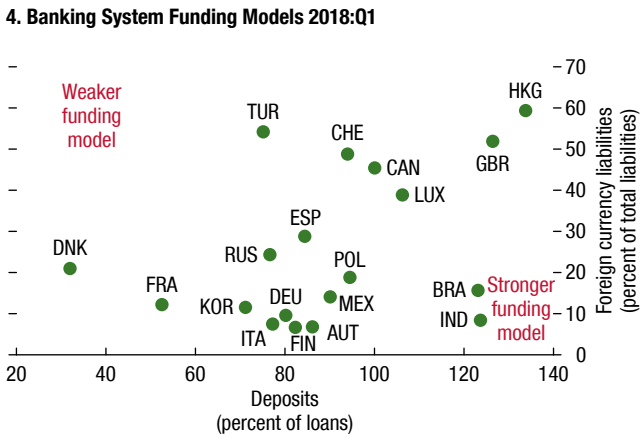
... but holdings are still large relative to capital at some G-SIBs.



Market prices suggest G-SIBs continue to be interconnected.



Bank funding models have improved but remain uneven.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; IMF, Financial Soundness Indicators; S&P Global Market Intelligence; and IMF staff calculations.
Note: The vertical axis in panel 2 shows the estimated loss on Level 2 and Level 3 assets that would result in a 1 percentage point reduction in each bank's leverage ratio. The panel is based on 2018:Q2 or, if not available, the latest available data. Panel 3 shows the range of outward spillovers from one G-SIB to another, captured by the percentage of variance in equity returns in one G-SIB that can be explained by the variation in equity returns in other G-SIBs, based on Diebold and Yilmaz (2009). Panel 4 uses data from the IMF Financial Soundness Indicators (FSI) database. Reporting countries compile these data using different methodologies, which may vary across time. The metadata accompanying the FSI database explains the definitions used. The panel is based on 2018:Q1 or, if not available, the latest available data and reflects the most recent revisions submitted by authorities to the IMF FSI database. Data labels in panel 4 use International Organization for Standardization (ISO) country codes. G-SIB = global systemically important bank.

ian bank credit default swap spreads. Should market concerns about fiscal policy reemerge, there is a risk of reigniting the sovereign-bank nexus given banks' holdings of Italian government bonds and their exposure to the domestic economy (Figure 1.21, panel 4). In such a scenario, market tensions could spread to other government bond markets in Europe, as happened in the euro area crisis and, to a limited extent, in May.

Some banks may also face vulnerabilities through their holdings of opaque and less liquid assets. Such assets are known as Level 2 assets (securities and derivatives that are valued using models with market prices as inputs) and Level 3 assets (securities and derivatives valued using models that are not based on observable market data). Global systemically important bank (G-SIB) holdings of these assets have fallen over the past few years (Figure 1.22, panel 1). But Level 2 and Level 3 assets still represent significant multiples of capital in many G-SIBs.[27] To illustrate the potential risk of these holdings, Figure 1.22, panel 2 estimates the size of the decline

[27]IMF (2018a) notes euro area authorities' recent work on Level 3 assets (as well as some Level 2 assets) and suggests that this work should be extended to all Level 2 instruments.

in value of the portfolio of Level 2 and Level 3 assets at individual G-SIBs that would reduce their leverage ratio (capital as a proportion of assets) by 100 basis points. In some cases, Level 2 and Level 3 assets would need to fall by an amount that would be highly unlikely, but for other G-SIBs with large holdings of Level 2 and Level 3 assets, this impact could result from a decline of less than 5 percent in the value of these portfolios.

Interconnectedness between banks raises a risk that problems in one institution could spill over to others. Equity market prices imply that there is a core set of G-SIBs that either have exposures to each other or are exposed to similar risks. Figure 1.22, panel 3 shows the outward spillovers in equity markets, based on Diebold and Yilmaz (2009). The figure shows the range of outward spillovers from one G-SIB to another, captured by the percentage of variance in equity returns in one G-SIB that can be explained by the variation in equity returns in other G-SIBs. The results suggest that markets still view most of the G-SIBs as being interconnected, although there are a few global banks, outside of a core group, that seem less interconnected than in the past (shown by the light green area in Figure 1.22, panel 3).

Bank liquidity buffers have improved in aggregate since the global financial crisis, but challenges remain. Chapter 2 finds that average liquidity buffers have grown and reliance on wholesale funding is trending downward, though some banking systems in major jurisdictions still rely significantly on wholesale funding.[28] Figure 1.22, panel 4 shows the variation in funding positions using two metrics, the loan-to-deposit ratio and the proportion of liabilities in foreign currencies. Banks that have large foreign currency and wholesale borrowing, as well as significant foreign currency mismatches, could find it difficult to roll over this financing if their local currency has depreciated significantly, as has been seen in some emerging market economies. Furthermore, in periods of stress, liquidity problems strike at individual entities within banking groups, so it is important to assess liquidity positions at the individual entity level, as discussed in the special feature on international banking groups. Indeed, the dollar balance sheets of internationally active banks headquartered outside the United States often have worse liquidity positions than would be suggested by their consolidated balance sheets (see the April 2018 GFSR). Institutions that rely on correspondent banking relationships to conduct their business have also been under pressure because these relationships have been cut back, as discussed in Box 1.6.

[28]Chapter 2 notes that reliance on wholesale funding was highlighted in the Financial Sector Assessment Program for France in 2012, Korea in 2014, and Japan and the Netherlands in 2017. IMF (2018a) finds that euro area banks are, for now, resilient to stressed liquidity conditions. Going forward, tighter financial conditions would unevenly affect banks' funding costs and access to liquidity.

Policies to Safeguard Financial Stability

The buildup of financial vulnerabilities raises the urgency for policymakers to step up efforts to boost the resilience of financial systems and ensure they have adequate policy tools for dealing with potential systemic risks and market pressures. Global policy coordination is critical to safeguarding global financial stability.

Policymakers Should Proactively Address Potential Systemic Risks

Given elevated financial vulnerabilities and increased downside risks to the global growth outlook, there is a greater urgency for policymakers to build buffers, strengthen resilience, and tackle long-standing problems (see "Global Financial Stability Assessment" section and the October 2018 WEO). Advanced economy central banks should continue to gradually withdraw monetary accommodation, where appropriate, and communicate intentions clearly. Countries with high public sector debt burdens should aim to improve debt sustainability and enhance fiscal buffers. Jurisdictions with high and rising nonfinancial sector leverage should mitigate attendant vulnerabilities through a combination of macroeconomic and prudential policies.

To further increase bank resilience, microprudential policies should aim to bolster bank balance sheets against solvency and liquidity risks:

- Regulators should continue to monitor bank lending to highly indebted private nonfinancial and sovereign borrowers, as well as exposures to opaque or illiquid assets, and take measures to reduce banks' excessive risk taking (see "Banks—Stronger, but Not Yet Out of the Woods" section).
- To lessen the risk of funding strains, regulators should develop currency-specific liquidity risk frameworks,[29]

[29]In the Basel framework, the liquidity coverage ratio (LCR) is required to be met in the single currency of use, but it is also suggested that to better capture potential currency mismatches, banks and supervisors should monitor the LCR in all significant currencies. A currency is considered "significant" if the aggregate liabilities denominated in that currency amount to 5 percent or more of the bank's total liabilities. In countries where monitoring has revealed

while central bank swap lines should be available to provide liquidity in periods of stress (see the April 2018 GFSR). Net stable funding ratios could be implemented in more countries.
- Asset quality problems should be addressed in a comprehensive way. In the euro area, efforts to tackle legacy nonperforming loans have borne some fruit, yet challenges remain (see "Banks—Stronger, but Not Yet Out of the Woods" section). In some emerging markets where nonperforming loans have risen, efforts should be made to strengthen banking systems, starting with comprehensive and credible asset quality reviews (see "Global Financial Stability Assessment" section).

Macroprudential tools should be deployed proactively to address systemic risks, in conjunction with macroeconomic policies. Given rising debt levels, loosening underwriting standards, and stretched housing market valuations in a number of countries, it is imperative for policymakers to deploy macroprudential policy tools in a timely and effective manner:
- Given that financial conditions are still accommodative but risks are rising, more active use of broad-based tools, including countercyclical capital buffers, has merit. These tools could help reduce exuberance and slow the pace of credit growth in the near term, and at the same time, increase bank resilience ahead of the eventual tightening of financial conditions.
- Rising foreign currency debt in emerging market economies calls for more active use of tools that mitigate foreign exchange mismatches. Usually such tools involve limiting borrowers' access to debt denominated in foreign currency through eligibility criteria or required regulatory approval, or, alternatively, limiting the exposure of lenders to nonfinancial sector foreign currency borrowers through additional risk weights. The adoption of currency-differentiated liquidity coverage ratios could provide additional foreign currency buffers to be used in the event of capital outflows.

Regulators should continue to improve the availability of data and to develop new tools with which to address emerging vulnerabilities outside the banking sector. Macroprudential frameworks have been established in many countries since the global financial crisis (see Chapter 2) and tend to be more developed in advanced economies than in emerging market economies—with more tools available for banks than for other entities (Figure 1.23). Efforts to close gaps in macroprudential toolkits should focus on areas in which vulnerabilities are high and rising:
- *Corporate sector vulnerabilities:* In most economies, excessive buildup of leverage in nonfinancial sectors is typically addressed indirectly through loan-to-value limits and similar restrictions on debt levels imposed on bank lenders.[30] Macroprudential tools affecting demand for credit intermediated through capital markets are rare.[31] In economies that are experiencing a rapid increase in corporate debt, authorities may also need to develop tools to limit credit intermediated through nonbank lenders. Emerging market economies need to develop a broader set of instruments to limit foreign currency risk exposures in the corporate sector, which could include foreign exchange reserve requirements, currency-specific risk weights, and hedging requirements.[32]
- *Household sector vulnerabilities:* With household leverage high and rising in many countries, authorities—especially those in jurisdictions experiencing lasting booms in house prices—should consider recalibrating and expanding the relevant policy tools. A periodic recalibration of tools limiting households' access to credit or lenders' exposures to households may be needed to effectively limit the continued buildup of household indebtedness.
- *Nonbank financial sector:* Regulators should aim to improve and harmonize prudential regimes. For

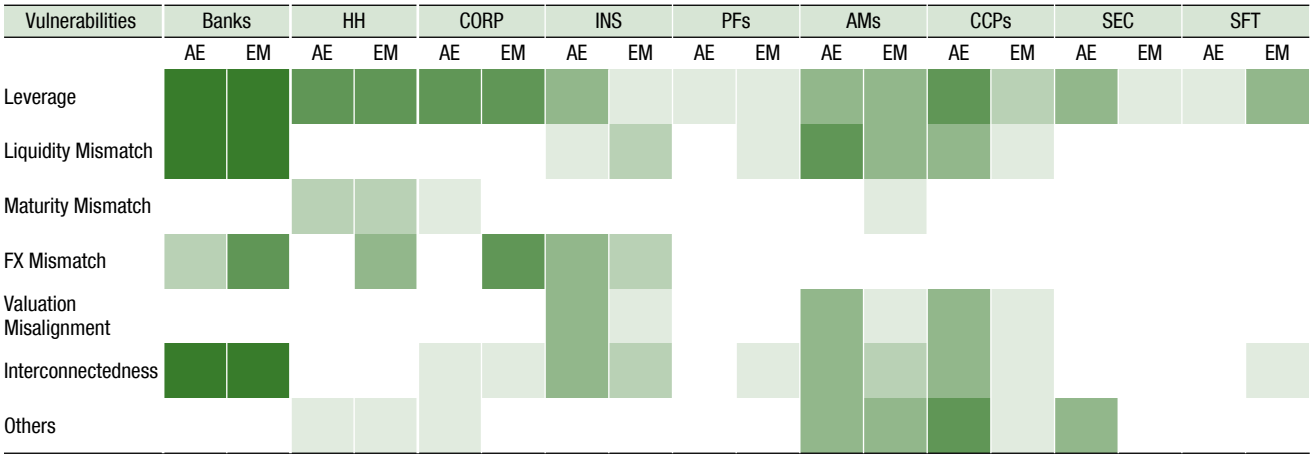
high and persistent mismatches in significant currencies, recent Financial Sector Assessment Programs (FSAPs) have recommended implementing currency-specific LCR requirements. For example, IMF FSAPs for Romania (IMF 2018e) and Mexico (IMF 2016b) proposed currency-differentiated LCRs and net stable funding ratios. Liquidity stress tests for significant foreign currencies and the holding of sufficient counterbalancing capacity in the form of high-quality liquid assets were recommended for Japan (IMF 2017a).

[30]For instance, in France, risks of spillovers from corporations' balance sheets to banks have recently been addressed by reducing the large exposure limit of systemic banks to large indebted corporations to 5 percent of capital.

[31]Notable exceptions include requirements for the hedging, liquidity, and credit ratings of corporations' external borrowing through international capital markets in Indonesia.

[32]Similar proposals, such as higher risk weights for foreign currency lending to nonfinancial corporations, are included, for example, in the recent Article IV Report on Turkey (IMF 2018f). The 2018 euro area FSAP and the 2017 Luxembourg FSAP recommended further developing borrower-based components of the macroprudential toolkit, for example, through sectoral risk weights, also to be levied on nonbank and nonfinancial lenders.

Figure 1.23. Availability of Macroprudential Tools for Addressing Key Vulnerabilities



Sources: IMF, 2017 Macroprudential Policy Survey; and IMF 2018d.
Note: Colors depict number of countries reporting at least one macroprudential tool: <20% 20–40% 40–60% 60–80% >80%
White shading means policy tools are unavailable or not reported. "Others" includes prudential tools such as risk management requirements, reporting duties, and, less frequently, fiscal measures. Many tools reported in the database are microprudential instruments to which macroprudential tools are attributed. The table covers the 29 economies with systemically important financial sectors. AE = advanced economies; AMs = asset managers; CCPs = central counterparties; CORP = nonfinancial corporate sector; EM = emerging market economies; FX = foreign exchange; HH = households; INS = insurance; PFs = pension funds; SEC = securitization; SFT = security financing transactions.

insurers, there is a need to establish a global capital standard and to strengthen resolution regimes, given the potential for systemic risk (see Chapter 2). There are relatively few macroprudential tools for asset managers.[33] Implementing comprehensive and globally consistent standards for asset managers would give regulators both the data and the tools to better identify and mitigate risks, particularly those related to liquidity mismatches and leverage.[34] In particular, there is scope for more rigorous limits on concentration risks. Chapter 2 provides more details on macroprudential tools to address risks in central counterparties, securitization markets, and global securities financing markets.

[33]In many jurisdictions, asset managers are subject to prudential limitations on redemptions, leverage, counterparty exposures, and portfolio concentration, as well as liquid asset ratios. In some jurisdictions regulators' mandates for securities markets and asset managers are limited to investor protection.

[34]The 2016 Ireland FSAP recommended the development of stress tests for money market funds, the analysis of leverage in investment funds, and the discouragement of constant net asset valuation in money market funds. Similarly, the 2017 Luxembourg FSAP recommended supervisory guidance on liquidity stress testing and management in investment funds. See Chapter 1 of the October 2015 and April 2018 GFSRs for analysis of risks stemming from increasing financial leverage.

Emerging Market Economies Should Be Prepared to Cope with Portfolio Outflows

Given continued monetary policy normalization in advanced economies and escalating trade tensions, policymakers in emerging market economies should be prepared to face portfolio flow reversals. To reduce the likelihood and severity of outflows, countries should maintain sound macroeconomic, structural, financial, and macroprudential policies, taking into account their cyclical position, balance sheet vulnerabilities, and policy space available (see the October 2018 WEO).

During periods of market stress, exchange rate flexibility often serves as a key shock absorber, but central bank interventions could also be used to prevent disorderly market conditions. When deciding whether to intervene, policymakers should consider a range of factors, including banks' and corporations' balance sheet exposures in foreign currencies, how the exchange rate is valued relative to fundamentals, the level of foreign exchange reserves, and whether alternative policy measures, such as policy rate hikes, are desirable. Foreign exchange interventions through derivatives can have effects comparable to those of spot market interventions, but the potential fiscal implications (including fiscal costs arising from losses) and monetary implications (such as the need to sterilize

the liquidity injection when settling losses) from such interventions should be carefully considered beforehand. In addition, convertibility risks (for instruments settled in local currency) may impair the effectiveness of such interventions.

Given the outlook for a sustained, challenging external environment, a key policy priority for emerging market economies should be to build and maintain adequate foreign exchange reserves and use reserves judiciously. For example, when faced with moderate outflow pressures, policymakers should consider the trade-off between using reserves today to smooth volatility versus preserving policy space to stem more significant outflow pressures in the future. Efforts to build reserve buffers could be complemented by steps toward making the exchange rate regime more flexible, where appropriate.

In the context of outflow pressures, capital flow management measures should be implemented only in crisis or near-crisis situations and should not substitute for any needed macroeconomic adjustment (IMF 2012, 2015b, 2016a). Moreover, capital flow management measures should be part of a broader policy response that addresses the underlying causes of the crisis. When warranted, such measures should be transparent, temporary, and nondiscriminatory, and should be lifted once crisis conditions abate.

To further increase resilience to external shocks, policymakers in emerging markets should focus on developing local bond markets and promoting a stable local investor base (IMF and World Bank 2016). Deeper and more liquid local markets would increase countries' resilience to capital flow volatility and help reduce currency mismatches. A strong and diversified local investor base helps reduce reliance on foreign investors. While foreign investors play a critical role in financial deepening in emerging market economies, excessively high levels of participation may increase the sensitivity of emerging asset markets to external shocks. The analysis of risks related to the foreign ownership of local currency bonds should cover exposures of foreign investors through derivatives.

Multilateral Policy Coordination Is Critical to Safeguarding Global Financial Stability

In the aftermath of the global financial crisis, global policy coordination was key to restoring market confidence, addressing financial stability challenges, and supporting economic recovery. However, in the face of waning support for multilateralism, as well as regulatory fatigue and growing pressure to roll back reforms, there is a risk that financial sector policies could become less coordinated in the future.

Insufficient multilateral policy coordination would increase policy uncertainty, raise the risk of policy missteps, and provide incentives for regulatory fragmentation and regulatory arbitrage.

- Coordinated policy action—including monetary policy communication—sends a strong signal to markets in times of stress. Losing such an ability could weaken the international policy response to future crises.
- Policy actions taken by individual countries might not account for externalities and spillovers to other economies, and so might not be optimal from a global perspective. Examples examined in this chapter include risks from an unwinding of unconventional monetary policy in advanced economies to capital flows to emerging markets, risks that host country subsidiarization and ring-fencing measures pose to the fragmentation of liquidity in international banking groups, and risks of disruption to financial services and market fragmentation during Brexit.
- An increase in private and non–Paris Club lending to emerging market and low-income economies could make any needed debt restructuring or resolution more complicated, as discussed in the April 2018 GFSR.
- A more disjointed financial regulatory policy could spawn opportunities for regulatory arbitrage. Although an evaluation of the effectiveness and efficiency of postcrisis regulatory reforms is welcome, any competitive deregulation could undo past gains and lead to a race to the bottom in regulation and supervision.

The international regulatory community must therefore continue its crucial work to tackle future policy challenges with cooperative solutions, including in the external debt sphere. As one of the pillars of the global financial safety net, the IMF will continue to promote cooperative financial policymaking as part of its agenda to strengthen the global financial system.

Box 1.1. Implications of the U.S. Yield Curve Slope for the GDP Growth Distribution

The slope of the U.S. Treasury curve—defined as the spread between longer- and shorter-dated yields—has narrowed meaningfully over the past several quarters, and now stands at less than 30 basis points between 2 and 10 years, near its lowest level since before the global financial crisis. Given that outright curve inversions, when shorter-dated yields exceed long rates, have typically tended to precede recessions, such narrowing of the slope has prompted worries about the longevity of the current recovery.

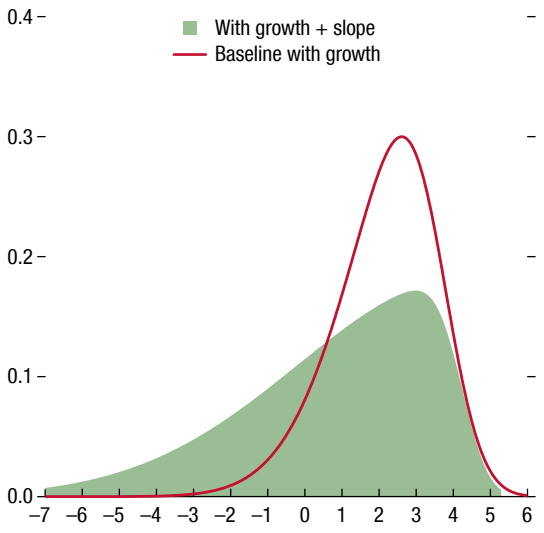
Previous econometric analyses have considered the impact of the yield curve slope on the mean of future growth forecasts, as well as the discrete outcome of outright recessions using probit regressions, but not on the full distribution around those projections. A lingering key question is whether the slope may have implications for overall uncertainty or asymmetry around anticipated outcomes.

Simple quantile time-series regressions at various horizons afford forecasts of not just the mean, but also the distribution of future real GDP growth. Using the simplest model, the red line in Figure 1.1.1 shows a baseline density forecast for one-year-ahead real GDP growth that includes the latest quarterly real GDP growth as well as an estimated linear trend, using quarterly data beginning in 1975. The shaded region shows the resulting density when the model also includes the most recent slope between 10- and one-year nominal constant-maturity U.S. Treasury yields. Adding the slope lowers expected GDP growth and increases the odds of a recession substantially, a familiar finding. But the inclusion of the slope also considerably boosts uncertainty around the conditional forecast, and it tilts the distribution markedly toward worse outcomes. This result holds even after controlling for other financial variables besides the term structure.

Another potential explanation for the current narrow slope of the U.S. yield curve is the very low level of term premiums. As noted in the April 2018 GFSR, distant-horizon term premiums across major bond markets have been more closely correlated in recent years. Global factors, perhaps related to unconventional monetary policies, have put downward pressure on longer-dated U.S. Treasuries. As a result, the signal from the flatter term structure is likely more ambiguous today.

The author of this box is J. Benson Durham.

Figure 1.1.1. Conditional Real GDP Growth Forecast Distributions
(Four quarters ahead)



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

Box 1.2. Escalating Trade Tensions and Growth at Risk

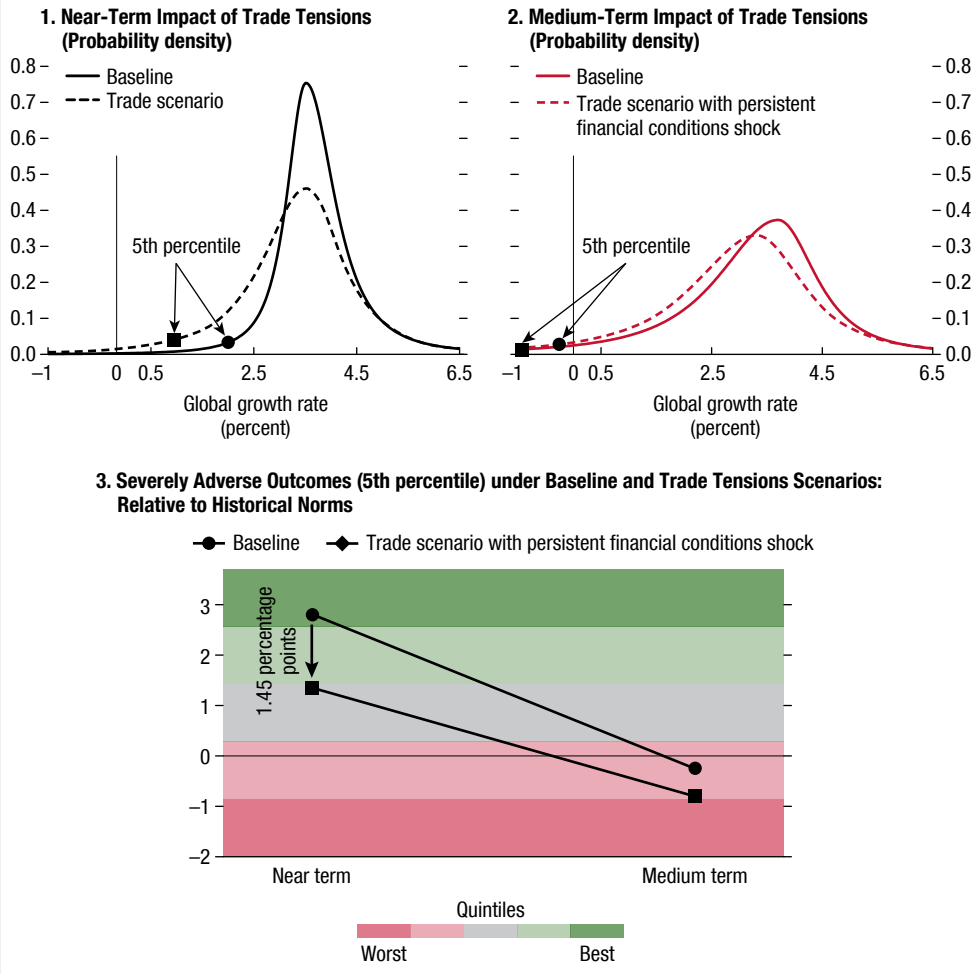
The recent rise in trade tensions has so far mostly affected sectors directly exposed to the announced trade measures. However, further rounds of trade measures and countermeasures could lead to a broader tightening of financial conditions, with negative implications for the global economy and financial stability.

In the October 2018 *World Economic Outlook* (WEO) ("Scenario Box 1—Global Trade Tensions"), the escalating trade tensions are modeled as a multiple-layer impact, including additional tariffs as well as a confidence shock and a financial conditions shock. As shown in the WEO box, the full scenario, including real, confidence, and financial shocks, can have a marked impact on global growth, with global GDP potentially coming in nearly 0.8 percent less than its current baseline forecast by the end of 2019.

The analysis presented here is complementary to the WEO box. It focuses on the impact of the financial conditions shock on the downside risks to future global growth using the growth-at-risk (GaR) approach. Given that GaR incorporates information on a larger set of financial indicators, a more comprehensive assessment incorporating a broader constella-

This box was prepared by Jeffrey Williams and Sheheryar Malik.

Figure 1.2.1. Trade Tensions Scenario Analysis Using the Growth-at-Risk Approach



Source: IMF staff estimates.
Note: The bands are based on the interquartile range of GaR predictions (near and medium term), based on historical data since 1990:Q1. Baseline distributions correspond to the latest GaR assessment, as of 2018:Q3, presented in Figure 1.3 of the main text. The lines indicate the pairs of near- and medium-term forecasts and do not assert a linear relationship between the two periods. GaR = growth-at-risk.

Box 1.2 *(continued)*

tion of asset prices is possible. In addition, to account for the possibility that further trade measures (beyond those included in the WEO) may be considered, the shock to financial conditions is assumed to be more persistent. This results in a more protracted impact on the downside risk to growth over the medium term.

This shock is modeled as a widening of corporate credit spreads reflecting market participants' expectations of a significant escalation of trade tensions between the United States and China.[1] The effects of escalating trade tensions on market valuations are assumed to be persistent, lasting throughout a three-year horizon.[2]

[1]The widening of the U.S. credit spread is commensurate with market analysts' expectations of a decline in U.S. corporate earnings of 15 percent in the event of an extreme escalation of trade tensions. Based on historical relationships, this decline in earnings corresponds to a roughly 100 basis point widening of aggregate U.S. credit spreads and a 12 percent drop of U.S. equity prices. For other Group of Twenty countries, the widening of credit spreads and the decline of equity prices is based on their credit ratings and stock market correlations (betas), respectively.

[2]The WEO analysis assumes that the full impact of the financial shock occurs in 2019, dissipating by half by 2020, and has no impact over the medium term.

Figure 1.2.1 shows the impact of escalating trade tensions on the distribution of future global growth:

- *Over the near term,* the financial conditions shock leads to a meaningful increase in the likelihood of severely adverse growth. Compared with the baseline, growth rates in the lower 5th percentile of the distribution shift leftward by about 1.5 percentage points (Figure 1.2.1, panel 1).
- *Over the medium term,* the tightening of financial conditions leads to both a leftward shift in the mode of the growth distribution and greater downside risks (i.e., a fatter left tail Figure 1.2.1, panel 2). Normally in the GaR framework, a tightening of financial conditions in the near term tends to mitigate downside risks to growth over the medium term by curtailing the buildup of vulnerabilities. In this box, however, the financial condition shock is assumed to be more persistent, increasing downside risk across horizons. This more pronounced downside risk more than offsets the reduction of vulnerabilities. Overall, the range of severely adverse growth outcomes shifts into negative territory, a relatively adverse level compared with the past three decades (Figure 1.2.1, panel 3).

Box 1.3. Brexit—Financial Stability Considerations

This box analyzes Brexit-related financial stability risks to the United Kingdom and the rest of the European Union (EU).[1] Considerable uncertainty remains as to the future relationship between the two jurisdictions.[2] It is still hard to gauge Brexit's impact on financial activity and the change in employment, since much will depend on the nature of the final agreement.[3] In general, the likelihood and severity of financial stability risks will be reduced by a closer relationship between the United Kingdom and the EU during the transition period and beyond, but will be heightened in the event of a hard Brexit. European and UK authorities have highlighted Brexit-related risks and called for adequate private-sector preparations. In addition, the European Central Bank and Bank of England have convened a joint technical working group on risk management in the area of financial services.

Short-Term Risks

EU and UK financial institutions will face two broad categories of transitional risks: contractual and operational. The transition period, which envisions maintaining current arrangements between March 29, 2019, and December 31, 2020, has been agreed to in principle but not legally sealed. This may help attenuate short- and medium-term risks, but not eliminate them.

Contractual risks relate to unexpected changes to the legal framework governing financial services agreements:

- For **derivatives**, ensuring the continuity of contracts is one of the most pressing issues. While over-the-counter (OTC) derivatives contracts remain valid in principle, "lifecycle events" built into such contracts could create challenges. According to International Swaps and Derivatives Association (ISDA, 2017), lifecycle events include novations, certain types of portfolio compression, maturity extension of open positions, material amendments, and some types of position unwinds. Lifecycle events can turn a legacy trade into a new transaction, thus falling under the umbrella of the permissions or authorizations in place at the time the new transaction occurs. Once the United Kingdom becomes a third country, UK financial firms would require an EU equivalence decision or an explicit national authorization or waiver in some EU27 member states to continue performing these events.[4] There is uncertainty about the amount of derivatives that could be subject to lifecycle events. The Bank of England estimates that a total notional amount of £29 trillion of uncleared OTC derivative contracts between the United Kingdom and European Economic Area (EEA) counterparties could be affected, of which £16 trillion mature after March 2019 (Bank of England 2018).With respect to cleared OTC derivatives contracts, the total notional amount potentially affected is estimated by the Bank of England to be around £67 trillion, of which £38 trillion mature after March 2019. According to Bank for International Settlements data, 78 percent of OTC foreign exchange derivatives globally and 45 percent of interest rate derivatives have a maturity of one year or less. Assuming a similar maturity structure among EU-based instruments, a transition period would thus substantially reduce the scale of the issue as maturing contracts run off. With respect to OTC derivatives contracts cleared by central counterparties (CCPs), an additional issue is that, following the UK's exit, CCPs in either jurisdiction will need to seek recognition to continue to provide their services cross border to clearing members. EEA clearing members and their clients currently heavily rely on CCPs based in the UK to clear contracts in certain products.
- Absent a specific arrangement, the Bank of England estimates that £55 billion worth of **insurance contracts** by UK insurers to EU policyholders could be disrupted because UK insurers will lose the authorization to service these contracts in the

This box was prepared by Jeroen Brinkhoff, Pierpaolo Grippa, Tryggvi Gudmundsson, Juan Sole, Ilan Solot, Richard Stobo, Froukelien Wendt, and Peter Windsor.

[1]Some references to the EU in this box also encompass countries belonging to the European Economic Area (EEA) that apply the EU regulatory framework under the EEA Agreement. Passporting rights refer to the legal ability of financial institutions that are authorized to do a certain business in one EEA member country to conduct the same business across the whole EEA.

[2]Even though there is no definition of soft and hard Brexit, the former is understood to refer to arrangements that are relatively close to the status quo, whereas the latter refers to outcomes in which disruptions and dislocations of current agreements are more prevalent.

[3]For example, TheCityUK and Oliver Wyman estimate 31,000–35,000 jobs driven out of the United Kingdom across all financial services under a hard Brexit scenario.

[4]This latter option is already available to third-country firms and used by non-EU counterparties. The applicability to UK firms is unknown at this point.

Box 1.3 *(continued)*

EU. The UK government has committed to pass legislation to allow EU insurers to temporarily continue to service insurance policies held by customers in the United Kingdom. The European Insurance and Occupational Pensions Authority (EIOPA) has published an opinion detailing available options to ensure contract continuity and called on national supervisory authorities to ensure that appropriate contingency plans are being implemented. Although recent data are not available, anecdotal evidence suggests a sizable value of insurance contracts have already moved to the EU27.

Operational challenges stem from uncertainties regarding the regulatory environment in which financial institutions will operate during the transition (for example, changes to licensing requirements, risk management, ability to hire talent, and so on):

- **Banks** and investment firms will lose passporting rights and may no longer be able to rely on branches or cross-border provision of services to operate across jurisdictions. They will instead require new operational structures and licenses, which the EU will only grant once institutions provide proof of "substantial presence." Furthermore, banks could need to maintain higher capital buffers related to positions in central counterparties (CCPs) outside their jurisdictions.[5] UK-based investment banks, the largest of which are subsidiaries of global systemically important banks, may also have to relocate some activities to the EU. Overall, the loss of passporting rights may amount to nontrivial adjustment costs on many business lines.
- **Asset managers** may face restrictions in their ability to delegate investment management to or market investment funds in different jurisdictions. For example, EU-domiciled funds may no longer be allowed to be managed from the United Kingdom.
- **Insurance companies** that do not rely on subsidiaries to conduct their cross-border business may also face restrictions on their ability to operate across jurisdictions. These insurers may need to restructure or apply for an authorization to maintain their cross-border business. This may increase costs, but large consolidated balance sheet adjustments are not expected.
- **Supervisory authorities** may also face higher operational needs. Large relocations from the United Kingdom could require additional supervisory and regulatory capacities (for example, regarding the process of granting licenses to applicants, validating risk models, and ensuring that entrants adhere to local regulations). Supervisory authorities have indicated that they are preparing for possible operational challenges.

Medium-Term Challenges

Depending on the final EU27-UK post-Brexit arrangement, Brexit could have financial stability implications for the EU and UK financial systems that go beyond the transition period:

- **Market liquidity** could be fragmented in the medium term, raising the cost of funding in capital markets and disrupting existing market-making arrangements. For derivatives, a forced relocation of large amounts of central clearing services to the EU could also lead to higher trading costs, reduced market liquidity, and increased margin requirements due to losses in efficiencies. This would pose challenges for financial institutions in both jurisdictions.
- **Onshore and offshore markets:** Trading venues could be duplicated given that a meaningful share of euro-denominated instruments are traded among non-EU financial institutions. A forced relocation policy may not succeed in pushing all trading of these instruments to within the EU27. Global banks may be forced to perform more back-to-back deals internally, which would complicate their risk management practices and pose some challenges to supervisors.
- Challenges to **risk management** will be posed because institutions will become more complex alongside a more fractured landscape for European financial markets.
- Current arrangements for **data storing and sharing** between the EU27 and the United Kingdom could breach national laws after Brexit. Limitations on data sharing may curtail regulators' capacity to monitor risks effectively, unless legal solutions and cross-border agreements are found.

Recommendations

- Financial institutions should step up their preparations for a post-Brexit landscape. In addition to maintaining momentum in their applications for

[5]European Commission (2018), https://ec.europa.eu/info/sites/info/files/180208-notice-withdrawal-uk-post-trade-services_en.pdf.

Box 1.3 *(continued)*

licenses, institutions should also ensure they have the necessary operational structures in place, including staffing arrangements and adequate information technology systems. Such plans should even include measures for a no-deal outcome in as much detail as possible, even if such a scenario is not considered likely.

- Authorities in both jurisdictions should continue to work with private parties to reduce the risks of disruption to financial services, paying special attention to needed arrangements in case of a no-deal outcome. Contractual aspects are a key area in which cooperation is crucial and the explicit commitment from authorities to legislate temporary waivers may be required.
- More clarity from authorities on which aspects fall exclusively under institutions' responsibility should be provided, and authorities should provide clear communication about their intention to mitigate possible cliff-edge risks and facilitate continuity of services. Recent steps from UK authorities to create temporary permission and recognition regimes for EEA firms operating in the UK are likely to help reduce uncertainty.
- Authorities should create permanent consultative bilateral bodies on financial regulatory and supervisory matters. A permanent forum for cooperation should be considered to replace existing temporary groups. International venues for cooperation already exist (for example, the Committee on Payments and Market Infrastructures, the International Organization of Securities Commissions, and the Financial Stability Board), but bilateral channels for day-to-day interaction will have to be expanded, given the greater complexity that could result from Brexit.
- Central banks should stand ready to provide liquidity assistance in case of disruption surrounding the United Kingdom's exit. Disruption via macroeconomic channels could also arise, so central banks should also be prepared to use available instruments as needed. On the external side, a disorderly exit could lead to capital outflows. Authorities should closely monitor such developments and be aware of the potential for sharp asset price moves.

Box 1.4. Jumps and Liquidity in the U.S. Stock Market

Intraday data on asset price movements can help shed some light on whether very high-frequency price disruptions may have seeped through to lower frequencies, which are ultimately most relevant for broader financial conditions and longer-term real effects.

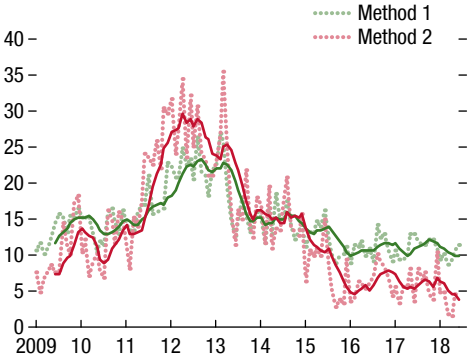
This box was prepared by Rohit Goel and Sheheryar Malik.

To examine this issue, the U.S. equity market may be an especially informative sample, given the marked penetration of High Frequency Trading (HFT) activity, both for market-making and active algorithmic trading. Using S&P 500 prices starting in January 2009 and recorded at 30-second time intervals, total daily price variation can be decomposed into a continuous component and a jump component, which

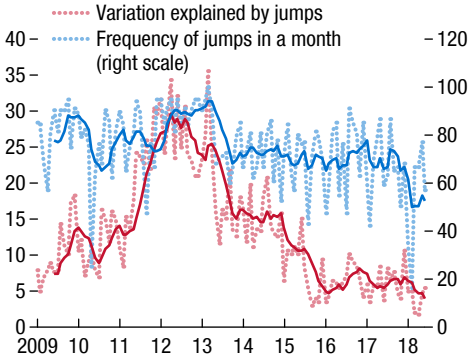
Figure 1.4.1. Jumps and U.S. Stock Market Liquidity

The proportion of overall price variation explained by jumps is at historical lows ...

1. Proportion of Variation Explained by Jumps (Percent; monthly and six-month moving average)

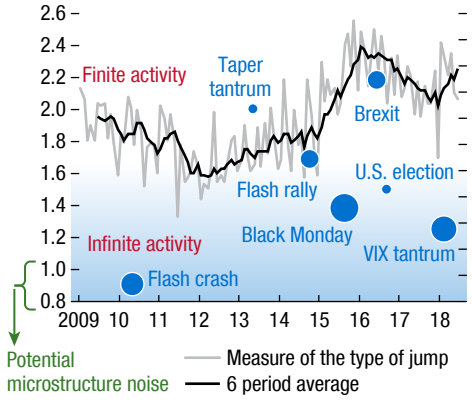


2. Frequency of Jumps (Percent; monthly and six-month moving average)



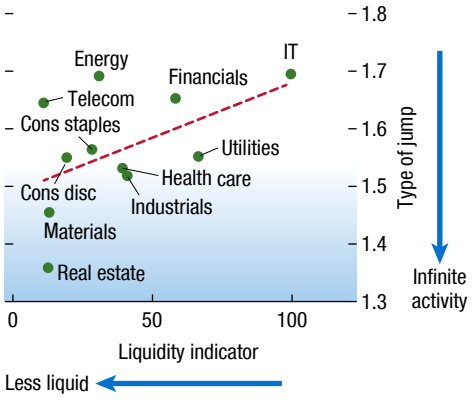
However, infinite activity jumps tend to be prevalent in stress episodes …

3. Type of Jumps over Time and during Specific Stress Episodes (Size of bubble corresponds to size of volatility spike)



... and tend to be characteristic of relatively illiquid sectors.

4. Type of Jumps versus Sectoral Liquidity (Index; averaged for S&P 500 constituents over the first half of 2018)



Sources: Bloomberg Finance L.P.; and IMF staff estimates.
Note: In panel 1, "Method 1" is based on Huang and Tauchen (2005) and Andersen and others (2006); "Method 2" is based on Ait-Sahalia and Jacod (2012). In panel 2, frequency of jumps is based on the former method, and variation explained by jumps is based on the latter method. In panel 3, the black and gray lines measure the type of jump: finite activity (that is, news-related shocks) versus infinite activity (that is, a series of small jumps reflecting insufficient liquidity); the size of circles depicts the level of the Chicago Board Options Exchange Volatility Index (VIX) on selected stress event days. In panel 4, trading volumes serve as a proxy for liquidity. Cons = consumer; cons disc = consumer discretionary; IT = information technology; telecom = telecommunications.

Box 1.4 *(continued)*

reflects discontinuities in prices. In turn, overall jumps can be characterized by so-called infinite activity, or small jumps, or finite activity, or large jumps.

Whereas large jumps reflect news-related shocks, a series of small jumps correspond to price moves that are significant over a period of few seconds, but not necessarily at a lower frequency. These small jumps likely reflect insufficient liquidity, insofar as markets cannot absorb orders without price impact.[1] Of course, both small and large jumps can occur within a day.[2] A news event can generate a large price move, but small jumps may nonetheless follow and reflect poor liquidity as prices drift after an announcement.

The analysis, explained in Online Annex 1.1, suggests that the proportion of daily price variation explained by jumps (either small or large) is currently at a historical low, notwithstanding a number of flash crash events in recent years (Figure 1.4.1, panel 1). Furthermore, the frequency of significant jump days per month has also declined, to about one standard deviation below historical norms (Figure 1.4.1, panel 2).

These results point to a decline in the proportion of price variations explained by jumps. In addition, small jumps, which are more likely to be related to poor liquidity, are less common than news-related large jumps on most days (Figure 1.4.1, panel 3). However, but not surprisingly, when volatility spiked dramatically—including during the VIX Tantrum, Black Monday, and the Flash Crash—small jumps were most prevalent. Overall, these findings suggest that liquidity has not materially deteriorated in the U.S. equity market.[3]

Beyond these findings on the aggregate index, analysis of sectoral S&P indices suggests that relatively "illiquid" sectors, as measured by the trading volume, tend to display a higher share of small jumps (Figure 1.4.1, panel 4). This finding points to an intuitive link between market liquidity and the type of jumps.

Overall, evidence from the U.S. equity market seems to indicate that flash crashes may not be a harbinger of sustained market liquidity strains. Yet caution is warranted. Although stock markets are arguably an important benchmark for risky assets, similar analyses of fixed income, foreign exchange, or global corporate bond markets may imply more worrying inferences for market liquidity.

[1]To detect significant jumps, the methodology developed by Huang and Tauchen (2005) and Andersen, Bollerslev, and Diebold (2006) is used. The so-called spectral analysis methodology proposed by Ait-Sahalia and Jacod (2012) is used to categorize the finite or infinite activity of jumps. Astrophysicists use similar techniques to distinguish components of light spectrum emanating from stars.

[2]The methodology based on Ait-Sahalia and Jacod (2012) usefully defines a range of possible distributional properties, from Poisson process, on the one extreme (defining finite activity jumps); different Levy processes (infinite activity); and Brownian motion (continuous evolution), at the other extreme.

[3]These results are consistent with recent research on high-frequency commodity futures activity (CFTC 2018) and a recent study on the UK equity market (Acquilina, Eyles, Shao, and Ysusi (2018)).

Box 1.5. Trading Activity in China's Bond Market

Trading activity in China's bond market exhibits a cyclicality that may pose risks to financial stability. In the context of steadily growing repurchase (repo) market borrowing linked to the roughly RMB 75 trillion (85 percent of GDP) investment vehicle sector, fluctuations in trading can amplify shifts in financial conditions. Improving market liquidity should therefore be an important part of the agenda to reduce financial vulnerabilities.

Trading activity in China's bond market, the world's third largest, is volatile by international standards. For government and corporate bonds, each roughly

The author of this box is Henry Hoyle.

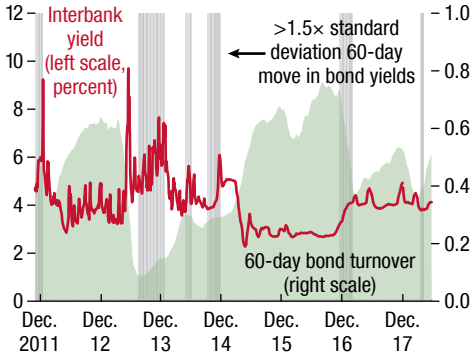
Figure 1.5.1. Chinese Bond Market Developments

Trading turnover fluctuates more than in other countries ...

1. Annual Growth in Three-Month Average Bond Trading Volumes, by Country and Bond Type (Percent)

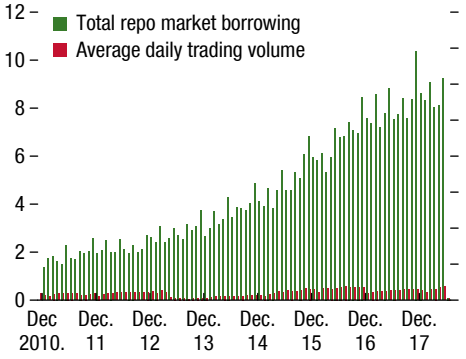
... and volumes tend to fall when interbank rates rise.

2. Rolling 60-Day Sum of Daily Bond Trading to Outstanding Total and One-Month SHIBOR Interbank Interest Rate



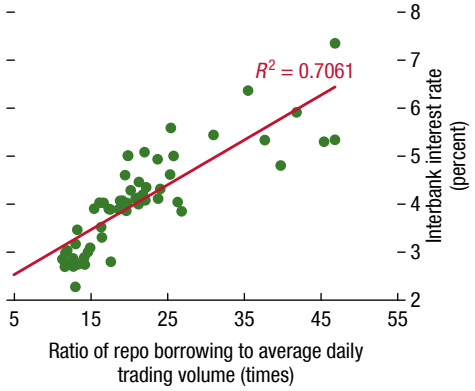
Declines in trading volumes pose risks in the context of growing short-term borrowing ...

3. Chinese Bond Market: Repo Borrowing Outstanding and Trading Volumes (Trillions of renminbi)



... because more borrowing must be rolled over and portfolios become more illiquid, reinforcing upward pressures on short-term interest rates.

4. One-Month SHIBOR Interbank Interest Rate and Repo Borrowing Outstanding Relative to Average Daily Trading Volume, June 2013–June 2018 (Percent and times)



Sources: Bloomberg Finance L.P.; CEIC; ChinaBond; Federal Reserve; Financial Industry Regulatory Authority; WIND Information Co.; and IMF staff calculations.
Note: Government bonds includes policy bank bonds but not local government bonds, which have negligible trading. For panel 2, bond turnover and yields are based on government bonds. SHIBOR = Shanghai interbank offered rate.

Box 1.5 *(continued)*

one-third of the overall market, trading volumes fluctuate considerably more than in the United States (Figure 1.5.1, panel 1).[1]

These shifts in volume occur in part because much trading appears to reflect cycles of leveraged carry trade–type activity. Trading volumes are tightly correlated with repo market volumes, suggesting that most purchases are financed with short-term borrowing and are therefore sensitive to interest rates.[2]

Trading volumes also fluctuate because the market's largest investors—banks and investment vehicles—do not actively hedge or short bonds. These firms mostly do not mark to market their holdings and have few suitable hedging instruments with which to manage market risks, so they often hold to maturity rather than sell bonds at a loss.[3] As a result, the market typically experiences one-way positioning during periods of stable or declining interbank interest rates, but trading declines and bond prices shift rapidly when interbank conditions tighten or become volatile (Figure 1.5.1, panel 2).

Reduced trading may pose risks in the context of growing levels of maturity-mismatched short-term borrowing (Figure 1.5.1, panel 3). Repo borrowing outstanding has reached nearly RMB 9 trillion, reflecting growing demand from investment vehicles that rely on such financing to bridge the maturity gap between their largely illiquid long-term assets and short-term liabilities. This borrowing was about 15 times larger than average daily trading volumes in 2017, more than double the peak ratio reached in the U.S. repo market of seven times in September 2008.[4]

The growing imbalance means that maturing repo borrowing exceeds total trading volumes by about RMB 3 trillion each day, on average, implying at least that much needs to be rolled over or repaid with liquid assets such as deposits. When trading volumes decline, a larger share must be rolled over or repaid with deposits, putting upward pressure on short-term interest rates and weakening borrowers' ability to raise liquidity by selling bonds. As a result, money market rates tend to rise as trading declines relative to total borrowing outstanding (Figure 1.5.1, panel 4).

This procyclical link between bond trading and financial conditions represents a significant vulnerability in China's financial markets, and highlights the ongoing importance of implicit guarantees. When investment vehicles face liquidity needs, they have been met largely via repo borrowing, often facilitated with bank credit. This approach averts the need to sell their largely illiquid corporate bonds into a thinning market, which could create a destabilizing feedback loop between bond prices and funding market pressures. Yet it creates upward pressure on short-term interest rates, often requiring authorities to inject liquidity to prevent a pernicious deleveraging cycle. This reinforces moral hazard and leads to rising borrowing.

Improving bond market liquidity will help ease this trade-off between distortionary implicit guarantees and financial instability, and should be a priority for addressing financial vulnerabilities and enhancing the transmission channel of monetary policy. Specific steps should include (1) deepening markets for derivatives and other instruments to hedge and short bonds, to encourage more balanced, two-way market positioning; (2) fostering the development of market makers to facilitate trading and price discovery; (3) increasing the share of mark-to-market investors, who have greater incentives to manage interest rate risk, including by increasing foreign participation from a low base;[5] and (4) facilitating a transition to a more stable, price-oriented financial system.

[1]The remainder of the market comprises local government bonds, which have negligible trading, and issuance by financial institutions. In this box, Chinese government bonds include policy bank bonds.

[2]The correlation holds when excluding bond purchases and repo borrowing volumes by securities firms, which suggests that the relationship is not due to market-making activity.

[3]Investment vehicles here refer to bank wealth management products and similar privately issued asset management products. For more information, see the April 2018 GFSR. The government bond futures market does not allow participation by banks, which are the largest investors in government bonds, and there is no futures market for policy bank bonds (bonds issued by developments banks), which are more widely traded. Until August 2018, futures were only available at the 5- and 10-year tenors, and there are no option markets. Corporate bonds lack credit default swap markets.

[4]U.S. repo market and trading volumes are based on primary dealer–reported transactions from the Federal Reserve's FR 2004 data series.

[5]Given low foreign participation levels and the large absolute size of China's bond market, at this time the marginal benefits to market deepening would outweigh any (small) risk from increased volatility or external spillover risks.

Box 1.6. Correspondent Banking Relationships

Correspondent banking relationships (CBRs), which facilitate global trade and economic activity, have been under pressure in several countries. A complete loss of CBRs would affect the ability of banks' clients to receive and make cross-border payments to conduct their economic activity. The latest data indicate that CBRs decreased globally during 2011–17. However, this decline has been largely offset by rechanneling the flows through remaining relationships and by financial institutions' putting alternative arrangements in place (Figure 1.6.1, panels 1 and 2). As a result, the global value of cross-border payment flows has not been affected so far.

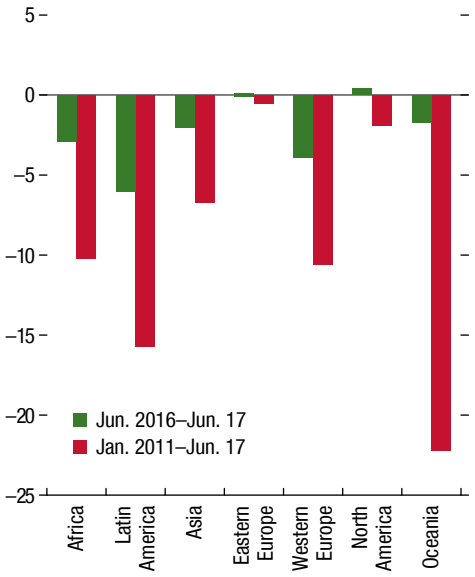
Although banks have lost correspondent accounts across all regions, regional pockets of pressures on CBRs have been identified in Africa, the Caribbean, the Middle East, and the Pacific islands. The implications may be macro-critical for some jurisdictions. Concentration through fewer CBRs allows for economies of scale, which is relevant for cost-effective implementation of anti–money laundering/combating the financing of terrorism (AML/CFT) requirements in particular, but it also accentuates financial fragilities in some countries. These fragilities could undermine affected countries' long-term growth and financial inclusion by increasing the costs of financial services and negatively affecting bank ratings. These fragilities could also tighten domestic liquidity conditions and increase the cost of finance. The drivers of CBR pressures are multiple and interrelated. Financial integrity issues related to corruption, difficulties around entity transparency, and the introduction of new sanctions are motivations that have gained attention recently. Ultimately, though, the decision to end a CBR comes

This box was prepared by Prasad Ananthakrishnan, Dirk Jan Grolleman, Yumi Kuramochi, and Alejandro Lopez Mejia.

Figure 1.6.1. Correspondent Banking

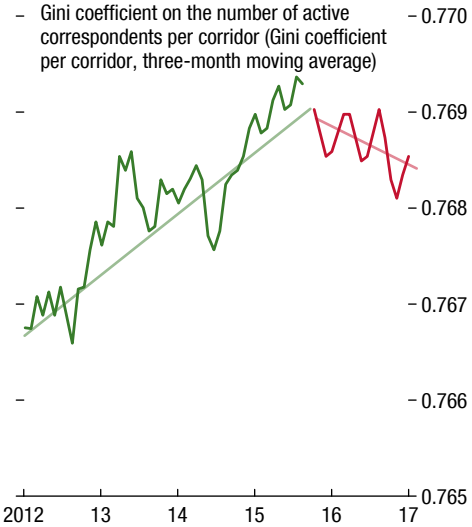
The declining trend in correspondent banking relationships remains a concern.

1. Regional Breakdown of Active Counterparty Countries (Percent)



While the number of active corridors is decreasing, concentration within remaining corridors appears to decline.

2. Concentration of Active Correspondents



Sources: Financial Stability Board Correspondent Banking Data Report Update (March 2018); and IMF staff estimates.
Note: An active corridor (or counterparty country) is a country pair where at least one SWIFT transaction has taken place in either direction during the observed time period. In a corridor, multiple correspondent banks can be active and transact with respondent banks.

Box 1.6 *(continued)*

down to an individual bank's assessment of the risk and profitability of the business relationship.

Several measures have been identified to address the withdrawal of CBRs. Enhanced monitoring of CBRs; strengthening regulation and supervision, particularly of AML/CFT; and removing impediments to information sharing are key. Outreach efforts by regulators and banks can dispel misperceptions about regulatory expectations and clarify expectations and risk tolerance. The IMF will continue following a multipronged approach to support member countries faced with withdrawal of CBRs based on (1) facilitating dialogue among stakeholders to foster a mutual understanding of the issues; (2) engaging with affected countries as part of IMF surveillance; and (3) implementing capacity-development programs to strengthen legal, regulatory, and supervisory frameworks, including on AML/CFT, and assisting supervisory agencies in the analysis of CBR trends through a new CBR data-monitoring tool developed by IMF staff (see, among others, IMF 2017d).

Special Feature: International Banking Groups—Centralized versus Decentralized Business Models

Banks' international branch networks are a crucial element of international banking. Branches rely on flexible and efficient cross-border liquidity management to provide global corporate banking services and liquidity to other entities within banking groups. Host regulators are tightening branch liquidity standards. There are benefits to this approach from a host regulator's perspective, particularly in the context of resolution during periods of stress. But there could also be unintended global spillovers. Liquidity in banking groups could be fragmented and international banking credit could be impaired. This transition to tighter branch liquidity is occurring at a time when global financial conditions are also tightening, and the combination of the two could create strains in funding markets.

Foreign Banks Are a Key Channel for Liquidity Flows across the Global Banking System

This special feature focuses on foreign bank offices (FBOs)—defined here as branches and subsidiaries outside the home country of their parent bank. FBOs can be organized according to two stylized models. In a centralized model, a banking group largely operates through a network of international branches, primarily supervised by its home regulator. The decentralized model mainly comprises subsidiaries, which are legal entities incorporated in host countries and supervised by the host regulator (McCauley and others 2010; CGFS 2010).

FBOs are an important element of the international financial system. FBOs account for more than 40 percent of the more than $20 trillion total of foreign claims for the 19 banking systems for which data on branches and subsidiaries are available (depicted by the blue and red portions of the bar in Figure 1.SF.1, panel 1).[1] FBOs, particularly branches, play a prominent role in foreign currency intermediation of both assets and liabilities (Figure 1.SF.1, panel 2). Global systemically important banks often use branches to deliver corporate and investment banking services (capital markets, hedging, international payments, clearing and settlement, custody, and treasury services) to multinational companies (see, for example, CGFS 2010 and the October 2015 GFSR).

Branches are the fulcrum of international intragroup liquidity management. Subsidiaries, however, are hindered by legal restrictions and exposure limits; thus branches facilitate cross-border deployment of liquidity by borrowing from and lending to group-related entities. Balance sheets reflect these differences: both branches and subsidiaries provide credit via loans and investments in securities, but only branches lend to intragroup counterparties (Figure 1.SF.2, panels 1 and 2). Similarly, branches avail themselves of intragroup borrowing to supplement short-term wholesale funding, while subsidiaries largely fund themselves through local deposits from companies and households (Figure 1.SF.2, panels 3 and 4).[2]

Centralized and decentralized banking models pose different financial stability benefits and costs. In centralized models, branches can tap intragroup funding in the event of liquidity problems, making them less sensitive to idiosyncratic shocks (Table 1.SF.1). However, their interconnectedness makes them more exposed to contagion within banking groups. In contrast, restrictions on transferring intragroup liquidity help shield subsidiaries in decentralized banking groups from shocks that affect other group entities, but make them more susceptible to local liquidity pressures. Because they are separate legal entities, subsidiaries are also easier to resolve.

Host regulators are likely to prefer a more decentralized international banking model. Local subsidiaries are less affected by liquidity problems in other parts of banking groups that are beyond the control of the local regulator. Furthermore, international banking groups are often complex, making it more difficult for host regulators to assess risks. Branches can pose complex problems for host regulators if a foreign bank needs to

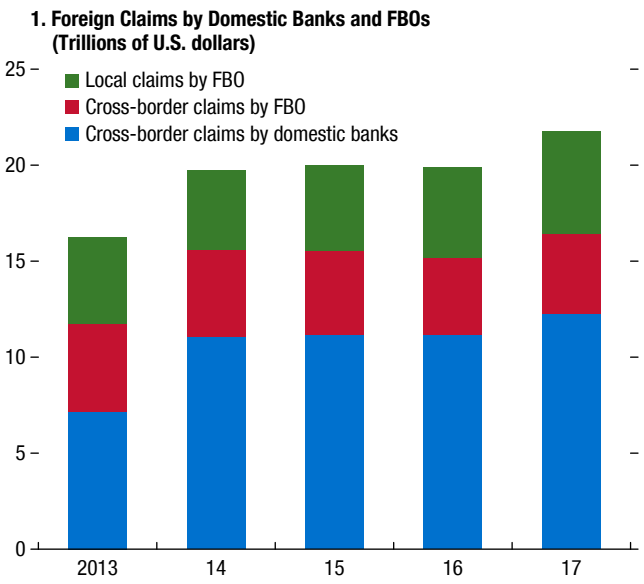
The authors of this feature are John Caparusso, Yingyuan Chen, and Will Kerry.

[1]The Bank for International Settlements publishes information on aggregate international credit exposures intermediated through foreign bank branches and subsidiaries for the following banking systems: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong SAR, Indonesia, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, Sweden, Switzerland, and Turkey. However, information on the balance sheet composition of foreign bank branches and intermediaries are available only through the permission of host country authorities in the following countries: the United States, the United Kingdom, Japan, Germany, Canada, Hong Kong, Korea, South Africa, Chile, Poland, and Turkey.

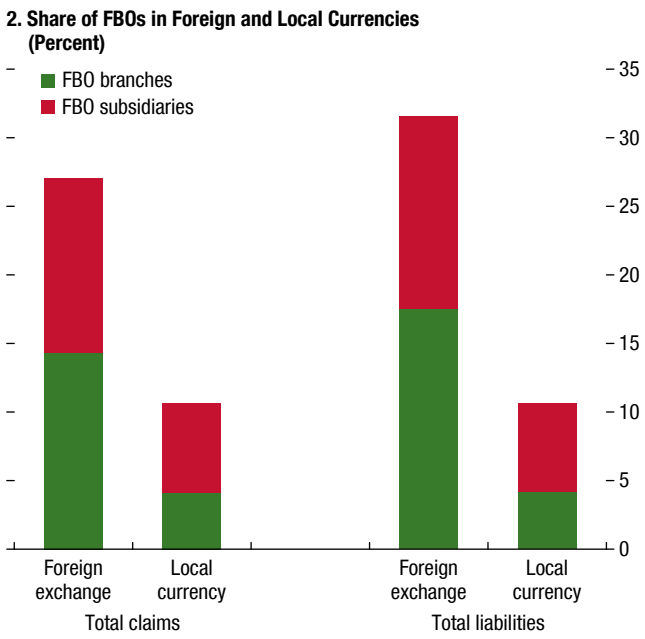
[2]The deposits available to branches are not covered by deposit insurance schemes and are therefore likely corporate deposits.

Figure 1.SF.1. Indicators of the Importance of Foreign Banking Offices

FBOs are an important element of the international banking system ...



... particularly for foreign currency credit.



Sources: Bank for International Settlements; and IMF staff estimates.
Note: In panel 1, foreign claims follow the Bank for International Settlements' (BIS) definition, which equals the sum of the three bars. The calculation is based on 19 BIS reporting countries that provide data according to the type of reporting bank in the locational banking statistics. Cross-border claims by domestic banks are made by domestic banks in their home country to counterparties in other countries. FBO local claims are made by foreign branches and subsidiaries to counterparties in their host country. FBO cross-border claims are made by foreign branches and subsidiaries to counterparties in a third country. FBO = foreign banking office.

be resolved—in particular, liquidity can be transferred out of branches before resolution takes place. By contrast, subsidiaries can be more easily resolved.

The choice of international banking model is less clear from a global perspective. The relative merits of branch and subsidiary networks from a global perspective depend on trade-offs between the branch model's flexibility to mitigate local funding problems and branches' greater openness to global shocks. In theory, subsidiaries are more readily resolvable because they have lower spillover costs should a local shock compromise their solvency; but in practice, a global group may support a troubled subsidiary to contain potential reputational damage. Uncertainty over global banks' response to local subsidiaries is crucial in countries under pressure (for example, in Turkey, five foreign banking groups have local operations that together account for a 25 percent share of the domestic banking market).

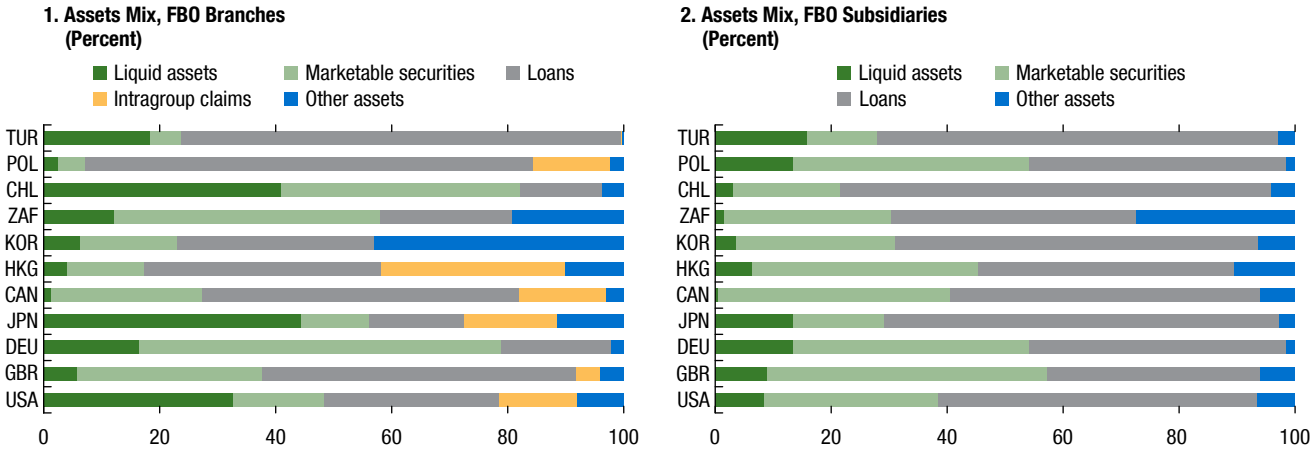
With their local perspective, many host regulators have gradually tightened their regulation and supervision of foreign bank branches. Such tightening was partly in response to excessive risk taking by some FBOs before the global financial crisis, allowed by weak governance and limited supervision, as well as difficulties with sharing relevant supervisory information across borders during the crisis. A few countries (Brazil, Mexico, Russia, South Africa) have disallowed branches altogether, but more often local policymakers have tightened branches' financial, operating, and governance requirements to converge with the stricter rules governing subsidiaries. This approach has proceeded on several fronts, such as tighter liquidity requirements at the branch level, structural subsidiarization initiatives, and other measures including resolution planning, stress testing, and informal guidance (Table 1.SF.2).

Global Banking Is Becoming More Decentralized and Fragmented at a Time When Financial Conditions May Tighten Further

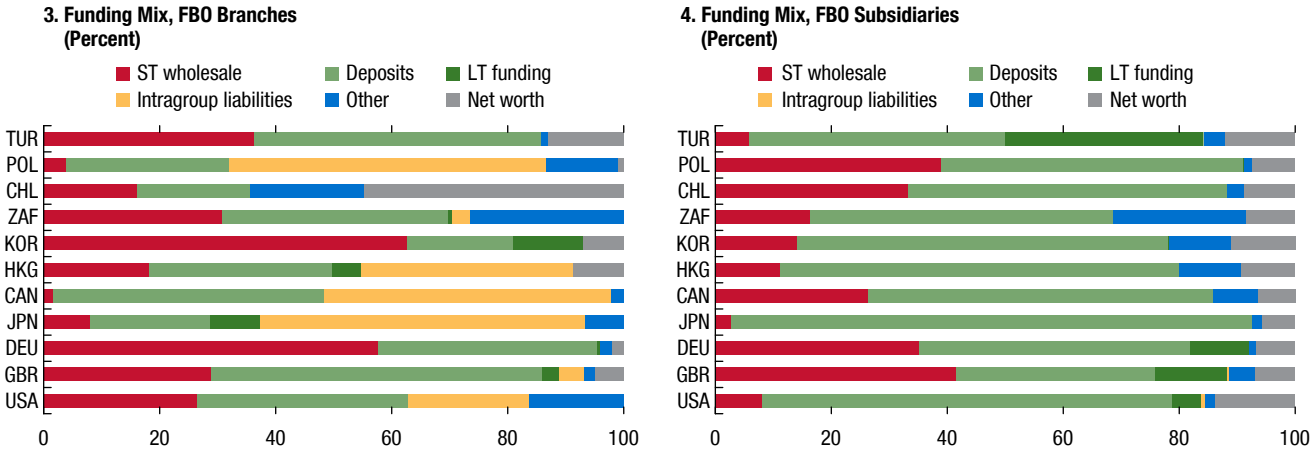
Foreign branches have increased their liquid assets in a number of banking systems since 2010. Branches

Figure 1.SF.2. Foreign Bank Branches and Subsidiaries: Balance Sheet Structures (End-2017)

Both branches and subsidiaries lend to customers, but branches also provide intragroup liquidity.



Branches rely on intragroup funding, while subsidiaries have broader deposit bases.



Sources: KPMG; national regulators and supervisors; S&P Global Market Intelligence; and IMF staff analysis.
Note: This figure is based on a selected number of countries for which data on branches and subsidiaries are available, and shows foreign bank offices operating in each country. Liquid assets include cash, reserves at the central bank, and holdings of government securities. Data labels in the figure use International Organization for Standardization (ISO) country codes. FBO = foreign banking office; LT = long term; ST = short term.

Table 1.SF.1. Main Advantages and Disadvantages of Centralized and Decentralized International Banking Models

Provision of Services	Centralized models have greater flexibility to transfer funds across borders, helping banking groups provide services to multinational companies.
	However, research suggests that lending provided by subsidiaries can be less procyclical than credit supplied by branches.
Resilience of Banking Groups	Centralized banking groups are more susceptible to contagion because distress in one entity can be transmitted more readily to other entities in the banking group.
	In decentralized models, banking groups can be shielded from distress in local entities. However, if the parent bank supports the local entity to limit reputational risk, this benefit is reduced.
	Although subsidiaries operating in decentralized models might receive limited liquidity support from the rest of the group, the fact that they are separate legal entities may mean they have more resilient funding profiles than branches.
Resolution	Subsidiaries, as separate legal entities, can be more easily resolved than branches.

Sources: Beck and others 2015; Berrospide and others 2016; Ervin 2018; Faykiss, Grosz, and Szigel 2013; Fiechter and others 2011; Goldberg and Gupta 2013; Hoggarth, Hooley, and Korniyenko 2013; Vinals and others 2013; discussions with market contacts; and IMF staff analysis.

Table 1.SF.2. Examples of Changes in the Regulation of Foreign Branches

	Structural Subsidiarization	Other Measures
Before 2015	A series of structural measures were introduced: • United Kingdom: Ring-fencing provisions recommended in ICB (2011) aka The Vickers Report and Liikanen and others (2012). • United States: Dodd-Frank Act and Volcker Rule (2010). These measures do not explicitly restrict cross-border funding, but they are intended to insulate activities vital to the real economy from reputation- or exposure-related contagion from elsewhere in the banking group, and tend to bring foreign banks' branches further toward domestic regulatory and supervisory oversight.	Of 31 countries in an OECD survey, • 22 impose local financial requirements on FBO branches. • 14 have changed regulation of FBO branch operations. • 4 effectively require local entities. • Nearly half may require systemic operations to convert to subsidiaries, depending on size, complexity. and other considerations. In emerging market economies, specific requirements on branch operations exist in Indonesia, India, and Singapore.
2015–Present	In the United States, • Regulation YY (implemented in 2016) requires FBOs with assets greater than $50 billion to establish intermediate holding companies subject to capital and liquidity rules as well as stress tests. • The Intermediate Holding Company framework includes branches within the "responsible officer" governance perimeter.	The framework in the United States includes: • A 14-day liquidity buffer for U.S. branch operations. • A 30-day liquidity buffer for the U.S. Intermediate Holding Company.
Emerging and Future	New measures are emerging: • The European Union is currently defining an Intermediate Parent Undertaking framework. • The United Kingdom is updating its approach to authorization and supervision of FBO branches, emphasizing a pragmatic balance between safety and openness.	In the United States, • In an effort to tailor regulation, many of the FBOs are permitted to submit limited or reduced resolution plans in 2018. • In 2018, for the first time, systemic FBO branches of six non-U.S. global systemically important banks must be explicitly recognized in resolution plans. • 2018 guidance requires FBOs to conform to resolution liquidity requirements, including intragroup liquidity tracking. Intragroup liquidity transfers are permitted, but should be supported by financial and legal impact analyses. • Material branches must identify and map financial and operational interconnections that affect other group entities or the U.S. resolution strategy.

Sources: Cleary Gottlieb 2017; Financial Stability Board 2014; Gambacorta and van Rixtel 2013; Ichiue and Lambert 2016; IMF 2014; OECD 2017; Vinals and others 2013; interviews with market participants; and IMF staff.
Note: FBO = foreign bank operations; OECD = Organisation for Economic Co-operation and Development.

have therefore faced trade-offs between holding liquidity, extending credit to customers, and lending to group entities. Where liquid assets have increased significantly, branches have tended to reduce either lending (for example, Japan and Germany), gross intragroup claims, or net lending to group affiliates (for example, the United States), fragmenting intragroup activity (Figure 1.SF.3, panels 1 and 2).[3]

These trends—either a cutback in credit or fragmentation of intragroup activity—could continue. Simulations based on branch balance sheets suggest that a further increase in branch liquidity ratios is likely to result in a significant reduction of loans to customers or intragroup claims (Figure 1.SF.3, panels 3 and 4). The simulations are run by assuming an increase in holdings of liquid assets—which increases the branch's liquidity ratio—and then calculating how much loans (intragroup credit) would need to drop if intragroup credit (loans) is held constant, increases (by 10 percentage points of assets), or falls (by 10 percentage points of assets).

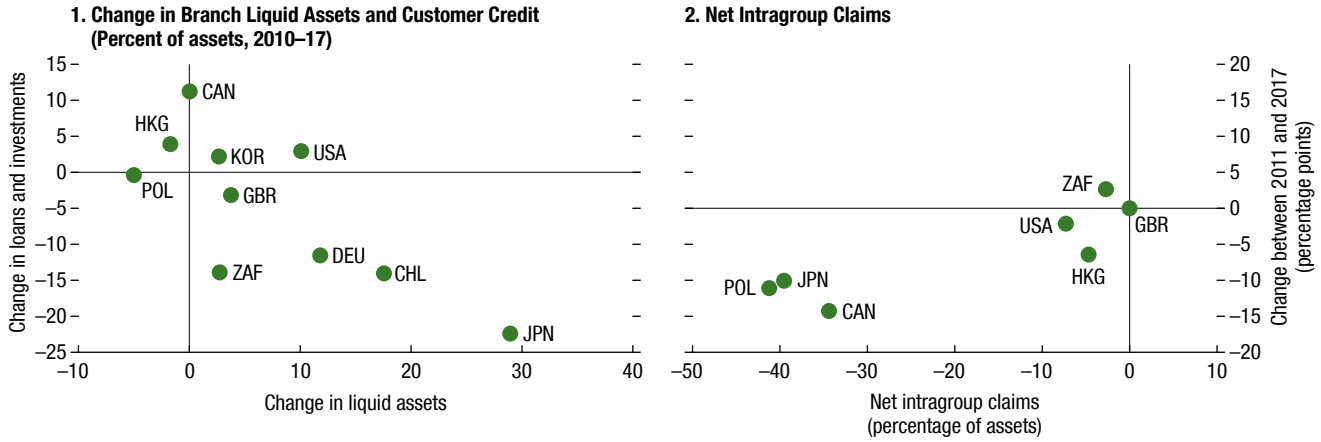
Higher branch liquidity may reflect a number of drivers. There have been commercial incentives in some countries to hold more liquid assets, such as

[3]In Turkey, branches have increased credit, but at the cost of a drop in liquid assets.

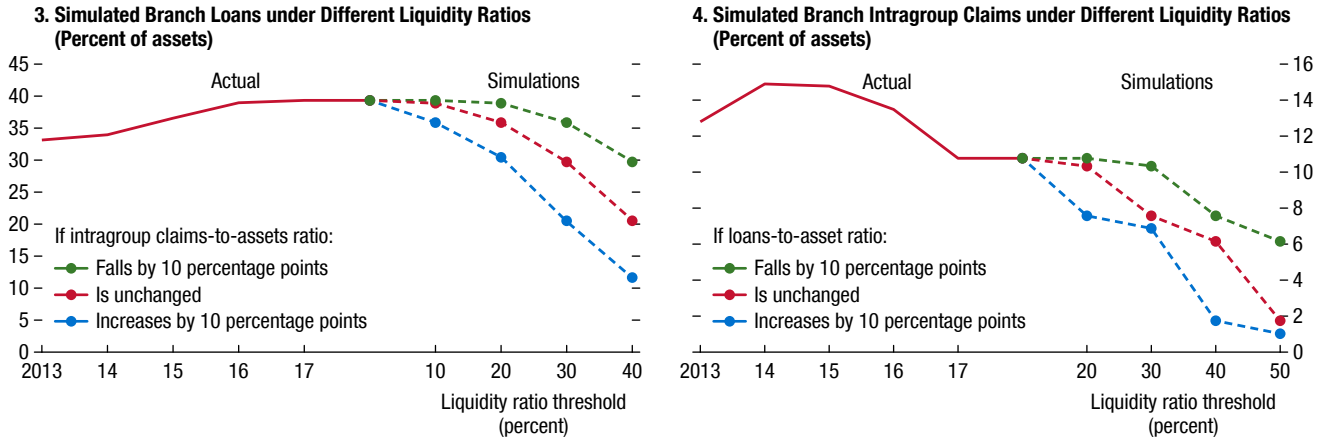
Figure 1.SF.3. Liquidity, Lending, and Intragroup Positions of Foreign Bank Branches

Liquid assets have risen while either credit has fallen ...

... or intragroup net claims have declined.



Further tightening of liquidity could prompt branches to continue reducing loans and intragroup lending.



Sources: Bank for International Settlements; KPMG; national regulators and supervisors; S&P Global Market Intelligence; and IMF staff analysis.
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes. Liquidity ratio = liquid assets divided by total assets. Liquid assets include cash, deposits with central banks, and government securities.

foreign banks seeking higher-yielding government bonds in the United States or foreign banks in Japan depositing swap proceeds. Bank liquidity positions could also reflect unconventional monetary policies, which result in the banking system in aggregate having elevated levels of reserves at central banks. Banks may also be looking to reduce liquidity risks by holding more liquid assets compared with the period before the global financial crisis. But conversations with bank treasury professionals suggest these changes also reflect host regulators' guidance and pressures.

Fragmentation of the international banking system could heighten systemic risks. Ring-fencing can help prevent contagion from spreading within banking groups and enhances the protection of local depositors in the event of a crisis overseas. However, heightened local control also weakens the ability of foreign banks to direct liquidity into country offices experiencing stress (Cetorelli and Goldberg 2016; Reinhardt and Riddiough 2014; Kerl and Niepmann 2016). If branch access to intragroup support is curtailed, the ability of foreign banks to access central bank liquidity assistance becomes more important. A study by the Bank for International Settlements (2017a) finds that eligibility of FBOs for central bank liquidity varies across jurisdictions; in several countries, subsidiaries are eligible but branches are not.

Table 1.SF.3. Policy Recommendations to Manage Risks in Banking Groups

Home-Host Collaboration	Where home-host collaboration does not currently take place, regulators should more actively coordinate. Where home-host collaboration agreements already exist, regulators should assess whether changes are needed to make them more effective. For example, BIS (2017b) reports that although there has been progress on the sharing of information, challenges remain and more work is needed to improve the flow of information.
Regulatory Coordination	Greater coordination is needed to ensure that measures adopted in individual countries do not impose significant costs on the global financial system. International standards for regulatory and supervisory regimes applied to large, internationally active banks should be consistently implemented. Subsidiarization and ring-fencing measures should be assessed to see whether they provide incentives for risk migration into the less regulated nonbank sector.
Enhanced Resolution	Harmonization of creditor hierarchies would facilitate cross-border resolution. Significant differences in creditor hierarchies between jurisdictions, particularly in the treatment of deposits, constitute a potential obstacle to cross-border resolution of branches in an international banking group. If a home country's legal regime ranks depositors lower (or deposit insurance is less) than the host country's regime, the host authorities may have an incentive to ring-fence the branch. In addition, better dissemination of information about international bank branches and their exposures—including through more regular, consistent, and comprehensive use of legal entity identifiers by all supervisors involved—can improve host country authorities' visibility into the full range of risks to which a branch in the host country is exposed.
Central Bank Liquidity Support	Host central banks may also consider providing liquidity assistance to foreign branches if they do not already do so. Home supervisors should facilitate host liquidity support by providing enhanced information about banking group conditions and risks.

Source: IMF staff.

Changes in the regulation of branch liquidity need to be managed carefully at a time when monetary policy changes are also tightening foreign currency liquidity conditions. The collision between structural and cyclical tightening could make a sudden spike in funding costs more likely. Alternatively, banking groups could respond to restrictions on branch networks by increasing their cross-border lending, which has historically been a more procyclical supply of credit than lending through branches (Correa, Goldberg, and Rice 2015). Local banks might look to fill the gap left by FBOs, but might need to finance a sharp expansion in credit with less stable short-term funding.

Finally, this regulatory tightening might result in lower provision of some services for which multinational corporate clients currently have few effective substitutes. This could cause these companies to turn to nonbank substitutes whose risks are not fully understood (Beck and others 2015; Vinals and others 2013).

Policy Initiatives Could Help Manage Risks at the Local Entity and Group Level

A number of policies should be adopted to manage risks in banking groups (Table 1.SF.3). A holistic regulatory approach can help mitigate branch risks and reduce the need for ring-fencing measures. This should involve better home-host collaboration, regulatory coordination, enhanced resolution, and central bank liquidity support.

References

Adrian, Tobias, Richard Crump, and Emanuel Moench. 2013. "Pricing the Term Structure with Linear Regressions." Federal Reserve Bank of New York Staff Report 340, New York.

Ahuja, Ashvin, Kevin Wiseman, and Murtaza H. Syed. 2017. "Assessing Country Risk: Selected Approaches." IMF Technical Notes and Manuals 17/08, International Monetary Fund, Washington, DC.

Ait-Sahalia, Yacine, and Jean Jacod. 2012. "Analyzing the Spectrum of Asset Returns: Jump and Volatility Components in High Frequency Data." *Journal of Economic Literature* 50 (4): 1007–50.

Andersen, Torben G., Tim Bollerslev, and Francis X. Diebold. 2006. "Roughing It Up: Including Jump Components in the Measurement, Modeling, and Forecasting of Return Volatility." *The Review of Economics and Statistics* 89 (4): 701–20.

Aquilina, Matteo, Brian Eyles, Jia Shao, and Carla Ysusi. 2018. "How Do Participants Behave during Flash Events? Evidence from the UK Equity Market." Financial Conduct Authority Research Note, London.

Arslanalp, Serkan, and Takahiro Tsuda. 2014. "Tracking Global Demand for Emerging Market Sovereign Debt." IMF Working Paper 14/39, International Monetary Fund, Washington, DC.

Bank of England. 2018. *Financial Stability Report.* Issue 42. London: Bank of England.

Bank for International Settlements (BIS). 2017a. "Designing Frameworks for Central Bank Liquidity Assistance: Addressing New Challenges." Committee on the Global Financial System Paper 58, Basel.

———. 2017b. "Fixed Income Market Liquidity." Committee on the Global Financial System Paper 55, Basel.

———. 2017c. "Progress Report on the Implementation of Principles for Effective Supervisory Colleges." Basel Committee on Banking Supervision, Basel.

———. 2017d. "Repo Market Functioning." Committee on the Global Financial System Paper 59, Basel.

Beck, Roland, John Beime, Francesco Patermo, Jolana Peeters, Julio Ramos-Tallada, Cyril Rebillard, Dennis Reinhardt, Lisa Weissenseel, and Julia Worz. 2015. "The Side Effects of National Financial Sector Policies: Framing the Debate on Financial Protectionism." ECB Occasional Paper 166, European Central Bank, Frankfurt.

Berrospide, Jose, Ricardo Correa, Linda Goldberg, and Friederike Niepmann. 2016. "International Banking and Cross-Border Effects of Regulation: Lessons from the United States." Federal Reserve Bank of New York Staff Report 793, New York.

Cetorelli, Nicola, and Linda Goldberg. 2016. "Organizational Complexity and Balance Sheet Management in Global Banks." Working Paper 22169, National Bureau of Economic Research, Cambridge, MA.

Cleary Gottlieb Steen & Hamilton LLP. 2017. "New Resolution Plan Guidance for 2018 Plans for Largest Foreign Banks & Feedback for December 2017 Plans for 16 Domestic Banks." Alert Memorandum, March 27.

Committee on the Global Financial System (CGFS). 2010. "Funding Patterns and Liquidity Management of Internationally Active Banks." CGFS Paper 39, Basel.

Commodity Futures Trading Commission (CFTC). 2018. "Sharp Price Movements in Commodity Futures Markets." CFTC Staff Report. June.

———. 2012. "Banking Globalization and Monetary Transmission." *Journal of Finance* 67 (5): 1811–43.

Correa, Ricardo, Linda Goldberg, and Tara Rice. 2015. "International Banking and Liquidity Risk Transmission: Evidence from the United States." *IMF Economic Review* 63 (3): 626–43.

Diebold, Francis, and Kamil Yilmaz. 2009. "Measuring Financial Asset Return and Volatility Spillovers, with Application to Global Equity Markets." *Economic Journal* 119 (534): 158–71.

———. 2012. "Better to Give Than to Receive: Predictive Directional Measurement of Volatility Spillovers." *International Journal of Forecasting* 28: 57–66.

Durham, J. Benson. 2013. "Which Component of Treasury Yields Belongs in Equity Valuation Models?" *The Journal of Portfolio Management* 39 (4): 80–90.

Ervin, Wilson. 2018. "Understanding 'Ring-Fencing' and How It Could Make Banking Riskier." Brookings Institution, Washington, DC. https://www.brookings.edu/research/understanding-ring-fencing-and-how-it-could-make-banking-riskier/.

European Commission. 2018. "Notice to Stakeholders: Withdrawal of the United Kingdom and EU Rules in the Field of Post-Trade Financial Services." Brussels.

Faykiss, Peter, Gabriella Grosz, and Gabor Szigel. 2013. "Transforming Subsidiaries into Branches—Should We Be Worrying about It?" MNB Occasional Papers 106, Central Bank of Hungary, Budapest.

Fiechter, Jonathan, Inci Otker-Robe, Anna Ilyina, Michael Hsu, Andre Santos, and Jay Surti. 2011. "Subsidiaries or Branches: Does One Size Fit All?" IMF Staff Discussion Note, International Monetary Fund, Washington, DC.

Financial Stability Board. 2014. "Structural Banking Reforms: Cross-Border Consistencies and Global Financial Stability Implications." Basel.

———. 2018. "FSB Correspondent Banking Data Report–Update." Basel.

Gambacorta, Leonardo, and Adrian van Rixel. 2013. "Structural Bank Regulation Initiatives: Approaches and Implications." BIS Working Paper 412, Bank for International Settlements, Basel.

Glosten, Lawrence R., Ravi Jagannathan, and David E. Runkle. 1993. "Relationship between the Expected Value and Volatility of the Nominal Excess Returns on Stocks." *Journal of Finance* 48: 1779–801.

Goldberg, Linda, and Arun Gupta. 2013. "Ring-Fencing and 'Financial Protectionism' in International Banking." *Liberty Street Economics* blog, January 9. Federal Reserve Bank of New York. http://libertystreeteconomics.newyorkfed

.org/2013/01/ring-fencing-and-financial-protectionism-in-international-banking.html.

Hoggarth, Glenn, John Hooley, and Yevgeniya Korniyenko. 2013. "Which Way Do Foreign Branches Sway? Evidence from the Recent UK Domestic Credit Cycle." BOE Financial Stability Paper 22, Bank of England, London.

Huang, Xin, and George Tauchen. 2005. "The Relative Contribution of Jumps to Total Price Variance." *Journal of Financial Econometrics* 3 (4): 456–99.

Ichiue, Hibiki, and Frederic Lambert. 2016. "Post-Crisis International Banking: An Analysis with New Regulatory Survey Data." IMF Working Paper 16/88, International Monetary Fund, Washington, DC.

Independent Commission on Banking (ICB). 2011. "Final Report: Recommendations." September.

International Monetary Fund (IMF). 2012. "The Liberalization and Management of Capital Flows: An Institutional View." IMF Policy Paper, Washington, DC.

———. 2014. "Cross-Border Bank Resolution: Recent Developments." IMF Policy Paper, Washington, DC.

———. 2015a. "Assessing Reserve Adequacy—Specific Proposals." IMF Policy Paper, Washington, DC.

———. 2015b. "Managing Capital Outflows: Further Operational Considerations." IMF Policy Paper, Washington, DC.

———. 2015c. "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." IMF Staff Discussion Note 15/80, Washington, DC.

———. 2016a. "Capital Flows—Review of Experience with the Institutional View." IMF Policy Paper, Washington, DC.

———. 2016b. "Ireland: Financial System Stability Assessment." IMF Country Report 16/258, Washington, DC.

———. 2016c. "Mexico: Financial System Stability Assessment." IMF Country Report 16/361, Washington, DC.

———. 2017a. "Japan: Financial System Stability Assessment." IMF Country Report 17/244, Washington, DC.

———. 2017b. "Luxembourg: Financial System Stability Assessment." IMF Country Report 17/122, Washington, DC

———. 2017c. "People's Republic of China: Financial System Stability Assessment." IMF Country Report 17/358, Washington, DC.

———. 2017d. "Recent Trends in Correspondent Banking Relationships—Further Considerations." IMF Policy Paper, Washington, DC.

———. 2018a. "Euro Area Policies: Financial System Stability Assessment." IMF Country Report 18/226, Washington, DC.

———. 2018b. *External Sector Report: Tackling Global Imbalances amid Rising Trade Tensions*. Washington, DC: World Bank.

———. 2018c. "France: Selected Issues." IMF Country Report 18/244, Washington, DC.

———. 2018d. "The IMF's Annual Macroprudential Policy Survey—Objectives, Design, and Country Responses." IMF Policy Paper, Washington, DC.

———. 2018e. "Romania: Financial Sector Assessment Program." IMF Country Report 18/160, Washington, DC.

———. 2018f. "Turkey: 2018 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Turkey." Washington, DC.

———. 2018g. "United States 2018 Article IV Consultation." IMF Country Report 18/207. Washington, DC.

International Monetary Fund (IMF) and World Bank. 2016. "Development of Local Currency Bond Markets: Overview of Recent Developments and Key Themes." Staff Note for the G20 International Financial Architecture Working Group, Washington, DC.

International Swaps and Derivatives Association. 2017. "Brexit and Contractual Certainty." New York. https://www.isda.org/2017/10/09/brexit-and-contractual-certainty/.

Kerl, Cornelia, and Friedericke Niepmann. 2016. "What Determines the Composition of International Bank Flows?" International Finance Discussion Paper 1170. Board of Governors of the Federal Reserve System, Washington, DC.

Liikanen, Erikki, Hugo Banziger, Jose Manuel Campa, Louis Gallois, Monique Goyens, Jan Pieter Krahnen, Marco Mazzucchelli, Carol Sergeant, Zdenek Tuma, Jan Vanhevel, Herman Wijffels. October 2, 2012. "High-Level Group Reforming the Structure of the EU Banking Sector." EU, Brussels, Belgium.

Lu, Yinqiu, and Dmitry Yakovlev. 2018. "Instruments, Investor Base, and Recent Developments in the Malaysian Government Bond Market." IMF Working Paper No. 18/95, International Monetary Fund, Washington, DC.

McCauley, Robert, Patrick McGuire, and Goetz von Peter. 2010. "The Architecture of Global Banking: From International to Multinational." *BIS Quarterly Review*. March,

Moody's. 2018. "North American Loan Covenant Quality Indicator: Protections Hit Weakest Level on Record as Conditions Continue to Favor Borrowers." Moody's, New York.

Nedeljkovic, Milan, and Christian Saborowski. 2017. "The Relative Effectiveness of Spot and Derivatives Based Intervention: The Case of Brazil." IMF Working Paper 17/11, International Monetary Fund, Washington, DC.

Organisation for Economic Co-operation and Development (OECD). 2017. "The Conditions for Establishment of Subsidiaries and Branches in the Provision of Banking Services by Non-Resident Institutions." January, OECD, Paris.

Reinhardt, Dennis, and Steven J. Riddiough. 2014. "The Two Faces of Cross-Border Banking Flows." BOE Working Paper 498. Bank of England, London.

Verdelhan, Adrien. 2018. "The Share of Systematic Variation in Bilateral Exchange Rates." *Journal of Finance* 73: 375–418.

Vinals, Jose, Ceyla Pazarbasioglu, Jay Surti, Aditya Narain, Michaela Erbenova, and Julian Chow. 2013. "Creating a Safer Financial System: Will the Volcker, Vickers and Liikanen Structural Measures Help?" IMF Staff Discussion Note 13/4, International Monetary Fund, Washington, DC.

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CHAPTER 2

REGULATORY REFORM 10 YEARS AFTER THE GLOBAL FINANCIAL CRISIS: LOOKING BACK, LOOKING FORWARD

Summary

The global financial crisis forced an overhaul of the global financial regulatory architecture. New standards, tools, and practices were developed, implementation was launched across the world, and the IMF was an important contributor to this effort.

With the benefit of hindsight, this chapter reviews the main failings in financial sector oversight before the crisis and assesses the progress in implementation of the reform agenda designed to address them. It also looks at whether shifts in market structure and risks in the global financial system since the crisis have been in the direction the new regulatory agenda intended—that is, toward greater safety.

The assessment shows that a decade after the global financial crisis, much progress has been made in reforming the global financial rulebook. The broad agenda set by the international community has given rise to new standards that have contributed to a more resilient financial system—one that is less leveraged, more liquid, and better supervised. Key successes include implementation of the Basel III capital and liquidity accords and widespread adoption of stress testing for the banking sector. The forms of shadow banking more closely related to the global financial crisis have been curtailed, and most countries now have macroprudential authorities and some tools with which to oversee and contain risks to the whole financial system. Furthermore, bank supervision has become more intensive, especially at large banks, and bank resolution regimes have been improved, with the expectation of government bailouts appearing to have diminished.

The chapter also looks forward, identifying areas in which consolidation or further progress is needed. Key priorities include completing implementation of the leverage ratio and of frameworks for the cross-border resolution of banks and for insurer solvency. Macroprudential authorities must also have an adequate toolkit with which to contain systemic risks. Existing progress in challenging areas such as bank compensation practices and use of credit rating agencies must be built upon, but new thinking may also be needed.

Financial sector reform efforts must continue to be coordinated internationally. An evaluation of the broader impact of the reforms is advisable 10 years after the global financial crisis, and any unintended consequences of the reforms should be assessed and addressed. The IMF supports a proportionate approach to regulation and supervision—whereby the complexity of technical standards and supervisory efforts and scrutiny are assigned in proportion to an institution's systemic importance and a jurisdiction's global importance. A rollback of reforms could spawn opportunities for regulatory arbitrage and lead to a race to the bottom in regulation and supervision. This could make the global financial system less safe and could jeopardize financial stability.

As the financial system continues to evolve and new threats to financial stability emerge, regulators and supervisors should remain attentive to risks. Oversight in new areas such as fintech and cybersecurity should be priorities, and continued vigilance on the perimeter of prudential regulation, in areas such as asset management, is appropriate. Finally, no regulatory framework can reduce the probability of a crisis to zero, so regulators need to remain humble. Recent developments documented in the chapter show that risks can migrate to new areas, and regulators and supervisors must remain vigilant to this evolution.

Introduction

The global financial crisis provided the impetus for a major overhaul of financial regulation. No other financial crisis since the Great Depression had led to such widespread dislocation in financial markets and abrupt and persistent consequences for growth and unemployment, requiring a rapid, comprehensive, and internationally coordinated public sector response. Between 2007 and 2008, 24 countries experienced banking crises, with output today remaining below its precrisis trend in 85 percent of these countries (October 2018 *World Economic Outlook*). A candid acknowledgment that these costs resulted partly from weaknesses in the regulatory architecture and the failure of supervisors to curb the accumulation of vulnerabilities and excessive risk taking in the global financial sector was a key factor in the resulting overhaul of prudential rules and oversight.

The regulatory reform agenda agreed to by Group of Twenty (G20) leaders in 2009 elevated the discussions to the highest policy level and kept international attention focused on establishing a stronger set of globally consistent rules. With 10 years of hindsight, this chapter examines the progress toward regulatory reform, remaining gaps, and the emerging risks that may need to be tackled. The chapter starts by discussing what went wrong before the global financial crisis, identifying the key vulnerabilities behind it and how they accumulated. It then reviews the main reforms to the global regulatory and supervisory framework promoted by the international regulatory community to address these vulnerabilities, and provides a qualitative assessment of whether implementation of these measures has advanced as originally planned. The chapter also analyzes trends in selected indicators that shed light on the current resilience of the global financial system. The discussion focuses primarily on the advanced and large emerging market economies addressed by the Financial Stability Board (FSB) and the Basil Committee on Banking Supervision (BCBS),[1] for which the agenda was designed, but it also considers the degree to which other advanced or emerging market economies may have adapted their regulatory and supervisory frameworks. The chapter also looks ahead to the remaining challenges in completing the implementation of the reform agenda, addressing its consequences, and facing new risks. Despite its breadth, the chapter does not analyze the potential macroeconomic consequences of the reforms, an undeniably relevant but acutely complex undertaking being advanced by the FSB (FSB 2017e).

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What Went Wrong before the Global Financial Crisis?

The immediate trigger for the global financial crisis was the correction in U.S. house prices starting in 2006, but a deeper analysis points to the structural vulnerabilities that accumulated globally during the preceding housing boom. These boom years were witness to the accumulation of financial vulnerabilities in banks and other financial intermediaries, which gathered in a regulatory and supervisory environment that, with hindsight, proved inadequate. Once housing values turned, these vulnerabilities amplified the large losses experienced by global financial institutions exposed to U.S. mortgage-related securities beginning in 2007, leading to knock-on effects that were felt across global financial markets and institutions through at least 2012. The rest of this section briefly describes the buildup of vulnerabilities that the regulatory reform agenda set up to address.

Leverage rose procyclically during the housing boom, and both the quality and quantity of capital were insufficient to absorb large losses. Several years of relatively benign macroeconomic conditions and low interest rates had supported a sustained U.S. housing boom, during which house prices and private sector leverage rose sharply (Figure 2.1, panel 1). Banks expanded lending without much increase in capital by transferring loans to off-balance-sheet special purpose vehicles (SPVs) that securitized them and sold them to investors. In Europe, the adoption of the euro led to a convergence of interest rates and lower borrowing costs for households, contributing to housing booms in Ice-

[1]The BCBS currently consists of 28 jurisdictions and 45 institutions.

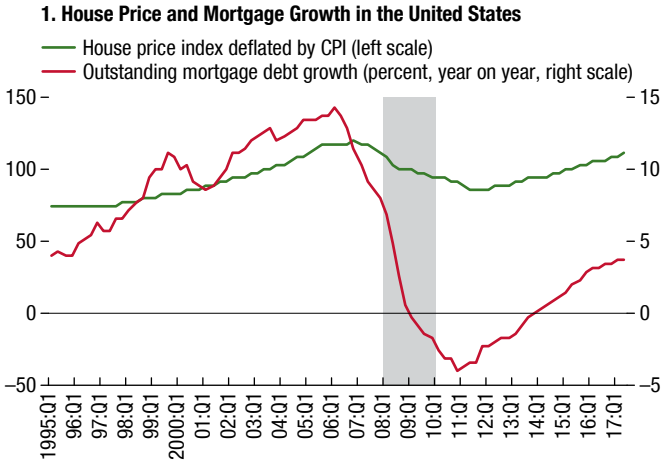
land, Ireland, and Spain.[2] Capital resources appeared strong at many institutions, but the high leverage and the collapse of SPVs exposed banks to greater losses and many instruments used by banks to meet their regulatory capital—so called Tier 2 instruments—had poor capacity to absorb losses.[3] Frameworks for stress testing banks were rudimentary, and tail risks, such as a widespread decline in house prices, had been underestimated.[4] Banks entered the crisis with relatively low provisions for losses, putting additional strain on their capital buffers. Thus, bank capital turned out to be an insufficient and unreliable cushion when conditions deteriorated. Leverage in the nonbank financial sector also rose as securitization expanded market funding for loan assets held both on and off balance sheets, while reducing regulatory capital charges.[5] The business models of some insurance companies, in areas such as monoline insurance, changed in the run-up to the crisis, also calling for a new approach toward risk management and solvency.

Risks related to liquidity and funding arose in many economies.

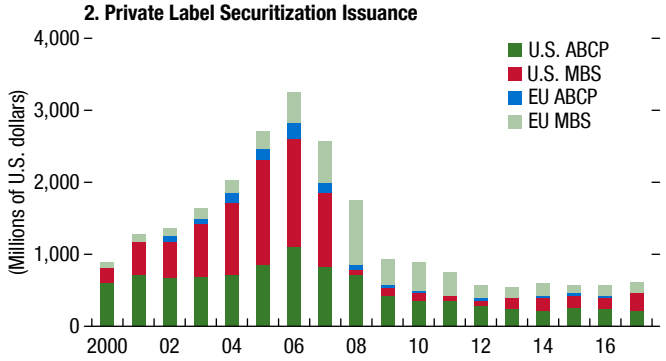
- Bank funding shifted toward short-term and uninsured market-based sources. A shift from deposit-based banking to short-term wholesale market funding allowed banks to grow lending portfolios aggressively, but with increasing liquidity and maturity transformation.[6] This market funding—provided by other banks and money market funds, among other things—was not covered by deposit insurance and often involved interlinked chains of maturity transformation where assets used as collateral passed along multiple intermediaries, raising counterparty risk and increasing fragility. For example, the off-balance-sheet vehicles where banks transferred loans to reduce capital charges relied almost exclusively on short-term market funding such as that for asset-backed commercial paper (Figure 2.1, panel 2).
- The use of complex products as collateral raised liquidity risks.[7] The availability of market

Figure 2.1. Developments in Housing, Credit, and Securitization

Before the crisis, as house prices reached historical highs, mortgages and household debt surged ...



... as did securitization.



Sources: Association for Financial Markets in Europe; CRE Finance Council; Fitch Ratings; Haver Analytics; IMF, Research Department house price data set; JPMorgan Chase & Co.; Merrill Lynch; and IMF staff calculations.
Note: The shaded area in panel 1 denotes the global financial crisis.
CPI = consumer price index; EU ABCP = European Union asset-backed commercial paper; EU MBS = European Union mortgage-backed securities; U.S. ABCP = United States asset-backed commercial paper; U.S. MBS = United States mortgage-backed securities.

[2]A similar process occurred in previous financial crises in advanced economies: Spain (1978), Norway (1987), Finland (1991), Sweden (1991), and Japan (1992). See Reinhart and Rogoff (2009).

[3]Some of these instruments required dividend payments even as the institution was failing.

[4]The IMF routinely used forward-looking stress testing in FSAPs, and since 2007 the GFSR's tests modeled the risks associated with securitized products and their distribution throughout the global financial system. The importance of adequate stress testing is apparent in that the use of the Supervisory Capital Assessment Program in the United States to ascertain capital needs to be covered by the Troubled Asset Relief Program marked a turning point, reviving confidence in the banking sector.

[5]See Ashcraft and Schuermann (2008) and Adrian (2017). Leverage also increased for structured products as originators created collateralized debt obligations (CDOs) from mortgage-backed securities and CDO-squared securities from underlying CDO assets.

[6]Liquidity transformation refers to the funding of illiquid—hard to sell—assets using liquid liabilities. Maturity transformation arises from the funding of long-term assets with short-term liabilities.

[7]In the United Kingdom, Northern Rock, for instance, grew its lending at nearly 20 percent per year from 2000 to 2007 by

funding relied on the perceived quality of the mortgage-backed securities and other complex assets used as collateral. Falling house prices reduced the value of many of these products, and their complexity and opacity led to confusion about their underlying value, further impeding market clearing and choking off market funding. Banks and other financial intermediaries that relied on this funding, such as Northern Rock in the United Kingdom, faced liquidity pressures, and insurers that had sold default protection on structured securities, such as AIG in the United States, started facing massive losses and margin calls. As credit losses mounted, the solvency of banks and insurers was threatened.

- Exchange rate risk also grew. In France, Germany, and the United Kingdom, banks posted U.S. mortgage-related securities as collateral to obtain U.S. dollar funding. In Iceland, banks used cheap short-term pound deposits to fund high-interest-rate lending at home. And in Central Europe, low-cost euro- and Swiss franc–denominated mortgages grew rapidly. While banks maintained limited balance sheet exposure to currency risk, their hedging relied on the continuous availability of short-term funding in dollar and other currencies, and the currency mismatches of ultimate borrowers made banks' loan portfolios vulnerable to currency fluctuations.

Large and interconnected institutions were a key vulnerability. Regulating and supervising large investment and commercial banks, like Lehman Brothers, Bear Sterns, or Dexia, with increasingly complex operations spread across the world and multiple financial markets, became a challenge for both home- and host-country authorities. The sheer size, interconnectedness, and opaqueness of their operations meant that troubles in one of these institutions could create havoc in the home country and rapidly propagate through the global financial system. For these reasons, large complex financial institutions became seen as "too big to fail," further strengthening moral hazard and incentives for risk taking. Beyond the banking sector, AIG, a large insurer, and other monoline insurers, played a key role in the market for asset-backed securities by selling default protection under assumptions that proved too optimistic. When short-term funding markets shut down, central players began to run short on liquidity and some came close to failure.

Supervision of increasingly complex financial systems and resulting systemic risk was challenging. In wholesale funding markets, banks and other financial institutions provided funding to one another to meet short-term liquidity needs using both unsecured and collateralized debt, creating vast networks that spread across the regulatory perimeter, supervisors, and jurisdictions. Interconnectedness also rose through the common exposure that multiple types of financial institutions in the United States and Europe had to mortgage-related securitized products with increasingly complex rules for transferring cash flows and allocating losses, both directly and through over-the-counter (OTC) derivatives.[8] These mortgage-backed securities were highly rated by ratings agencies paid by the issuers and that faced conflicts of interest (including advising issuers on how to structure the securities to maximize their high-rating tranches). The participation of insurers in selling default protection on these securities further increased the linkages across financial markets and participants. These multiple interconnections between highly leveraged institutions with fragile funding structures increased systemic risk and ultimately played an important role in propagating the effects of the financial shock well beyond the mortgage and banking sectors. In most countries, no single "macroprudential" authority had a view of how risks migrated across sectors, or powers and tools to contain such systemic risks.[9]

Compensation practices, market discipline, and corporate governance were unable to tame market participants' incentives to take excessive risks. Compensation practices encouraged risk taking across banks, and at a time when returns were high, they greatly rewarded it. Market discipline and self-regulation were unable to provide an effective brake to excessive risk taking. The originate-to-distribute model where mortgage originators sold off loans to be securitized and

issuing short-term market debt, using the mortgage loans it acquired as collateral.

[8]The most common type of derivative contract was credit default swaps that offered protection from potential credit losses resulting from defaults in broad portfolios of these instruments.

[9]Systemic risk is defined as "the risk of widespread disruption to the provision of financial services that is caused by an impairment of all or parts of the financial system, which can cause serious negative consequences for the real economy" (IMF and others 2016). Macroprudential policy is defined as the use of primarily prudential tools to limit systemic risk (Crockett 2000; FSB, IMF, and BIS 2011; IMF 2013).

sold to third-party investors weakened incentives for sound credit underwriting. Investors accepted ratings assigned to these products without much scrutiny. The existence of implicit guarantees further eroded market discipline and distorted incentives toward risk taking as well: for example, with government-sponsored enterprises in the United States that were heavily involved in buying securitized bank loans, and with "too-important-to-fail" institutions. Governance at many large financial institutions was too poor to understand or control these risks (Chapter 3 of the October 2014 *Global Financial Stability Report* [GFSR]). Finally, a preference for relatively light supervision allowed this expansion of risk without adequate oversight or buffers.

The absence of viable resolution frameworks for large complex financial institutions compounded problems. There had been no identification of systemically important financial institutions, and thus no special mechanisms for their resolution. Later, as large banks became insolvent, it led to lack of clarity about the resolution strategy, adding to uncertainty.[10] While some systemic firms, such as Bear Stearns, were sold, the failure of Lehman Brothers initiated one of the worst stages of the crisis as fears of counterparty risk turned into panic. At this stage, policymakers were forced to take coordinated actions to inject capital into significant financial institutions and issue deposit guarantees in several countries.

Assessing the Regulatory Agenda

With hindsight, the analysis of the developments described in the first section revealed that the prevailing regulatory framework was unable to contain the buildup of vulnerabilities and tame the incentives of market participants to take excessive risks. Shortly after the global financial crisis began, at the 2009 G20 summit, the international regulatory community convened to conduct a broad overhaul of the regulatory and supervisory framework.[11] Through a series of high-level goals in multiple areas, the new architecture aimed to: (1) enhance capital buffers and reduce leverage and financial procyclicality, (2) contain funding mismatches and currency risk, (3) enhance the regulation and supervision of large and interconnected institutions, (4) improve the supervision of a complex financial system, (5) align governance and compensation practices of banks with prudent risk taking, and (6) overhaul resolution regimes of large financial institutions. Through its multilateral and bilateral surveillance of its membership, including the Financial Sector Assessment Program (FSAP), Article IV missions, and its GFSRs, the IMF has played a critical role in facilitating implementation of the regulatory reform agenda (see Box 2.1).

This section discusses the measures taken, implementation, and progress achieved in these areas. In addition, this section presents selected indicators of banking activity, resilience, and risks that shed light on the current health of the global financial system. Based on information on the largest banks in 80 countries—35 advanced economies and 45 emerging market economies—it analyzes trends and assesses whether the changes are statistically significant.[12] The aim is not to draw a strict line of causality between progress in regulatory reform and trends detected in the indicators, given that these are as much affected by the global macroeconomic backdrop and policy measures taken since the global financial crisis as they are by changes in supervision and regulation. Nonetheless, an assessment of these trends reveals areas in which relatively more or less change can be detected in the structure of banking and in progress toward building resilience.

Enhancing Capital, Reducing Leverage and Financial Procyclicality

Improving the Quality and Quantity of Capital Under Basel III

The BCBS created a global framework for more resilient banks and banking systems: this meant more and better-quality capital. Focusing on common

[10]Although the Federal Reserve was able to arrange a rescue package for Bear Stearns, no buyer was found for Lehman Brothers, and the firm subsequently failed.

[11]Ahead of the 2009 G20 Summit in Pittsburgh, U.S. President Barack Obama laid out the goals of this effort: "Essential to this effort [to promote recovery and to restore prosperity] is reforming what's broken in the global financial system—a system that links economies and spreads both rewards and risks. For we know that abuses in financial markets anywhere can have an impact everywhere; and just as gaps in domestic regulation lead to a race to the bottom, so too do gaps in regulation around the world. Instead, we need a global race to the top, including stronger capital standards." U.S. President Barack Obama, Federal Hall, New York, September 14, 2009, ahead of the 2009 G20 Leaders Summit in Pittsburgh.

[12]See Online Annex 2.1 at www.imf.org/en/Publications/GFSR.

equity, Basel III increased the permanence and loss absorption of banks' capital (Figure 2.2, panel 1). In addition, it addressed the definition and composition of regulatory capital: it widened the risks being covered, balanced risk-based measures of capital with a new non-risk-based leverage ratio, and constrained the capital relief that banks could achieve by using their own models to calculate risk weights.[13] Basel III added capital cushions, such as the countercyclical capital buffer and capital conservation buffers, both of which can be drawn down at times of stress to mitigate procyclicality, and capital surcharges for systemic banks—a clear signal from the regulators that banks were not expected to skirt too close to the minimum regulatory standards. In addition, the BCBS completed its review of the regulatory treatment of sovereign exposures without changes to existing rules, as no consensus was reached.[14]

Implementation of the Basel III capital agreement has advanced largely as planned. Most jurisdictions implemented the agreement on time or shortly after the agreed-on timelines. As of March 2018, the BCBS had also assessed the timeliness and consistency of Basel III capital regulations for all its members under the Regulatory Consistency Assessment Programme (RCAP). Of the 19 assessments, 15 were compliant. Indonesia, Korea, and the United States were found largely compliant. The European Union (EU), grouping together nine Basel member jurisdictions, was found to be materially noncompliant.[15] All jurisdictions that were home to global systemically important banks (G-SIBs), including the EU, were found compliant with the G-SIB standards for imposing more intense supervision and surcharges for capital and leverage. Many non-BCBS countries have also implemented some parts of the Basel III capital agenda (Figure 2.2, panel 2).

Capital buffers have increased notably following the global financial crisis. Both regulatory capital ratios (Tier 1 and total capital ratios) have followed a steady upward trend since the crisis, and the global median common-equity-to-asset ratio (an inverse measure of leverage) has increased by more than 2 percentage points since 2010 (Figure 2.2, panel 3). By 2017, all ratios were significantly higher than before the crisis (Figure 2.2, panel 4).[16] In part, the increase in regulatory capital ratios has been achieved because banks have moved away from assets with higher regulatory risk weights (Figure 2.2, panel 5).[17] Considering that the definition of regulatory capital was made more stringent after the crisis, the observed postcrisis increases in regulatory capital ratios are particularly encouraging.[18]

IMF FSAP surveillance has identified areas for improvement in the implementation of capital standards. FSAP analysis is complementary to and broader than Basel RCAP monitoring. The assessments have paid special attention to the willingness of jurisdictions to set banks' individual capital standards higher than the international minimum that Basel expects, and to the effectiveness of supervisory review of institutions, including the willingness to require capital remedies if needed.[19] While jurisdictions hosting the majority of banking assets are deemed compliant or largely compliant, materially noncompliant ones host a small but non-negligible fraction of banking assets (Figure 2.2, panel 6). Common reasons for non-

[13]Floors to the risk reduction that can be achieved calibrated on the standard approaches were introduced (at 72.5 percent of the standard calculation).

[14]https://www.bis.org/press/p171207a.htm

[15]Divergences from the Basel standard in the EU included extended transitional treatment of small- and medium-sized enterprises and greater latitude given to banks using sophisticated approaches in calculating their capital requirements.

[16]The statistical significance of postcrisis buildups in capital buffers is markedly greater, for the full sample and for crisis countries, when the means tests are conducted on country-level data using the Financial Soundness Indicators database and the Global Financial Development database. See Online Annex 2.1 at www.imf.org/en/Publications/GFSR for details.

[17]Although the share of loans in total assets has not declined since the crisis, aggregate credit growth has declined in about three-quarters of countries analyzed. Based on a subsample of 47 countries for which there were sufficient annual observations, the average growth rate of real banking system credit to the private sector declined from the precrisis period (2000–07) to the postcrisis period (2010–15) in 27 countries. Real credit growth declined in 18 of the 27 BCBS countries.

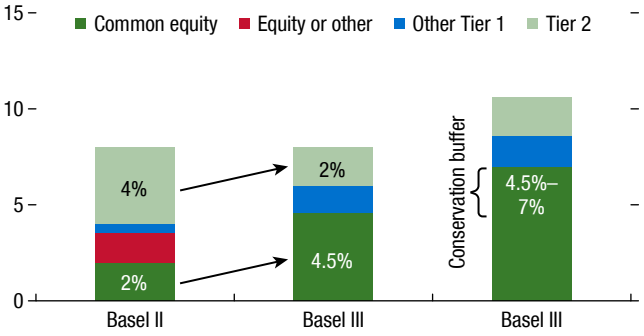
[18]However, vulnerabilities remain. Chapter 1 shows how in some larger banks in advanced countries, leverage is markedly higher when calculated using market valuations, and capital simulations indicate that profitability shocks could leave a sizable portion of bank assets in capital deficiency. In addition, private indebtedness is currently high in some countries, and borrowers' ability to pay could come under further strain due to adverse movements in exchange rates or interest rates.

[19]Two key FSAP tools are stress testing and the sectoral standards assessments. The FSAP stress tests examine the resilience of a system to shocks, which sheds light on whether national implementation or deviations from regulatory capital standards set by the BCBS could introduce vulnerability. The Basel Core Principles assessment, which goes beyond regulations and evaluates supervisory practices, provides a richer understanding of a jurisdiction's approaches to bank capital adequacy.

Figure 2.2. Bank Capital Requirements and the Evolution of Buffers

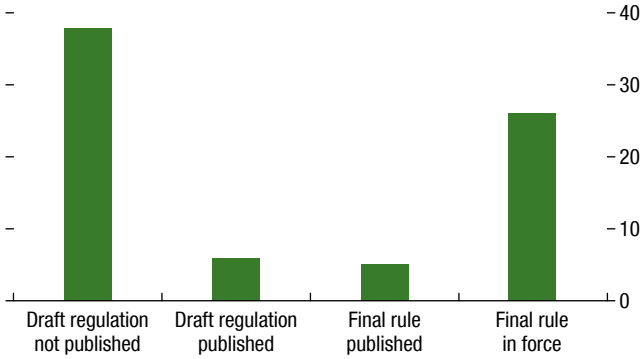
The Basel III standards called for higher and better-quality bank capital ...

1. Minimum Capital Requirements under Basel II and Basel III (Percent)



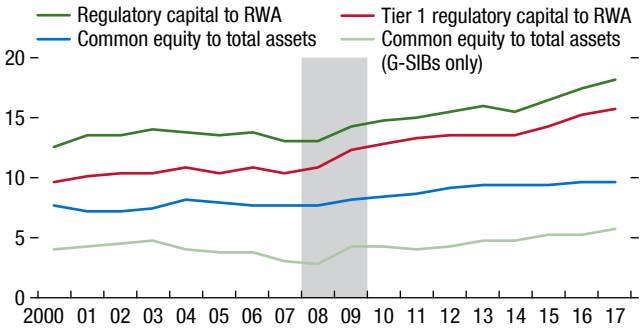
... and these standards were adopted well beyond the Basel Committee for Banking Supervision (BCBS) countries ...

2. Adoption of Definition of Capital by Non-BCBS Countries (Number of countries, as of end of 2015)



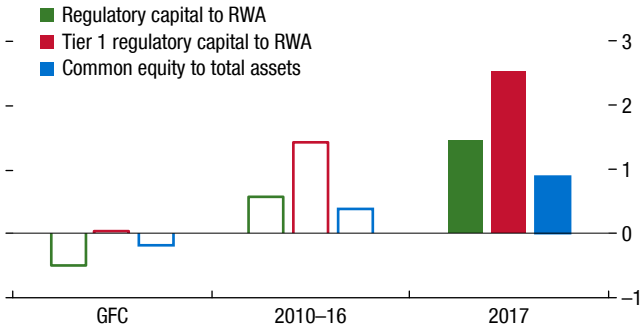
... thus contributing to a widespread postcrisis thickening of capital buffers ...

3. Capital Buffers (Percent)



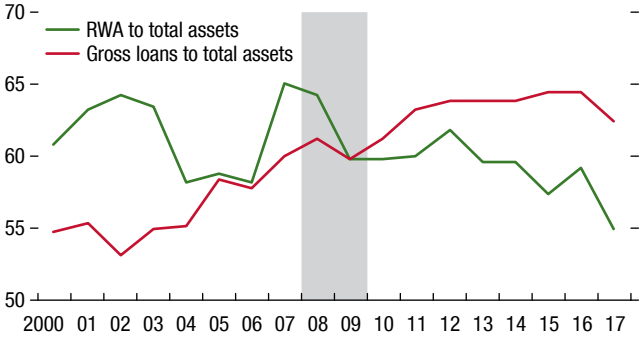
... leaving bank capital significantly larger today than before the crisis.

4. Changes in Capital Buffers Relative to Precrisis Period (Percentage points)



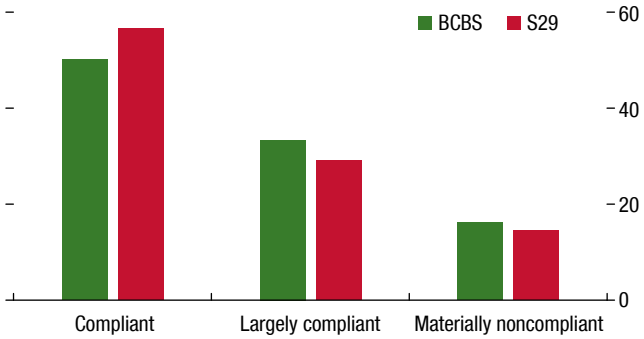
This was in part achieved through a de-risking of bank assets.

5. Bank Asset Composition (Percent)



Today, the majority of banking assets reside in countries with good-quality capital regulation and supervision.

6. Quality of Regulation and Supervision of Capital Based on FSAP Data (Percent of total banking assets)



Sources: Basel Committee on Banking Supervision (2010); Fitch Connect; IMF, 2017 Macroprudential Policy Survey; IMF, Financial Sector Assessment Program; World Bank, Global Financial Development Database; and IMF staff calculations.
Note: Panels 3 and 5 correspond to the global median across medians at the country level for all countries in the sample. The shaded area denotes the global financial crisis (GFC). In panel 4, each bar represents the difference in means in the GFC, in the 2010–16 period, and in 2017 relative to the pre-GFC period (2000–07). Solid bars indicate that the differences are statistically significant at the 10 percent level. In panel 6, the S29 is the group of 29 countries included in the Financial Stability Board Shadow Banking Monitor. Not all S29 and BCBS countries have been graded since the crisis. Panel 6 is based on the results of past and ongoing IMF FSAPs. BCBS = Basel Committee for Banking Supervision; FSAP = Financial Sector Assessment Program; G-SIBs = global systemically important banks; RWA = risk-weighted assets.

compliance are: political pressures against enforcing regulatory agreements, structural features of economies (such as the widespread presence of small- and medium-sized enterprises in the EU), and the fact that adequate powers and readiness to use them can take time to be internalized.[20]

Reducing the Procyclicality of Leverage

The main countercyclical capital tool is the countercyclical capital buffer (CCyB). This buffer should be activated to lean against the accumulation of systemic risks during periods of financial exuberance, and be released when the cycle turns.[21] At the end of 2017, some BCBS jurisdictions had not set the CCyB above zero, despite relatively large credit gaps, a measure of the difference between the current ratio of credit to GDP and its long-term trend (Figure 2.3, panel 1).[22] Outside the BCBS, the use of CCyB has been sparing. Reasons vary: some country authorities feel that risks can be sufficiently contained with other tools, either microprudential or macroprudential, or that taking into account other indicators of credit risk would weigh against its use. Others are concerned that activating the CCyB will lead to disintermediation as bank costs rise above those of less regulated sectors.

Shifts in accounting rules are also aimed at reducing procyclicality. Forward-looking provisioning is one tool that has been particularly effective. Some countries, such as Brazil and Mexico, already prescribe that loan loss provisions be recognized based on expected losses, and the two main international standards–settings boards for accounting have developed new standards that will require forward-looking estimates of "current expected credit losses."[23] Forward-looking provisioning should reduce the amount of lending at the top of the credit cycle because expected losses would rise, leading banks to curtail lending to conserve capital for provisioning.

Other tools have been used, as well. The capital conservation buffer and leverage ratio also contained in Basel III regulations should be more binding and limit balance sheet expansion in the upswing of the cycle. Regulation also allows the capital conservation buffer to be used in times of stress. The capital conservation buffer has been introduced very broadly, but progress in the leverage ratio has been more gradual. Countries have also used tools such as caps on credit growth, although such caps have been used primarily in emerging markets.[24]

There are indications that procyclicality of bank credit has also declined. A simple measure—the regression coefficient of real quarterly bank credit growth on real GDP growth, both detrended—indicated significant procyclicality in a sample of 61 countries in the precrisis period. Then its value declined and it became nonsignificant in the postcrisis period. When estimated at the country level, this measure shows declines in procyclicality of credit in 60 percent of the sample countries, and in slightly more than half of BCBS countries (Figure 2.3, panel 2).[25]

More-targeted tools have been used most often in relation to household credit risks in real estate. Although sectoral tools have been used for corporate sector risks, tools aimed at containing the cyclical risks related to real estate prices are much more common (Figure 2.3, panel 3). Some countries assign higher risk weights to housing loans with higher loan-to-value ratios. This approach will be applied more widely as the revision to the standardized approach for credit risk—one of the last aspects of Basel III—is adopted. Many countries have introduced loan-to-value caps, sometimes differentiated by the size of the loan, whether the house is a first or second home, or tenor of the loan. Debt-service-to-income ratios—which require a great deal of information about borrowers and which

[20]Successive FSAPs in Germany (2011 and 2016) and Japan (2012 and 2017) found that the supervisory authorities did not impose higher than minimum capital requirements, even when the powers to do so had been provided.

[21]The countercyclical capital buffer in most countries is designed to be raised with a delay, to allow banks time to build up capital, but can be released immediately.

[22]Many European countries—the Czech Republic, Iceland, Norway, Slovakia, Sweden, and the United Kingdom—have set the CCyB at levels between 0.5 and 2 percent. In addition, Hong Kong SAR has currently set its CCyB at 1.875.

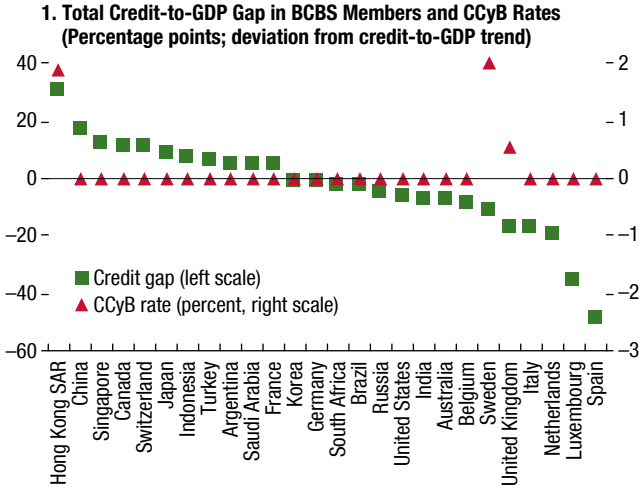
[23]These standards-setting bodies are the International Accounting Standards Board (IASB) globally and the Financial Accounting Standards Board (FASB) in the United States. The International Financial Reporting Standard (IFRS 9) for financial instruments, set by the IASB, was required beginning in January 2018. The FASB does not require this for listed companies until 2020. For a discussion, see Cohen and Edwards (2017).

[24]For example, China's Macroprudential Assessment tool looks at the pace of lending, with measures determined accordingly.

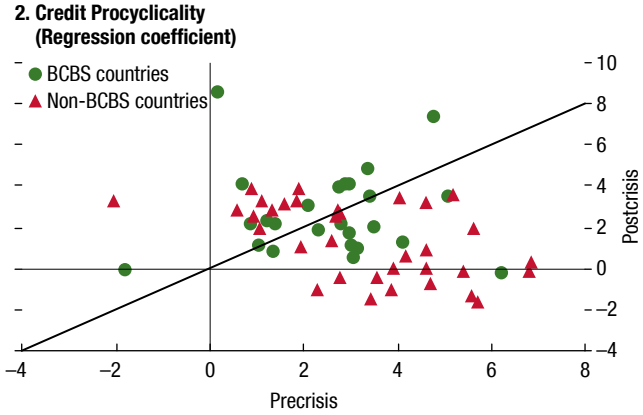
[25]Furthermore, bank-level analysis suggests that leverage has gone from being slightly procyclical in the precrisis period to slightly countercyclical in the postcrisis period. This analysis was conducted on a subsample of banks for which a sufficiently long time series was available. This subsample contained only banks in Canada and the United States.

Figure 2.3. Procyclicality: Regulatory Tools, Outcomes, and IMF Technical Assistance

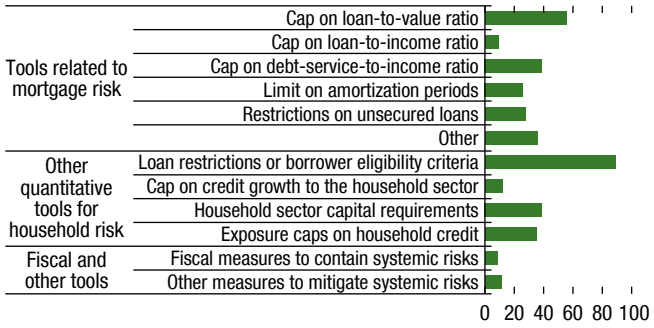
Despite positive credit gaps in many countries, countercyclical capital buffers have been triggered infrequently.



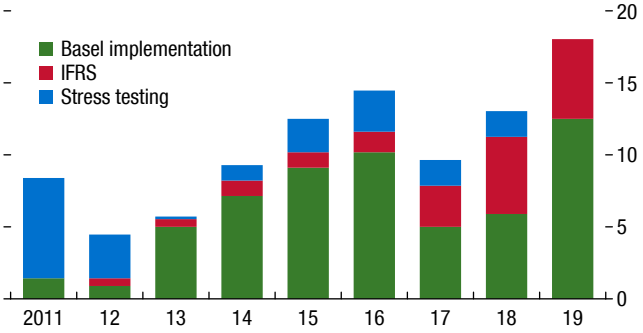
Most countries have seen declining procyclicality of their bank credit since the crisis ...



... as a variety of sectoral countercyclical tools have taken hold.



A fundamental IMF role in the reform agenda has been through its technical assistance activities.



Sources: Bank for International Settlements; Fitch Connect; IMF, 2017 Macroprudential Policy Survey; IMF, Financial Sector Assessment Program; and IMF staff calculations.
Note: In panel 1, credit-to-GDP gap is calculated as of 2017:Q3. In panel 2, each point represents the country-level regression coefficient of real quarterly banking system credit growth on quarterly real GDP growth, both detrended. The horizontal axis shows the coefficient estimated for the precrisis period (2000–07), and the vertical axis shows the coefficient for the postcrisis period (2010–15). BCBS = Basel Committee for Banking Supervision; CCyB = countercyclical capital buffer; IFRS = International Financial Reporting Standards.

can become less binding just as low interest rates encourage leveraging—are used in several countries, particularly in Europe and Asia. Despite their greater resilience to interest rate shifts, debt-to-income ratios have been used more sparingly.

Stress Testing Capital Buffers

Stress testing has become a central component of bank supervision. Microprudential stress testing, used to assess the impact of stress scenarios on the solvency (and liquidity) of banks, had been developed before the crisis. Following the U.S. Supervisory Capital Assessment Program in 2009, however, use of the tool spread widely. While existing frameworks can still be improved (for example, resilience is often tested to only a single scenario and estimated bank losses are generally less than historical experience), stress testing is now used by almost all supervisors of sophisticated banking systems to assess capital adequacy under potential stress scenarios, and supervisory practices in some jurisdictions (such as the United Kingdom and the euro area) have been reorganized around

stress tests. FSAPs, along with technical assistance to countries to improve their stress-testing frameworks, have helped spread expertise developed in advanced economies with supervisors across the full range of the membership (Figure 2.3, panel 4).

Leverage in the Nonbank Sector

Greater focus on risk in solvency frameworks and constraints to leverage and procyclicality has also been added in the nonbank sector. Solvency frameworks and regulation for insurance companies have been improved in some countries and regions (most notably, implementation of Solvency II in the EU), but a globally consistent approach is still under development. Separately, many of the riskier businesses in which insurance companies became involved have now been wound down in light of the greater focus on systemic risk in the insurance sector since the global financial crisis. Securities financing has also been constrained by the FSB's 2014 framework for haircuts on non–centrally cleared securities-financing transactions, and final or draft rules have been issued in many jurisdictions (BCBS 2017). Consolidated supervision has also helped reduce the leverage of some nonbank financial institutions, but it has not been fully implemented in many jurisdictions, thereby facilitating regulatory arbitrage within financial groups. Nonetheless, measurement of leverage in asset managers is difficult and information is limited, with some evidence pointing to its increase (see Chapter 1 of the April 2018 GFSR).

Containing Funding Mismatches and Addressing Liquidity and Currency Risk

The Basel III Framework for Bank Liquidity

Two new regulatory liquidity ratios for banks emerged from the crisis. The first to be implemented, beginning in 2015, was the liquidity coverage ratio (LCR), based on the concept of holding a stock of liquid assets to withstand a high degree of stress for a 30-day period. The other, the net stable funding ratio (NSFR), implemented beginning in 2018, is based on managing the potential mismatch between asset and liability maturities up to a one-year horizon. All Basel member countries have already implemented the LCR and undergone Regulatory Consistency Assessment Program assessments, which indicate that they have achieved consistency with the agreed-on Basel framework (Figure 2.4, panel 1). In contrast, implementation of the NSFR has proved to be more demanding because of the discretion needed to ensure its effectiveness in local markets.[26] Thus, while the NSFR should have been implemented by January 2018, some jurisdictions have not issued draft proposals and others have drafts with open deadlines for conclusion (Figure 2.4, panel 2). Outside BCBS membership, there has also been interest in adopting the Basel III liquidity standards (Figure 2.4, panel 3).

FSAP assessments show that wholesale funding is still important in various jurisdictions and that a broad review of liquidity risks will always be necessary. A clear objective of the liquidity reforms was to reduce reliance on volatile short-term funding. However, FSAP observations between 2012 and 2018 indicate that banking systems in major jurisdictions still rely significantly on wholesale funding. Although some jurisdictions have introduced liquidity stress testing using horizons beyond the 30-day LCR horizon and highly granular supervisory data, the FSAP risk analysis findings also identified instances in which stress-testing techniques for assessing the scale and nature of liquidity risks warranted further development.[27] Without adequate stress-testing tools and insights, liquidity metrics might be misleading. In addition, the FSAP has also identified instances in which the banking community, shielded by benign market conditions, has been slow to develop risk management skills (Figure 2.4, panel 4).

Nonetheless, liquidity buffers have, on average, grown since the global financial crisis, and reliance on wholesale funding is trending downward. In particular, banks' holdings of cash and government securities, considered to be highly liquid, have increased as a share of total assets, and recent reporting of the LCR shows levels well above 100 percent and increasing since data became available in 2014 (Figure 2.5, panel 1). Holdings of government securities have risen in many countries (Figure 2.5, panel 2), which could also signal persistence

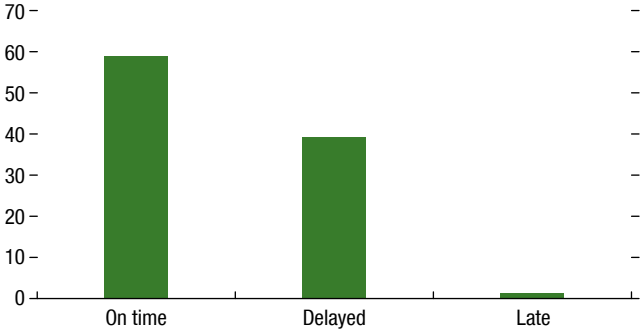
[26]The fine-tuning of this tool is challenging because supervisors need to impose standards that adequately reflect funding risk profiles without unduly constraining banks' business and inducing banks to favor short-term lending at the expense of projects that require funding for more than one year. The NSFR from the outset was recognized as requiring more time for implementation. Even so, delays are likely.

[27]Reliance on wholesale funding was highlighted in the FSAP for France in 2012, Korea in 2014, and the Netherlands and Japan in 2017. Improvements in liquidity stress testing were suggested for Canada (2014), Germany (2016), China (2017), and Japan (2017).

Figure 2.4. Overview of Postcrisis Regulatory Progress in Liquidity

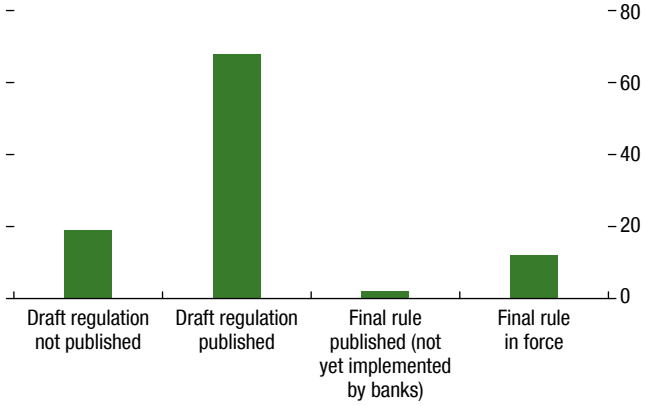
Most countries are on track to implement core liquidity standards ...

1. Timeliness of Implementation by BCBS Countries of the Core Liquidity Requirements of Basel III (Percent of total banking assets, as of March 2018)



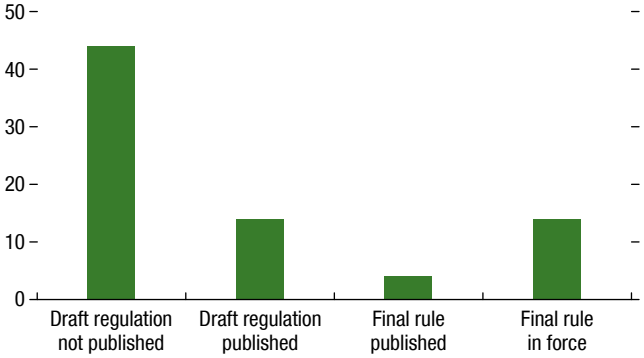
... although the net stable funding ratio remains a challenge.

2. Emerging Implementation Delays for Net Stable Funding Ratio (Percent of total banking assets, as of March 2018)



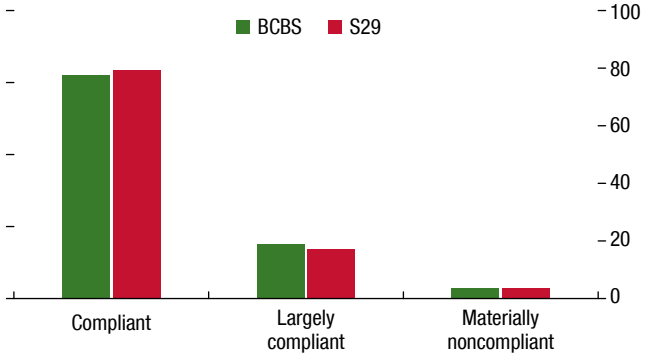
Many non-BCBS countries are following suit on liquidity standards ...

3. Adoption by Non-BCBS Countries of Basel Liquidity Standards (Number of countries, as of end of 2015)



... and at present, a large majority of bank assets reside in countries with good-quality liquidity regulation and supervision.

4. Quality of Regulation and Supervision of Liquidity Based on FSAP Data (Percent of total banking assets)



Sources: Basel progress reports; IMF, Financial Sector Assessment Program; IMF, 2017 Macroprudential Survey; World Bank, Global Financial Development Database; and IMF staff calculations.
Note: In panel 4, the S29 is the group of 29 countries included in the Financial Stability Board Shadow Banking Monitor. Not all S29 and BCBS countries have been graded since the crisis. Panel 4 is based on the results of past and ongoing IMF FSAPs. BCBS = Basel Committee on Banking Supervision; FSAP = Financial Sector Assessment Program.

of the links between banks and sovereigns—an issue that will remain a challenge to authorities.[28] Banks' reliance on wholesale funding has been trending downward since the crisis (Figure 2.5, panels 3 and 4). However, internationally active banks domiciled outside the United States continue to rely on U.S. dollar funding, including through foreign exchange swaps, for their global dollar lending (see Chapter 1 of the April 2018 GFSR).

[28]The sovereign-bank linkages have proved particularly potent in cases when the domestic banking system is heavily exposed to sovereign debt and where the debt itself is assessed to be high risk.

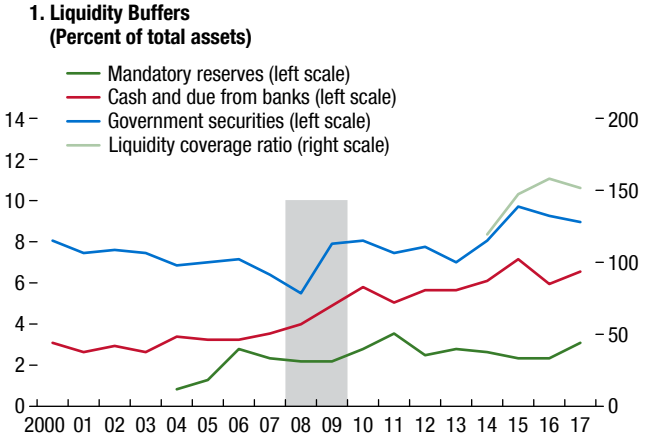
Nonbank Liquidity and Foreign Currency Risks

New valuation guidelines for money market mutual funds have reduced run risks.[29] U.S. institutional money market funds that invest largely in less liquid corporate debt or municipal bonds have moved toward a mark-to-market basis, reducing the incentives of investors to run against the fund in times of stress. Boards of money market funds can also take measures,

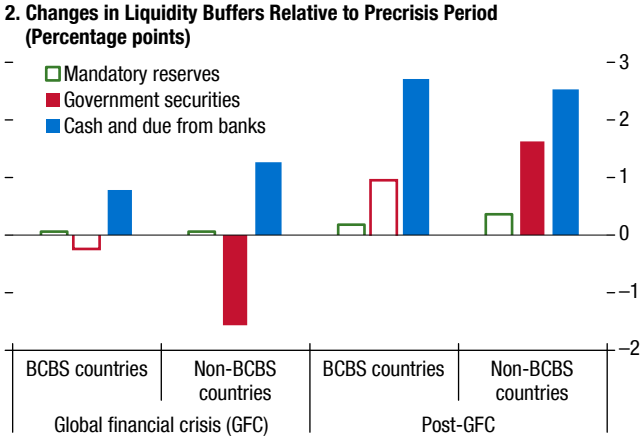
[29]Run risk is the risk that enough investors in the fund will withdraw their holdings at the same time to overwhelm the fund's holdings of liquid assets, forcing it to default to investors or sell illiquid assets, potentially threatening solvency.

Figure 2.5. Liquidity Buffers and Reliance on Wholesale Funding

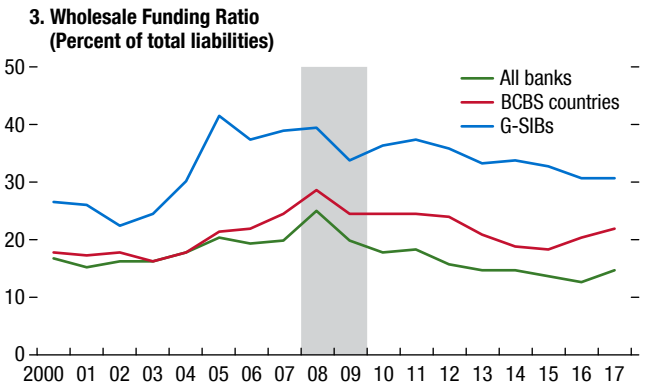
Banks' liquidity buffers have also increased since the crisis ...



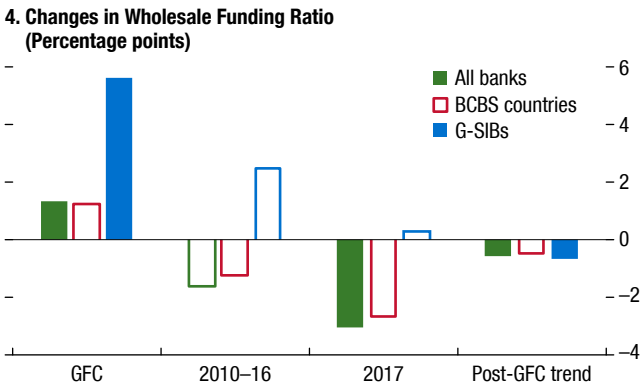
... resulting in significantly larger liquidity buffers after the crisis.



Banks' reliance on wholesale funding has also been declining ...



... reflecting a significant downward postcrisis trend.



Sources: Fitch Connect; and IMF staff calculations.
Note: Panels 1 and 3 correspond to the global median across medians at the country level for all countries in the sample. The shaded area denotes the global financial crisis (GFC). In panel 2, each bar represents the difference in means in the GFC and post-GFC periods relative to the pre-GFC period, and for BCBS and other countries. In panel 4, the first three sets of bars represent the difference in means in the GFC, the 2010–16 period, and 2017, all relative to the precrisis period (2000–07), for all banks, BCBS countries, and G-SIBs. The fourth set of bars represents the estimated annual trend during the postcrisis period. Solid bars indicate that the differences are statistically significant at the 10 percent level. BCBS = Basel Committee on Banking Supervision; G-SIBs = global systemically important banks.

such as liquidity charges and suspended redemptions, to address potential run risks. In Europe, most money market funds have also moved toward floating valuation, with exceptions for those investing in government debt, or those that can, like Chinese money market funds, show that they closely track advertised values. To reduce run risks, European regulations have also included potential redemption gates and liquidity charges.[30] The standards-setting body for securities supervisors, the International Organization of Securities Commissions (IOSCO), has also contemplated additional guidelines. In the United States, reforms to the triparty repo market, including greater transparency about haircuts, rules aimed at reducing the riskiness of collateral, and new clearance procedures aimed at reducing intraday credit, have reduced potential run risks.

Many countries have also applied measures to contain foreign exchange risk. Foreign exchange risk is covered within the Basel capital framework, although the framework does not explicitly cover credit risk related to unhedged counterparties with foreign exchange exposures. Countries with elevated levels

[30]As noted in Chapter 3 of the April 2015 GFSR, while gates and suspensions should be part of the toolkit, caution is needed in their use because they may send negative signals to the market and lead to preemptive runs ahead of them coming into force.

of foreign exchange exposures have also long used measures now classified as macroprudential—such as reserve requirements differentiated by currency or higher risk weights for foreign exchange loans—to lean against foreign exchange risk.[31] In addition, more explicit macroprudential measures related to foreign exchange risk have been used. In Central and Eastern Europe, a wide range of tools were deployed to contain risks for foreign exchange–denominated mortgages. In Korea, leverage caps were imposed on banks' positions in foreign exchange derivatives, and a levy was imposed on nondeposit liabilities denominated in foreign exchange, with shorter-term deposits attracting a higher charge than long-term ones.

Enhanced Regulation of Large and Interconnected Institutions

Measures to address risks associated with large, interconnected, and complex institutions have largely focused on identifying systemic firms and imposing stricter regulatory and supervisory requirements on them. Agreement on the criteria, first developed by the IMF in conjunction with the FSB and Bank for International Settlements (BIS), and on the list of G-SIBs is an important success of the postcrisis reform agenda (FSB, IMF, and BIS 2009). G-SIBs are identified using indicators of size, interconnectedness, lack of readily available substitutes, global (cross-jurisdictional) activity, and complexity. Supervisory judgment, as an overlay, permits authorities to nominate banks to be included on the publicly disclosed list. G-SIBs have been subject to a systemic capital surcharge since 2016.[32] A list of global systemic insurers has also been developed, but not published, while work on capital standards, including higher loss absorbency for systemic insurers, is suffering delays. At a local level, many countries have adapted the G-SIB methodology to develop a framework for domestic systemically important banks (D-SIBs).[33]

Supervisory colleges and crisis management groups have been deployed. All G-SIB host jurisdictions should have both supervisory colleges and crisis management groups, where supervisors and other relevant authorities from home and host countries exchange information and views on supervisory issues and crisis preparedness and management. Successive FSAPs have been able to trace the increasing confidence and sophistication of the supervisory exchanges. Cooperation across borders and among supervisors has improved, with more open exchange.[34] Nevertheless, based on FSAP missions, continued progress is needed, and more open communication between authorities and the G-SIBs remains a priority area.

Systemic institutions have increased their capital buffers and banking systems appear to be slightly less concentrated today, but competition measures have not improved. Consistent with the introduction of additional regulatory capital surcharges, the postcrisis increase in capital buffers has been particularly substantial for G-SIBs, which have increased their regulatory capital ratios by 5 percentage points or more, compared with 1 percentage point for other institutions (Figure 2.6, panel 1).[35] Furthermore, the systemic importance of large institutions has not increased. On average, the moderate but sustained decline in the three-bank concentration ratio observed since 2000 continued (Figure 2.6, panel 2), and the size of systemic institutions relative to the economy has been declining or remaining stable in most countries, including those in the BCBS.[36] However, the trend in

[31]For example, Argentina applies limits on lending from foreign currency deposits.

[32]The BCBS sets surcharges ranging from 1 percent to 3.5 percent based on banks' systemic importance; these surcharges have to be met in common equity. All banks designated as globally systemic are headquartered in BCBS member jurisdictions—Canada, China, France, Germany, Italy, Spain, Sweden, Switzerland, the United Kingdom, and the United States. However, after Nordea's re-domiciliation is complete in late 2018, Sweden will no longer be home to a G-SIB.

[33]Australia and the EU use the four main categories of size, interconnectedness, substitutability, and complexity to frame their approach. Brazil uses a single indicator to balance coverage versus simplicity and transparency. The EU and Hong Kong SAR explicitly consider supervisory judgment. Some jurisdictions, such as Brazil and Canada, set a surcharge equal to 1 percent of risk-weighted assets for all D-SIBs, whereas in the EU and Hong Kong SAR, a range of surcharges is used. Brazil and Hong Kong SAR have both followed the G-SIB lead and have created a category for which the highest surcharge has not—yet—been applied to any institution and is designed as an "empty bucket" to deter banks from becoming even larger or more interconnected.

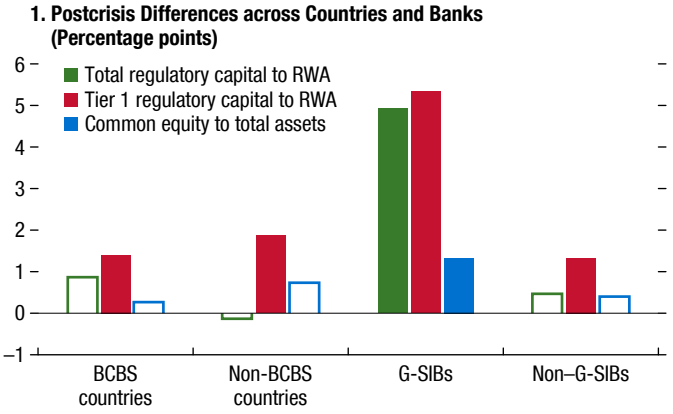
[34]In the EU, legislation such as the Capital Requirements Regulation and the Capital Requirements Directive IV has done much to stimulate progress by underpinning EU supervisory relationships with a number of mandatory requirements. Also, the establishment of the SSM in the euro area in 2014 has enhanced supervisory relationships and cooperation in the region.

[35]However, regarding liquidity, Chapter 1 shows that some G-SIBs continue to hold substantial amounts of less liquid assets in relation to their capital, particularly in Asia-Pacific and Europe.

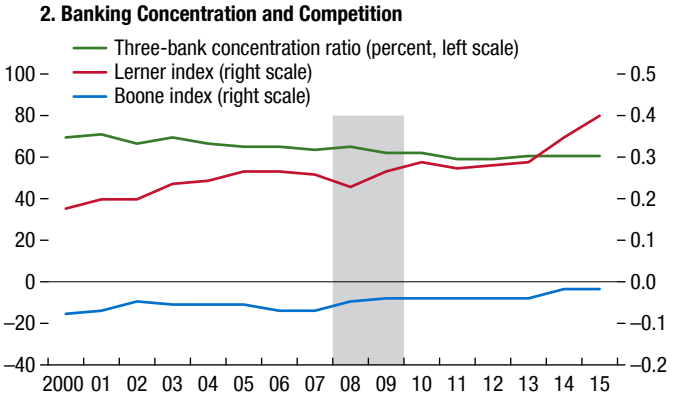
[36]The median ratio of G-SIB bank assets to GDP across 13 host countries declined by 0.4 percentage point, and that of D-SIBs by 0.1 percentage point over 39 countries. The asset-to-GDP ratio of G-SIBs declined in 8 of the host countries, and it did so for D-SIBs in 19 of the countries.

Figure 2.6. Banking Concentration and Competition and Capital Buffers of G-SIBs

Thickening of capital buffers has been notable for systemic banks.



Concentration within the banking sector has fallen slightly, although competition has not picked up.



Sources: World Bank, Global Financial Development Database; and IMF staff calculations.
Note: In panel 1, each bar represents the coefficient of the post–global financial crisis (GFC) dummy variable, that is, the difference in means in the postcrisis period (2010–17) relative to the precrisis period. Solid bars indicate that the coefficients are statistically significant at the 10 percent level. Panel 2 shows the medians across all countries in the sample. The Lerner index is a measure of bank markups, the difference between output prices and marginal costs (estimated from a translog cost function). A higher value is associated with lower competition. To express it in percentage points, the Lerner index was multiplied by 100. The Boone indicator is a competition measure based on the elasticity of bank profits to marginal cost. A more negative value is consistent with greater competition because inefficient banks are punished more harshly through lower profits. The shaded area refers to the GFC. BCBS = Basel Committee on Banking Supervision; G-SIBs = global systemically important banks; RWA = risk-weighted assets.

concentration has not clearly translated into greater banking competition, as both the Lerner index, a measure of banking sector markups, and the Boone indicator, a measure of elasticity of profits to marginal costs, appear to have markedly increased in recent years.[37]

Important progress has been made in addressing key data gaps for systemic institutions, though the task is yet to be completed. The data hub for G-SIBs contemplated in the Data Gaps Initiative (see Box 2.2) has been set up at the Bank for International Settlements, thereby providing supervisory authorities in major jurisdictions the ability to contribute to and access a common database on risk exposures and interconnectedness across systemically important financial institutions, markets, and jurisdictions. Two key areas for further progress stand out: increasing the granularity of data accessible to international financial institutions and increasing access to aggregate data by national macroprudential authorities.

Better Supervision of a Complex Financial System

Intensifying Supervision

One of the earliest postcrisis messages from the IMF was that supervisors needed to impose intense scrutiny on banks, coupled with the will and the ability to act. The revised sectoral standards also embodied this approach, with an emphasis on timely and effective supervision rather than regulations alone. These standards require greater attention to be focused on systemic institutions and risks. Many supervisory authorities have refreshed their approaches to examine systemic institutions more rigorously. For example, the United States launched the Comprehensive Capital Analysis and Review to examine the resilience of its major institutions more rigorously. Some jurisdictions, such as Brazil, have segmented, or tiered, their institutions. In the euro area, supervision is predicated on the systemic significance of institutions. Russia has centralized the supervision of its systemic banks. FSAPs

[37]The Lerner index is defined as the difference between output prices (the ratio of total bank revenue to assets) and marginal costs (from an estimated translog cost function, and scaled by output), as a ratio of assets. The Boone indicator is the estimated coefficient from a log regression of bank profits on marginal costs. See Demirgüç-Kunt and Martínez Pería (2010) and Leon (2014) for details. Similar patterns emerged when cross-country averages that weigh each country by the size of its banking system were computed.

have investigated how supervisory intensity has been interpreted and have considered its adequacy, often noting insufficient resources for supervisors, for example, in China, the Netherlands, Sweden, Switzerland, and the United Kingdom.[38] Overall, concerns were expressed in one-quarter of the postcrisis FSAPs of systemic jurisdictions that the right balance of supervisory resources was not being devoted to systemic institutions or that supervision of them was not sufficiently intense. Factors have also been identified in a number of jurisdictions that could compromise the independence of the supervisory authorities, a key weakness in ensuring financial stability.[39]

Expanding the Regulatory Perimeter

Incentives to move bank activities to off-balance-sheet vehicles to benefit from regulatory arbitrage have been curtailed. The loopholes used by banks to game the Basel I and II capital frameworks by moving items off the balance sheet and setting aside only moderate resources for potential liquidity support have been closed in Basel III (FSB 2017a). New rules on the treatment of special purpose vehicles reduced the profitability of using them as conduits for capital arbitrage and made them less attractive. Off-balance-sheet exposures are now captured on a more rigorous basis by the capital framework. Establishing a liquidity framework that considers the volatility of different funding sources has thrown a spotlight on bank use of nonbank financing, bringing this previously largely unmonitored risk within the perimeter. In the United States, the movement of investment banks toward traditional banking licenses after the global financial crisis also brought more institutions within the more tightly regulated part of the regulatory perimeter.

Systemic risk monitoring has been expanded to include shadow banking and market-based finance. The international community has made considerable progress in measuring the size and growth of the shadow banking sector and identifying its main risks, which provide a basis for regulation to contain those risks.[40] These risks have risen rapidly in emerging markets, particularly in China where they could become globally systemic risks. The FSB has established a typology and a broad framework for such regulation, and IOSCO has also published recommendations on issues such as liquidity mismatch between fund investments and redemption terms, leverage within investment funds, operational risk, and securities lending. IOSCO has also been working to transform its recommendations into operational guidance. The proposed remedies are reporting, monitoring, risk management, stress testing, and deeper liquidity buffers. Some jurisdictions have implemented measures to address some of these risks, but regulatory advances remain limited to date.[41] Efforts should continue to improve the timeliness of data and the granularity of the information on interconnections, especially cross-border ones.

The regulatory framework for securitization has been overhauled. The direction of regulation was clear: institutions participating in the securitization market needed to take greater responsibility for their business decisions, show greater transparency, reduce complexity, and engage in less mechanistic reliance on outside agents—such as the ratings from credit agencies. Under the new standards, banks originating securitizations must also retain part of the original structure. Implementation of the revised securitization framework is still in progress, with the rules for these standards yet to be finalized and not yet in force in many jurisdictions. Going ahead, it is crucial to ensure that retention rules adequately align the incentives of securitization sponsors, an issue that has been debated regarding existing rules in some jurisdictions.

There has been important progress in the migration of OTC derivative trading to central counterparties (CCPs) and reporting to trade repositories. Failures in risk management and transparency in OTC derivatives markets led to a call to migrate this activity to CCPs. The crisis demonstrated that financial market infrastructures (FMIs) such as CCPs played a critical role in underpinning stability by reducing uncollateralized counterparty exposures across the financial system, thereby significantly attenuating the contagion of losses

[38]The United Kingdom finding was in the postcrisis FSAP before the creation of the Prudential Regulation Authority.

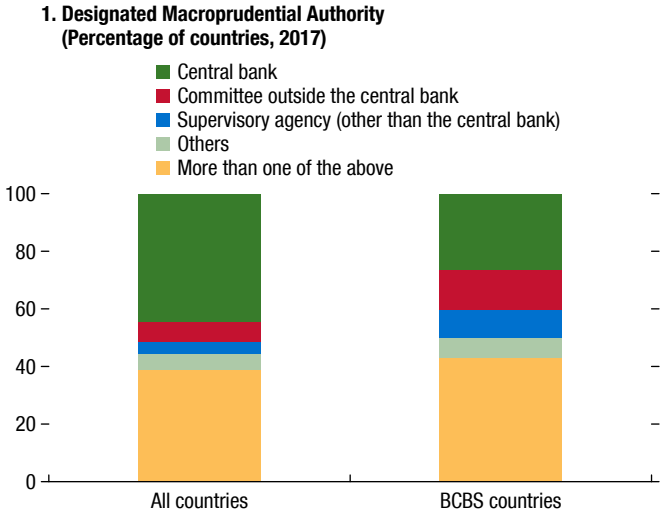
[39]FSAPs have identified these challenges in Australia, Canada, China, France (before the Single Supervisory Mechanism), Hong Kong SAR, Japan, Korea, Luxembourg, Mexico, the Netherlands, Saudi Arabia, Singapore, South Africa, Spain, Sweden, and Turkey.

[40]See Chapter 2 of the October 2014 GFSR. Continuation of this effort has taken place under the auspices of the FSB, which coordinates the gathering of information on nonbank financial intermediaries through the Global Shadow Banking Monitoring Report.

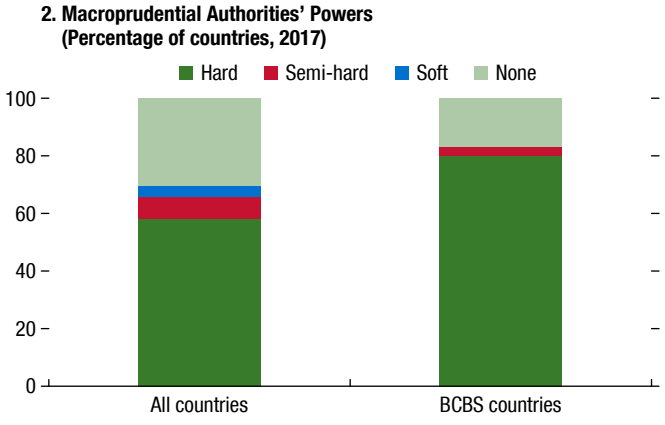
[41]For instance, in the United States, measures to widely institutionalize the practice of swing pricing targeted at attenuating run-risk incentives were introduced by the Securities and Exchange Commission in 2016 and have reportedly been adopted by all large asset management firms. Compliance across the industry is expected by the end of 2018.

Figure 2.7. Macroprudential Policy Frameworks

Countries have designated a macroprudential authority in a variety of ways ...



... and have granted them substantial powers to promote financial stability.



Source: IMF, 2017 Macroprudential Policy Survey.
Note: BCBS = Basel Committee on Banking Supervision.

from spreading. Consequently, the Pittsburgh G20 Summit pressed for regulation, as opposed to voluntary change, to support the development of FMIs. OTC contracts were to be reported to trade repositories and all standardized OTC contracts were to be cleared on CCPs by end-2012.[42] There has been important progress on this front (FSB, BIS, and IOSCO 2018).

[42]In a market cleared by a CCP, participants are no longer exposed to one another because the CCP becomes the single counterparty to all trades. Counterparty risk is reduced by the margining practices and guarantee funds of the CCP, and the multilateral netting between members lowers gross exposures and increases efficiency. Market transparency is enhanced through the centralized administration of members' positions.

Furthermore, reflecting their new centrality, financial buffers at most CCPs deemed systemic have been beefed up and other buffers, such as liquidity support, have been strengthened.[43]

An important example of inherent difficulties is reform of credit rating agencies. These agencies are generally paid by an issuer to rate that issuer's securities, creating well-recognized incentives problems. In addition, the reliance on credit ratings as a basis for capital charges exposed the users of the ratings to the failures of and weaknesses in the agencies' models. Regulatory efforts to address these shortcomings have led to some successes, with a new code of conduct and better oversight as well as reduced use of ratings in some parts of the regulatory standards. Nevertheless, the service performed by the credit rating agencies has not been substituted by other agents, and they retain a central role in the financial system.

A Macroprudential Approach to Systemic Risk

Since the global financial crisis, most countries have instituted systemic oversight authorities. Detailed arrangements vary across jurisdictions, but in most cases this role has been assigned to the central bank (Figure 2.7, panel 1), especially when the central bank oversees prudential supervision (as in the United Kingdom). Committees outside the central bank are the second most prevalent form of organization.[44] In Mexico, for example, the Financial System Stability Council has nine members, including representatives from the finance ministry, the central bank, the deposit insurance agency, and prudential supervisors. The United States has a similar arrangement with the Financial Stability Oversight Council, though it also incorporates additional representatives. China, too, has recently instituted the Financial Stability and Development Committee, bringing together its key supervisors. However, in other countries with separate authorities, such as Brazil and Canada, no explicit macroprudential

[43]Central banks in Europe provide, under strict criteria, liquidity support to CCPs and accounts to manage cash collateral. In the United States, the Federal Reserve allows them to open and maintain accounts but not to access routine intraday credit.

[44]The stresses of the global financial crisis caused many countries to reassess the organizational structure of financial supervision. Some countries chose to move supervision into the central bank, while others chose to separate responsibilities. No preferred model has emerged for the structure of supervision. In particular, different countries have established bank resolution authority in various areas.

mandate has been given, and macroprudential responsibilities are shared among agencies. The IMF, via technical assistance, Article IV missions, and the FSAP, has worked with many countries to design macroprudential agencies and develop systemic risk monitoring capacity.

The powers of established macroprudential authorities to contain systemic risk vary greatly across jurisdictions. Most authorities have some hard powers (Figure 2.7, panel 2). These range from the United States, where the Financial Stability Oversight Council has the power to designate systemic financial institutions and subject them to enhanced supervision by the Federal Reserve or, in the case of financial market utilities and infrastructures, to enhanced risk management, to the Monetary Authority of Singapore, which has the full range of macroprudential tools at its disposal. Other authorities only have semi-hard powers, such as comply-or-explain mechanisms. In India, the Financial Stability and Development Council is a coordinating entity for macroprudential policy, and hard powers are left to the individual supervisors. Soft powers include informing the relevant hard-power agency and the public of potential risks. In the United States, as well as in Russia and South Africa, this role of informing the supervisors also includes a responsibility to advise relevant agencies on which policy steps should be taken. Although even soft powers can be effective if exercised correctly, macroprudential authorities in many jurisdictions still lack powers and tools. This is an area that needs to be addressed.

Governance and Compensation as an Overarching Control on Risk Taking

The scope of bank supervision has extended to include aspects of corporate governance, and the Basel Core Principles for Banking Supervision (Core Principles) have become more demanding in this area. After the crisis, there was wide recognition that banks' corporate governance should more seriously consider risk appetite and management.[45] More than half of the FSAPs in 25 systemic jurisdictions between 2011 and 2018 identified gaps, deficiencies, or weaknesses in corporate governance in the financial sector. Progress can also be identified, however. By 2017, most jurisdictions had regulations addressing compensation packages in the financial sector, and an FSB stocktaking of governance practices in major banks found that most now recognized the board's responsibility, supported by committees, to determine an appropriate level of risk taking. Most jurisdictions by that time also required independent directors to chair key board committees, and additional efforts were supported by legislative and supervisory initiatives. By 2018, for example, the Single Supervisory Mechanism had already carried out thematic reviews of governance in banks in the euro area; the Russian authorities were newly empowered with relevant legislation; and the Brazilian supervisory agency had intensified and reorganized its supervisory processes, taking corporate governance findings as the foundation for its assessments.

Reform of compensation practices remains untested, though studies, including by the IMF, have sought to examine the impact of these reforms (see Chapter 3 of the October 2014 GFSR). Although almost all major FSB member jurisdictions have substantively implemented the principles for sound compensation practices and their implementation standards (FSB 2017d), the legal enforceability of some key measures, such as malus and clawback of compensation paid in light of the discovery of deficient performance, is not yet clear. Moreover, there is the inherent risk that compensation contracts can be reengineered to get around such clauses and regenerate excessive risk-taking incentives.

Overhauling Resolution Frameworks for Systemic Financial Institutions

The widespread assumption that the government stood behind many large institutions—borne out repeatedly during the crisis—created moral hazard. Following the crisis, it became clear that the resolution framework for large institutions was inadequate and political support for bailouts evaporated. Regulators moved to develop a system for managing the failure of financial institutions in which investors would bear more risk and taxpayer support would be minimized. The adoption by the FSB of the Key Attributes of Effective Resolution Regimes for Financial Institutions provided a benchmark for resolution authorities to have the tools to enable them to

[45]The Organisation for Economic Co-operation and Development (OECD) and the BCBS both issued revised corporate governance standards. The BCBS's 2015 standards (Corporate Governance Principles for Banks) focus on addressing failings in executive management and boards of directors. Essential elements of these principles were folded into the revised Basel Core Principles.

quickly resolve nonviable systemic financial institutions while maintaining the continuity of functions critical for financial stability and the functioning of the real economy.[46,47]

As noted by the FSB, and confirmed in recent FSAPs, enhancement of resolution regimes continues to progress, albeit at an uneven pace (Box 2.3). Most jurisdictions in which G-SIBs are domiciled have introduced all, or nearly all, of the bank resolution powers advocated by the Key Attributes, while many other FSB members are actively pursuing reforms. The IMF has also worked with country authorities outside the FSB, via FSAPs and technical assistance, to make regimes more predictable, effective, and transparent. The adoption of the Total Loss-Absorbing Capacity (TLAC) standard, which requires G-SIBs to maintain a certain amount of liabilities that can be used at the point of failure to absorb losses, recapitalize the failing firm, and reduce potential calls on public resources, has been an important milestone toward ensuring the resolvability of G-SIBs (FSB 2015).[48] Implementation is well under way, with several FSB member jurisdictions (for example, Canada, Sweden, Switzerland, the United Kingdom, and the United States) already having incorporated TLAC requirements into domestic rules and regulations, and others (for example, the EU and Japan) having issued policy proposals. Significant amounts of TLAC-eligible securities have been issued in recent years, with many G-SIBs already meeting the January 2019 requirement.[49] Similarly, all G-SIBs have established recovery plans, while resolution plans are being finalized. However, less progress has been made in strengthening resolution regimes for systemic nonbanks.

Changes in banks' ratings and market prices suggest that the likelihood of government support and bailouts for banks, especially the largest ones, is perceived to have fallen since the crisis. Banks' support rating—an assessment of the likelihood that a bank will receive extraordinary support from either a parent bank or the government—is markedly lower today than before the crisis for stand-alone banks, which do not have a parent and could only receive extraordinary support from the government (Figure 2.8, panel 1). A market measure of the implicit subsidy from which systemic banks benefit as a result of possible government bailout also suggests a lower likelihood of bailout, falling visibly from its highs during the crisis (Figure 2.8, panel 2).[50] This is particularly so in the euro area, where the implicit subsidy reached 194 basis points at the end of 2011, and is now slightly less than 18 basis points.

Concerted efforts remain necessary, however, to achieve the stated objectives of the resolution reforms, especially for cross-border issues. Even in many systemic financial sectors, FSAPs have found that national bank resolution regimes often have significant weaknesses and are not fully aligned with the Key Attributes. Resolution regimes for nonbanks (especially systemically important insurers and financial market infrastructure) need to be finalized (see FSB 2016, 2017c). Remaining impediments to resolvability, such as group structures that hinder orderly resolution and adequate loss-absorption capacity at non–G-SIBs—whose failure may also lead to systemic stress—should be addressed. Initiatives are under way to improve funding sources for the time of resolution. Cross-border resolution remains an important gap: information sharing is impeded by confidentiality issues; there is a need for greater coordination and planning in how cross-border resolution for G-SIBs would be conducted; and crisis management groups should be established for systemic nonbanks such as insurers and CCPs.

[46]The global financial crisis added new impetus to efforts led by the IMF to develop and promote a framework for cross-border insolvency of financial firms in major jurisdictions, which dated back to the early 2000s.

[47]The Key Attributes provide 12 essential features of effective resolution regimes that can be clustered in four broad categories: (1) strengthened national resolution regimes (for example, resolution authorities, powers, safeguards, and funding mechanisms), (2) recovery and resolution planning, (3) arrangements for enhanced cross-border cooperation, and (4) access to information and removal of barriers to information sharing.

[48]The TLAC standards envisage phased implementation. Institutions classified as G-SIBs before the end of 2015 (except for those headquartered in emerging markets that benefit from an extended implementation period) need to establish the TLAC standard of 16 percent of risk-weighted assets beginning January 2019 and 18 percent beginning January 2022.

[49]Banks have approached the requirement to issue long-term subordinated debt in varying ways, with some European banks issuing 10-year bullet-maturity bonds, while some U.S. banks have issued bonds callable at one- or two-years' remaining maturity. Banks from emerging markets have been granted a longer adjustment period, and Chinese G-SIBs have not yet sold TLAC-eligible debt.

[50]The implicit subsidy is computed as the difference between a "fair value" credit default swap (CDS) spread (obtained from contingent claim analysis) and the observed CDS spread on bank bonds. This analysis follows and updates that of Chapter 3 in the April 2014 GFSR.

Regulatory Efforts Going Forward: Where to Focus?

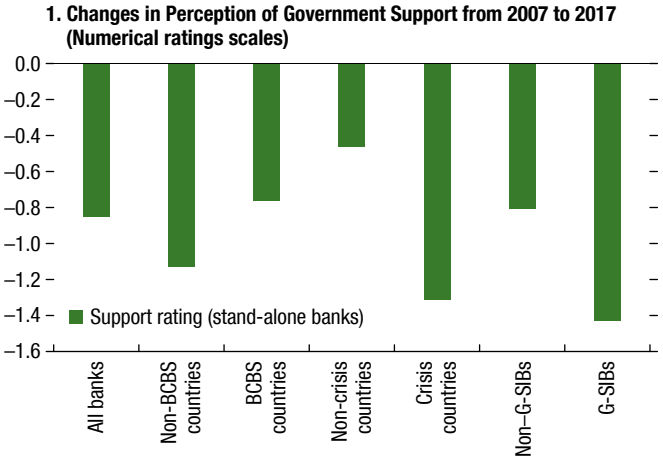
Complete the Global Regulatory Reform Agenda

Incomplete aspects of the global regulatory agenda should be fully implemented. As discussed in the previous section, despite great progress, many aspects of the reform agenda are still in process and must be adequately completed. These include solvency frameworks for insurers, the leverage ratio, and outstanding items on the liquidity agenda. Continuing to intensify supervision, particularly of systemic institutions, remains important. Macroprudential oversight and policy tools are improving, but the key challenge is ensuring accountability and willingness to act in a timely manner. Cross-border cooperation in data sharing and systemic risk oversight should also be further developed. Corporate governance should ensure that cultures of excessive risk taking can be reined in, and that boards are held accountable for doing so, and difficult issues, such as compensation and the use of credit ratings, should be confronted. Finally, resolution frameworks consistent with the Key Attributes should continue to be implemented, and those for systemic entities should be improved; this is particularly important for cross-border institutions such as banks.

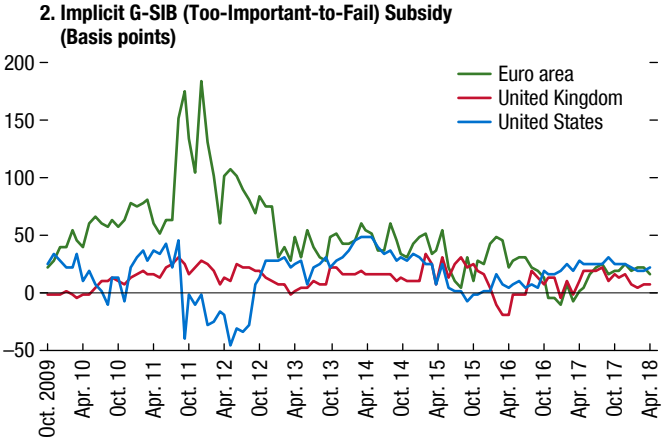
Improvements in oversight and regulation of shadow banking should continue. According to FSB (2017a), the aspects of shadow banking that contributed most to the global financial crisis generally no longer pose financial stability risks. However, in many countries, systemic risks associated with new forms of shadow banking and market-based finance outside the prudential regulatory perimeter, such as asset managers, may be accumulating and could lead to renewed spillover effects on banks (Figure 2.9, panels 1 and 2). This is particularly true in many emerging markets, including China, where shadow banking has grown rapidly, albeit from a small base (see Chapter 2 of the October 2014 GFSR). Concerns about the resilience of liquidity could expose asset managers to fire sale losses if redemptions are large, with potential spillovers to other intermediaries (see Chapter 1 of this GFSR and Chapter 2 of the October 2015 GFSR). Numerous policy and regulatory options for reducing shadow banking risks could be envisaged, including activity-based (as opposed to entity-based) regulation and development of macroprudential tools for nonbanks. Closing data gaps is also key to these efforts (see Chapter 3 of the April 2015 GFSR).

Figure 2.8. Perceptions of Likelihood of Bailout of Systemic Institutions

Bank ratings suggest that it is now less likely for systemic institutions to be bailed out ...



... a perception that is echoed by a decline in market-based measures of the implicit subsidy that arises from possible bailout.



Sources: Fitch Ratings; Moody's CreditEdge; and IMF staff calculations.
Note: In panel 1, the first bar represents the difference in means for all banks between 2007 and 2017, and the remaining bars represent this difference for different groups of countries and banks. The support rating reflects a view on the likelihood that a bank will receive support from either a parent bank or the government, ranging from a likelihood of 1 (low) to 7 (high). Stand-alone banks refer to banks without a parent. Solid bars indicate that the differences are statistically significant at a 10 percent level. In panel 2, the implicit subsidy is calculated as the difference between the "fair value" credit default swap (CDS) spread obtained from equity prices and the CDS spread on a bank's bonds. A higher difference implies a higher implicit too-important-to-fail subsidy. BCBS = Basel Committee on Banking Supervision; G-SIBs = global systemically important banks.

Policies aimed at addressing the links between banks and sovereigns should be designed with a holistic perspective. Banks' government bond holdings are still large (Figure 2.9, panel 3, and Chapter 1 of this GFSR). Sovereign bonds play a prominent role as safe and liquid assets in the new liquidity regulations, receive favorable treatment in capital regulations (often with a risk weight of zero), and are exempted from concentration limits. At the same time, the resulting interconnection between banks and the sovereign may result in a negative feedback loop, where a banking or sovereign crisis can reduce the value of government bonds, thereby deepening the decline in banks' asset values and further affecting sovereign bonds.[51] Dell'Ariccia and others (2018) argue that improving balance sheets of banks and sovereigns is key, but that policies that discourage banks from holding excessive sovereign bonds can also improve financial stability and market efficiency, emphasizing they should be designed to minimize possible procyclical effects.

Reform fatigue and rollback pressures, already visible, should be resisted. The postcrisis agenda was very wide-ranging, and the sheer volume of new measures has tested financial institutions and supervisors. As memories of the global financial crisis fade, fatigue with ongoing implementation is rising and warnings about new risks are less likely to be heeded. These tendencies, as well as pressures to roll back the agenda, should be resisted. In particular, supervisory oversight of major banks should not be reversed; supervisory intensity, especially onsite and for systemic banks, should not be weakened.

Address the Consequences of the Postcrisis Regulatory Agenda

After 10 years, an evaluation of the effectiveness and efficacy of the reforms is appropriate. The regulatory reform agenda was set in place to increase the resilience of a global financial system that was deeply affected during the crisis. Of course, heightened resilience might come at some cost to efficiency that needs to be weighed against financial stability gains. Although the calibration of the regulatory response was not oblivious to this trade-off, an ex ante assessment of a reform of the breadth and depth of that undertaken was nearly impossible. Now that the core parts of the agenda are in place, supervisors can start taking stock of the effect of regulations on the broader economy, with measures fine-tuned accordingly. Indeed, the FSB has started this process through dedicated working groups, and the IMF is leveraging the FSAP to conduct these assessments in countries with adequate data.[52]

New risks arising from a bigger role of CCPs in derivative markets should be addressed. Following the 2009 G20 mandate to centrally clear all standardized derivatives contracts through CCPs, counterparty risk and leverage have decreased, reducing systemic risk. However, this has led to a concentration of credit risk within CCPs as they gained importance (Figure 2.9, panel 4). Given their close interconnections with banks and other market participants, a failure of a CCP to absorb losses could amplify adverse aggregate shocks (Committee on Payment and Settlement Systems 2010). Also, margin calls and haircuts tend to rise as the financial cycle worsens, potentially leading to procyclicality. It is therefore important that regulation and supervision of CCPs ensure that their capital and liquidity buffers are solid, and adequate resolution frameworks are in place that consider the cross-country nature of these entities. Some of these risks could also be addressed using macroprudential tools. Finally, provision of central bank liquidity to solvent and systemic CCPs could be considered under extreme circumstances to safeguard financial stability (Wendt 2015).[53]

In countries affected by a withdrawal of correspondent banks, authorities should address possible consequences for financial stability and inclusion. The regulatory reform agenda, along with money-laundering rules and other factors, may have contributed to the reassessment of correspondent banking relationships that has affected access to the global financial system for residents of some countries

[51]This can occur either because the fiscal cost of potential sovereign guarantees to the banking sector (whether explicit or implicit) may hinder fiscal solvency or the crisis may have an impact on real activity and government revenues. For instance, studies on the European sovereign debt crisis show that less strongly capitalized banks reduced loans and increased lending rates more sharply than did less exposed banks, and hence amplified the effect of sovereign stress on lending (Altavilla, Pagano, and Simonelli 2016; Georgoutsos and Moratis 2017).

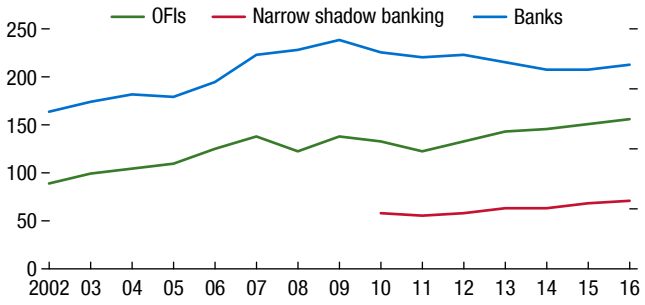
[52]For instance, the recent Peru FSAP used microeconomic data to evaluate the impact of higher capital requirements on lending, finding only small transitory effects.

[53]Some jurisdictions, including Australia, the euro area, Switzerland, the United Kingdom, and the United States, already consider the possibility of providing emergency liquidity support to domestic financial market infrastructures.

Figure 2.9. New Sources of Risk and Vulnerabilities

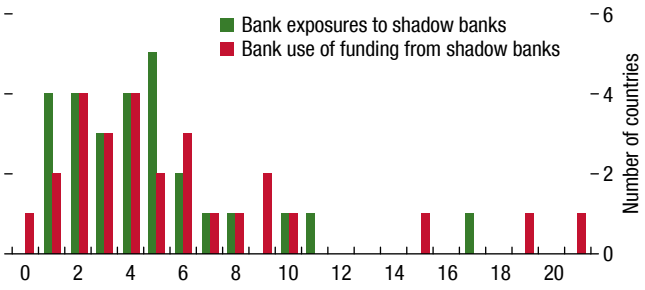
As assets of conventional banks stagnate, nonbank institutions gain ground ...

1. Shadow Banking in S29 Countries
(Percent of GDP)



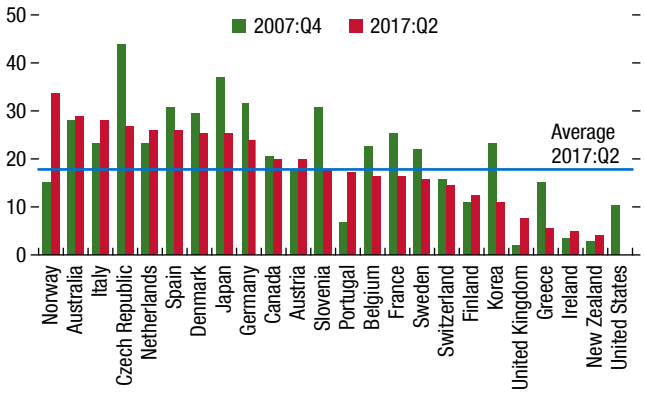
... and banks' interconnections with these institutions can be large in some countries.

2. Country-Level Exposure of Banks to and Use of Funds from Shadow Banks
(Percent of GDP, 2016)



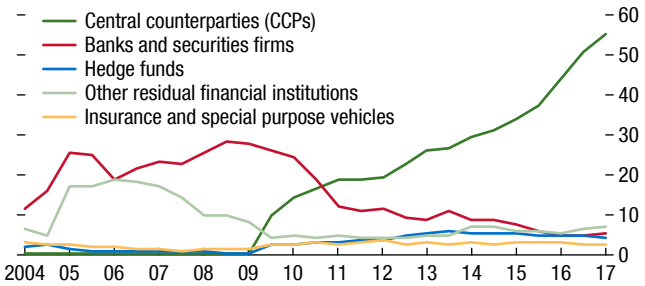
In many countries, the bank-sovereign nexus remains strong.

3. Domestic Bank Holdings of General Government Debt Securities
(Percent of total)



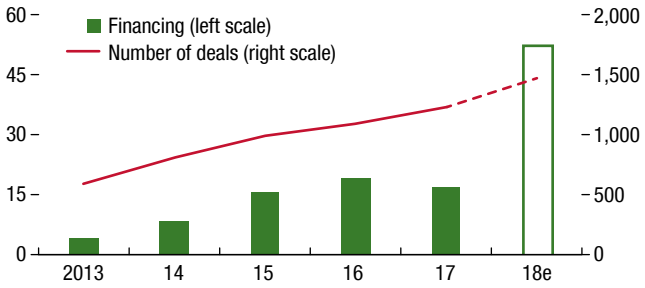
The systemic importance of central counterparties is growing rapidly ...

4. CCPs and Other Counterparties in Derivatives Clearing
(Share of different counterparties, percent)



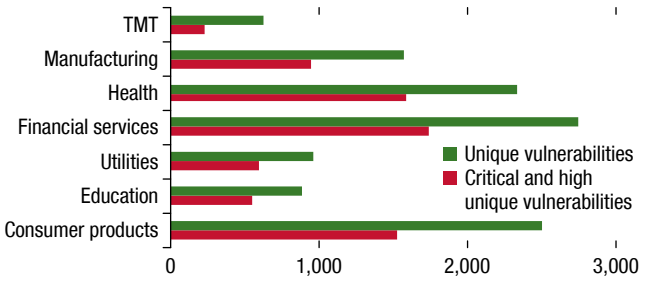
... and financial technology (fintech) is rapidly making inroads.

5. Global Fintech Investment Backed by Venture Capital
(Billions of U.S. dollars; number of deals)



Cyber risk can be sizable, and not all economic sectors are equally vulnerable.

6. Cyber Risks: Vulnerability Severity by Industry and Sector
(United States, 2017)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; CB Insights; Financial Stability Board; Protiviti; and IMF staff calculations.
Note: In panel 1, shadow banking is computed from the Financial Stability Board Shadow Banking Monitor 2017 for a group of 29 countries (S29). Panel 2 shows the distribution of the banking system's exposures to and use of funds from shadow banks across the S29 countries. In panel 3, bank holdings of general government debt are based on updated statistics from Arslanalp and Tsuda (2014). In panel 4, the role of central counterparties is from the Bank for International Settlements Quarterly Review of June 2018 (Figure 2). In panel 5, the growth of fintech investments is from CB Insights' Global Fintech Report of 2018:Q1, showing annual venture capital–backed global fintech deals and financing (2018 full-year data are extrapolated from 2018:Q1). In panel 6, cyber risk vulnerability severity is from Protiviti's 2018 Security Threat Report. OFI = other financial institutions; TMT = technology, media, and telecom.

(see Chapter 1 of the October 2018 GFSR).[54] In some cases, this has led to a migration of risks to nonbanks, which may require a reevaluation of the regulatory perimeter. In others, where overall access to financial services has been reduced, country authorities should step in to support financial inclusion. The IMF has tried to help affected countries strengthen their legal, prudential, and supervisory frameworks through FSAPs and technical assistance.

Confront New Risks

New financial technology (fintech) poses challenges as well as opportunities, while cybersecurity risks should be addressed. While fintech—encompassing activities such as big data, automation of loan processing, distributed ledger technology, and new lending and electronic trading platforms—is still small, it has grown rapidly (IOSCO 2017; Figure 2.9, panel 5). The regulatory challenge is to support fintech's potential contribution to innovation, efficiency, and inclusion, while safeguarding against risks that could amplify shocks to the financial system (FSB 2017b). Given the increasing reliance of the financial sector on information technology and interconnectedness of systems, cyber threats could pose financial stability risks (Figure 2.9, panel 6). The direct cost of cybersecurity events could be large, and indirect costs, such as reputational risk, further raise the stakes (Kopp, Kaffenberger, and Wilson 2017; Bouveret 2018). Supervisors must engage with financial institutions to develop identification, response, and recovery capabilities. Unfortunately, supervisors often lack dedicated units and skills shortages are widespread.

Conclusion

Ten years after the onset of the global financial crisis, progress is clear, but the reform agenda must be completed. The broad agenda set by the international community has given rise to new international standards, guidance, and best practices. Implementation of measures for capital, liquidity, and systemic oversight have been successful, and vulnerabilities related to derivatives and wholesale funding have been reduced. The FSAP, given its coverage of the entire sector, has helped support and evaluate the implementation of these reforms in both FSB and non-FSB economies. This chapter has documented important progress in all areas of the reform agenda, but it has also shown that gaps remain across a range of areas, from macroprudential frameworks and systemic risk monitoring to data and cross-border cooperation. Bank compensation practices and the use of credit rating agencies are particularly thorny issues for which existing progress must be consolidated, and new thinking may be necessary.

Regulators and supervisors must be able to respond to new threats. The risks of rollback, waning multilateralism, and regulatory fatigue are real and could easily undermine the important progress made in improving financial stability. In addition, new risks are emerging as the financial system adapts to new regulations and structural change takes place. OTC derivatives trading through CCPs has enhanced counterparty risk management but has concentrated potentially systemic risk in these entities. The growth of credit intermediation by nonbank financial institutions has not been adequately matched by regulators' ability to monitor risks and act through regulation and supervision as needed. The development of fintech has been rapid. Despite its potential benefits, our knowledge of its potential risks and how they might play out is still developing. Increased cybersecurity risks pose challenges for financial institutions, financial infrastructure, and supervisors. These developments should act as a reminder that the financial system is permanently evolving, and regulators and supervisors must remain vigilant to this evolution and ready to act if needed.

Above all, regulators must avoid complacency. No financial regulatory framework can or should aim to reduce the probability of crisis to zero, so regulators should remain humble. The current regulatory reform agenda was designed to compensate for weaknesses that led to the global financial crisis, and the measures taken have contributed to a less leveraged, more liquid, and better supervised financial system. However, risks tend to rise during good times, such as the current period of low interest rates and subdued volatility, and those risks can always migrate to new areas. Supervisors must remain vigilant to these unfolding events (see also the policy discussion in Chapter 1 of this GFSR).

[54]Fragile states under sanctions or facing civil unrest are among those that have been the most affected. Among small states, African, Pacific, and Caribbean islands have experienced the largest declines in correspondent banking value over the 2012–15 period (IMF 2017).

Box 2.1. The IMF's Role in the Global Regulatory Reform Agenda

The Washington Summit of 2008 launched the international regulatory reform agenda "to achieve needed reforms in the world's financial systems."[1] This agenda was refined through successive Group of Twenty (G20) summit meetings. In addition to commitments by jurisdictions, the international bodies were mobilized and tasked with supporting the reform, taking on roles consistent with their respective mandates.

The IMF's focus was on surveillance of international and domestic financial systems, assessment of the implementation and implications of financial sector policies, and identification of macrofinancial risks and vulnerabilities. Surveillance and assessment work complemented that of the Financial Stability Forum (FSF), which was reconfigured as the Financial Stability Board (FSB), beginning in 2009. Charged with the coordination and elaboration of financial sector and regulatory and supervisory policy, the FSB oversaw the technical work of the regulatory reform agenda that was largely undertaken by the working structures of the international standards–setting bodies. The standards setters included the Basel Committee on Banking Supervision, which was tasked with enhancing the capital adequacy framework, one of the first objectives of the reform, but also included the International Organization of Securities Commissions and the International Association of Insurance Supervisors.

From the outset, the IMF's macrofinancial expertise was recognized as complementary to the development of regulatory policy. The IMF was called on to work in collaboration with the FSF/FSB to enhance efforts to better integrate regulatory and supervisory responses into the macroprudential policy framework and to conduct early warning exercises. It was asked to work with the FSF/FSB and others to draw lessons from the crisis, consistent with its mandate.

Contributing to the intellectual debate, the IMF has published on topics related to its role in the international collaboration.[2] The evolution of macroprudential policy frameworks has become a keystone of the IMF's response to addressing systemic risk. Themes of the IMF papers published in the years following the crisis covered the reform agenda more broadly, including identification of gaps in regulatory architecture; systemic institutions; the importance of coordination, cooperation, and removal of obstacles to information sharing in all dimensions of regulation and supervision; and resilience and the importance of progress not only for domestic but also for cross-border resolution frameworks. The IMF considered the stability implications of the structure of complex groups and throughout its policy output stressed the importance of robust, intensive supervisory practices.

In launching the regulatory reform agenda, the G20 jurisdictions committed to participation in the Financial Sector Assessment Programs (FSAPs), which previously were voluntary. The IMF adapted its FSAP process to the postcrisis era, successively in 2009 and 2014, to strengthen the analytical components to detect vulnerabilities and measure resilience through stress testing and spillover analysis, as well as the quality of financial stability policy and financial safety nets. Consequently, since the crisis, the FSAP has been able to expand coverage of its stress testing and deepen its analysis of interconnectedness and cross-border spillovers. Through both the FSAP and Article IV surveillance, the IMF has worked with country authorities to improve systemic risk monitoring, develop and calibrate macroprudential tools, and strengthen macrofinancial analysis. Countries deemed to be systemic in the IMF's analysis have been subject to mandatory FSAP assessment on a five-year cycle. Consistent with the 2008 Washington declaration, the IMF has collaborated with the FSB in examining the impact of regulatory reform on emerging market and developing economies and continues to provide capacity-building assistance to emerging market and developing economies in their own programs to enhance their regulatory and supervisory systems.

This box was prepared by Katharine Seal.

[1]Declaration of the Summit on Financial Markets and the World Economy (G20 2008).

[2]The IMF's intellectual contribution to central debates includes Viñals, Fiechter, and others (2010); Viñals, Pazarbasioglu, and others (2010); Claessens and others (2010); Claessens and others (2011); Otker-Robe and others (2011); and Ong and Pazarbasioglu (2013).

Box 2.2. The Data Gaps Initiative: Better Data as a Foundation for the Financial System Reform Agenda

Lack of timely and reliable data proved to be very costly during the global financial crisis because it hindered policymakers' ability to detect emerging risks and imbalances. This problem was emphasized by the IMF in March 2009 (Johnston and others 2009) and the importance of filling data gaps was widely supported by the international community. Key gaps were identified in financial sector data for detecting the buildup of risk, cross-border interconnections, financial linkages of global systemically important financial institutions, sectoral accounts, and national balance sheets. In response, in October 2009, the G20 finance ministers and central bank governors endorsed the G20 Data Gaps Initiative (DGI) to address the key data gaps identified by the crisis. The initiative is led by the Financial Stability Board Secretariat and IMF staff.

The first phase of the DGI (2009–15) aimed to better capture the buildup of risk in the financial sector, improve data on connections within the international financial network, monitor the vulnerability of domestic economies to shocks, and improve communication of official statistics. Its second phase (DGI-2), launched in September 2015, focuses on implementation of the regular collection and dissemination of reliable and timely statistics for policy use. The DGI-2 introduced action plans that set out specific targets for the implementation of its 20 recommendations by 2021. The DGI-2 also increases the emphasis on linkages across economic and financial sectors, reflecting the policy need to assess risks, interconnections, and spillovers within and across economies. It also aims to improve cooperation, communication, and sharing of data.

Among the main achievements to date are the following:

- The DGI led to the development of the IMF's Special Data Dissemination Standards (SDDS) Plus, launched in February 2012, targeting those economies that have systemically important financial sectors.
- Most of the G20 economies now report the seven financial soundness indicators (FSIs) that are expected from adherents to the SDDS Plus,[1] and work is well advanced to initiate collection of FSI measures beyond simple averages (for example, median, skewness, quartiles) to provide information on tail risks, concentration, and shifts in risk distribution.
- A framework for reporting credit default swaps was developed and implemented, and new international guidance was developed for securities statistics.
- A framework for the collection and sharing of data on global systemically important banks was established and reporting of such data to the International Data Hub is progressing.
- All G20 economies report their international investment positions quarterly and core Coordinated Portfolio Investment Survey data semiannually.
- Most of the G20 economies disseminate residential property price indices.

The DGI has been a key component of the financial sector reform agenda. By contributing to a better understanding of trends and volatility of capital flows, DGI data are also related to the G20 work on international financial architecture. In turn, global regulatory reforms such as Basel III and the work on the Legal Entity Identifier support the DGI by contributing to the robustness of various data frameworks (that is, security-by-security and cross-border exposures of nonbank corporations).

Through 2021, DGI work will address key remaining data gaps: compilation of government finance statistics beyond the central government; sectoral accounts, including details on shadow banking activities; and sharing of granular data.

This box was prepared by Florina Tanase and Evrim Bese Goksu.

[1]These seven FSIs are: (1) regulatory Tier 1 capital to risk weighted assets; (2) regulatory Tier 1 capital to assets; (3) non-performing loans net of provisions to capital; (4) non-performing loans to total gross loans; (5) return on assets; (6) liquid assets to short-term liabilities; and (7) residential real estate prices.

Box 2.3. Resolution Reforms in Selected Countries

Country-level Financial Sector Assessment Programs (FSAPs) conducted in recent years have highlighted substantial progress in improving bank resolution regimes and fostering resolvability of systemically important banks.

United States. Title II of the Dodd-Frank Act ("Orderly Liquidation Authority") provides the U.S. authorities with an extensive range of powers to resolve systemic nonbank financial institutions. These powers are closely aligned with the powers of the Federal Deposit Insurance Corporation to resolve banks and the Financial Stability Board's Key Attributes of Effective Resolution Regimes for Financial Institutions (Key Attributes). Substantial progress has been made with resolution planning, as illustrated by the "single point of entry" strategy that envisages the resolution of complex groups through the initiation of receivership proceedings at the holding company level, with shareholders and creditors of the failed holding company absorbing its losses. Still, the 2015 FSAP found that further improvements are needed with respect to cross-border issues, including the introduction of statutory powers to act promptly in response to actions taken by foreign resolution authorities. It also recommended enhancing the resolution regime for systemically important insurance companies and other nonbanks (such as asset managers and financial market infrastructure).

United Kingdom. The 2016 FSAP concluded that the United Kingdom has an effective resolution regime that is broadly in line with the Key Attributes. The Bank of England, as the resolution authority, cooperates closely with other stakeholders, both domestically and on a cross-border basis. The regime provides for a broad range of stabilization options—including bail-in—that can be used to preserve financial stability while avoiding taxpayer bailouts. Still, the FSAP recommended introducing an explicit power to depart from *pari passu* treatment of creditors where needed to preserve financial stability. The FSAP also recommended development of an effective resolution framework for insurance companies, which could be systemically important at the point of failure.

Switzerland. At the time of the 2014 FSAP, the Swiss authorities had already adopted a broad range of resolution powers. However, although many elements from the Key Attributes were found to be in place, the FSAP suggested some improvements, including removal of the requirement for creditor approval to apply resolution powers to banks not predesignated as systemically important; enhancing the authorities' powers to implement bridge banks to temporarily take over and maintain certain assets, liabilities, and operations of a bank placed into resolution; and development of guidance for resolution and recovery planning for nonsystemic banks. Subsequent reforms—such as the introduction in federal legislation of temporary stays on early termination rights and mandatory debt write-downs during resolution—have further strengthened the regime.

Japan. The 2017 FSAP found that the Japanese resolution framework has been significantly enhanced in recent years. Legal reforms in 2013 introduced additional resolution options and expanded the framework to include insurance companies, securities firms, and holding companies—even though central counterparties and other financial market infrastructure are not yet covered. Still, some gaps remain, including the absence of statutory bail-in powers and an explicit safeguard that "no creditor [will be] worse off than in liquidation." Moreover, the FSAP urged the authorities to provide further clarity regarding the circumstances under which the various components of the framework would be used because ambiguity could hamper effective implementation of powers to resolve systemically important banks without reliance on public support.

Euro area. The 2018 FSAP found the bank resolution framework substantially upgraded, but noted that the regime remains fragmented. The adoption of the Bank Recovery and Resolution Directive (BRRD) and the creation of the Single Resolution Mechanism (SRM) provided a comprehensive set of powers for early intervention and bank resolution, including for bailing in creditors. However, intervention cases since the new regime came into effect have demonstrated that incentives remain to use national powers with less stringent burden-sharing requirements than under the SRM/BRRD. This has resulted in different treatment of bank creditors depending on where intervention takes place. The FSAP urged the authorities to expedite the buildup of loss-absorbing capacity, strengthen the operational capacity of the resolution authority, and align triggers and minimum loss-sharing requirements, while introducing sufficient flexibility into the BRRD/SRM for times of severe financial stability risk. In addition, the FSAP recommended making the Single Resolution Fund fully operational and establishing a deposit insurance scheme for the entire euro area.

Other FSB members. While various other jurisdictions (including Canada, Hong Kong SAR, and Singapore) have also made considerable progress in strengthening their resolution regimes, recent FSAPs in other jurisdictions (such as China, India, Indonesia, and Turkey) have found that further efforts remain necessary to enhance legislative frameworks or buttress operational capacity.

This box was prepared by Constant Verkoren and Marc Dobler.

References

Adrian, Tobias. 2017. "Risk Management and Regulation." *Journal of Risk* 20 (1): 23–57.

Altavilla, Carlo, Marco Pagano, and Saverio Simonelli. 2016. "Bank Exposures and Sovereign Stress Transmission." *Review of Finance* 21 (6): 2103–39.

Arslanalp, Serkan, and Takahira Tsuda. 2014. "Tracking Global Demand for Advanced Economy Sovereign Debt." *IMF Economic Review* 62 (3): 430–64.

Ashcraft, Adam B., and Til Schuermann. 2008. "Understanding the Securitization of Subprime Mortgage Credit." *Foundations and Trends in Finance* 2 (3): 191–309.

Basel Committee on Banking Supervision (BCBS). 2010. "Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems" (revised June 2011). Bank for International Settlements, Basel.

———. 2017. "Thirteenth Progress Report on Adoption of the Basel Regulatory Framework." Bank for International Settlements, Basel.

Bouveret, Antoine. 2018. "Cyber Risk for the Financial Sector: A Framework for Quantitative Assessment." IMF Working Paper 18/143, International Monetary Fund, Washington, DC.

Claessens, Stijn, Giovanni Dell'Ariccia, Deniz Igan, and Luc Laeven. 2010. "Lessons and Policy Implications from the Global Financial Crisis." IMF Working Paper 10/44, International Monetary Fund, Washington, DC.

Claessens, Stijn, Ceyla Pazarbasioglu, Luc Laeven, Marc Dobler, Fabian Valencia, Oana Nedelescu, and Katharine Seal. 2011. "Crisis Management and Resolution: Early Lessons from the Financial Crisis." IMF Staff Discussion Note 11/05, International Monetary Fund, Washington, DC.

Cohen, Benjamin, and Gerald Edwards Jr. 2017. "The New Era of Expected Credit Loss Provisioning." *BIS Quarterly Review* March: 39–56.

Committee on Payment and Settlement Systems. 2010. "Strengthening Repo Clearing and Settlement Arrangements." Bank for International Settlements, Basel, September.

Crockett, Andrew D. 2000. "Marrying the Micro- and Macro-Prudential Dimensions of Financial Stability." Remarks made at The Eleventh International Conference of Banking Supervisors, Basel, September 21.

Data Gaps Initiative (DGI). Various years. *Annual Progress Reports*. Retrieved July 13, 2018, from http://www.imf.org/external/ns/cs.aspx?id=290.

Dell'Ariccia, Giovanni, Caio Ferreira, Nigel Jenkinson, Luc Laeven, Alberto Martin, Camelia Minoiu, and Alex Popov. 2018. "Managing the Sovereign-Bank Nexus." IMF Staff Discussion Note, International Monetary Fund, Washington, DC.

Demirgüç-Kunt, Asli, and María Soledad Martínez Pería. 2010. "A Framework for Analyzing Competition in the Banking Sector: An Application to the Case of Jordan." World Bank Policy Research Working Paper 5499, World Bank, Washington, DC.

Financial Stability Board (FSB). 2015. "Principles on Loss-Absorbing and Recapitalisation Capacity of G-SIBs in Resolution: Total Loss-Absorbing Capacity (TLAC) Term Sheet." Financial Stability Board, Basel. http://www.fsb.org/2015/11/total-loss-absorbing-capacity-tlac-principles-and-term-sheet/.

———. 2016. "Developing Effective Resolution Strategies and Plans for Systemically Important Insurers." Financial Stability Board, Basel. http://www.fsb.org/2016/06/developing-effective-resolution-strategies-and-plans-for-systemically-important-insurers/.

———. 2017a. "Assessment of Shadow Banking Activities: Risks and The Adequacy of Post-Crisis Policy Tools to Address Financial Stability Concerns." Financial Stability Board, Basel.

———. 2017b. "FinTech Credit: Market Structure, Business Models and Financial Stability Implications." Financial Stability Board, Basel.

———. 2017c. "Guidance on Central Counterparty Resolution and Resolution Planning." Financial Stability Board, Basel. http://www.fsb.org/2017/07/guidance-on-central-counterparty-resolution-and-resolution-planning-2/.

———. 2017d. "Implementing the FSB *Principles for Sound Compensation Practices* and Their *Implementation Standards*: Fifth Progress Report." Financial Stability Board, Basel. http://www.fsb.org/2017/07/implementing-the-fsb-principles-for-sound-compensation-practices-and-their-implementation-standards-fifth-progress-report/.

———. 2017e. "Framework for Post-Implementation Evaluation of the Effects of the G20 Financial Regulatory Reforms." Financial Stability Board, Basel.

Financial Stability Board, International Monetary Fund, and Bank for International Settlements (FSB, IMF, and BIS). 2009. "Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations." https://www.imf.org/external/np/g20/pdf/100109.pdf.

Financial Stability Board, International Monetary Fund, and Bank for International Settlements. 2011. "Macroprudential Policy Tools and Frameworks Progress Report to G20." https://www.imf.org/external/np/g20/pdf/102711.pdf.

Financial Stability Board, Bank for International Settlements, and International Organization of Securities Commissions (FSB, BIS, and IOSCO). 2018. "Incentives to Centrally Clear Over-the-Counter (OTC) Derivatives: A Post-Implementation Evaluation of the Effects of the G20 Financial Regulatory Reforms." Financial Stability Board, Basel.

Georgoutsos, Dimitris, and George Moratis. 2017. "Bank-Sovereign Contagion in the Eurozone: A Panel VAR Approach." *Journal of International Financial Markets, Institutions and Money* 48: 146–59.

Group of Twenty (G20). 2008. Declaration of the Summit on Financial Markets and the World Economy, Washington,

DC, November 15. http://www.un.org/ga/president/63/commission/declarationG20.pdf.

International Monetary Fund (IMF). 2013. "Key Aspects of Macroprudential Policy." IMF Policy Paper, International Monetary Fund, Washington, DC.

———. 2017. "Recent Trends in Correspondent Banking Relationships—Further Considerations." IMF Executive Board Paper, International Monetary Fund, Washington, DC.

International Monetary Fund, Financial Stability Board, and Bank for International Settlements. 2016. "Elements of Effective Macroprudential Policies: Lessons from International Experience." Washington, DC, August 31. https://www.imf.org/external/np/g20/pdf/2016/083116.pdf.

International Organization of Securities Commissions (IOSCO). 2017. "IOSCO Research Report on Financial Technologies (FinTech)." International Organization of Securities Commissions, Madrid. https://www.iosco.org/library/pubdocs/pdf/IOSCOPD554.pdf.

Johnston, R. Barry, Effie Psalida, Phil de Imus, Jeanne Gobat, Mangal Goswami, Christian Mulder, and Francisco Vazquez. 2009. "Addressing Information Gaps." IMF Staff Position Note 09/06, International Monetary Fund, Washington, DC.

Kopp, Emanuel, Lincoln Kaffenberger, and Christopher Wilson. 2017. "Cyber Risk, Market Failures, and Financial Stability." IMF Working Paper 17/185, International Monetary Fund, Washington, DC.

Leon, Florian. 2014. "Measuring Competition in Banking: A Critical Review of Methods." Working Paper 201412, Centre d'Etudes et de Recherches sur le Developpement International (CERDI), University of Auvergne, Auvergne, France.

Ong, Li L., and Ceyla Pazarbasioglu. 2013. "Credibility and Crisis Stress Testing." IMF Working Paper 13/178, International Monetary Fund, Washington, DC.

Otker-Robe, Inci, Aditya Narain, Anna Ilyina, Jay Surti, Alberto Buffa di Perrero, Julian Chow, Marc Dobler, Silvia Iorgova, Turgut Kisinbay, Michael Moore, Jiri Podpiera, Katharine Seal, Volodymyr Tulin, and Jianping Zhao. 2011. *The Too-Important to Fail Conundrum: Impossible to Ignore and Difficult to Resolve.* IMF Staff Discussion Note 11/12, International Monetary Fund, Washington, DC.

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

Viñals, José, Jonathan Fiechter, Aditya Narain, Jennifer A. Elliot, Ian Tower, Pierluigi Bologna, and Michael Hsu. 2010. "The Making of Good Supervision: Learning to Say 'No.'" IMF Staff Position Note 2010/08, International Monetary Fund, Washington, DC.

Viñals, José, Ceyla Pazarbasioglu, Laura E. Kodres, Aditya Narain, and Marina Moretti. 2010. "Shaping the New Financial System: Progress and Next Steps." IMF Staff Position Note 2010/15, International Monetary Fund, Washington, DC.

Wendt, Froukelien. 2015. "Central Counterparties: Addressing Their Too Important to Fail Nature." IMF Working Paper 15/21, International Monetary Fund, Washington DC.

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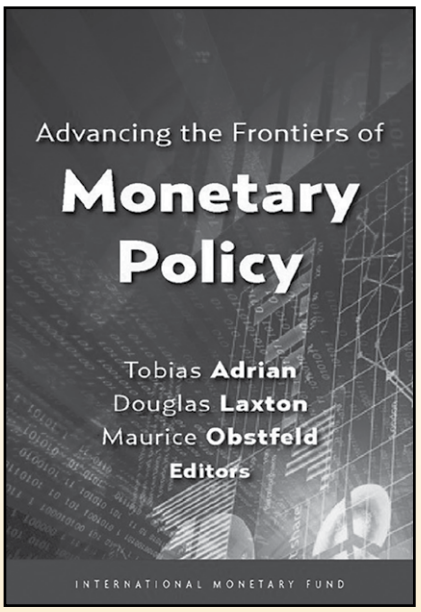

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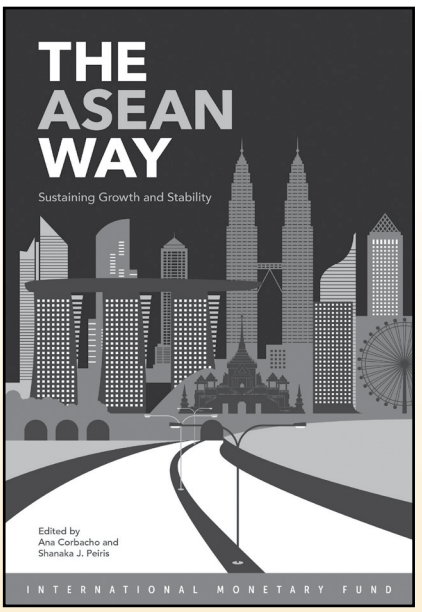

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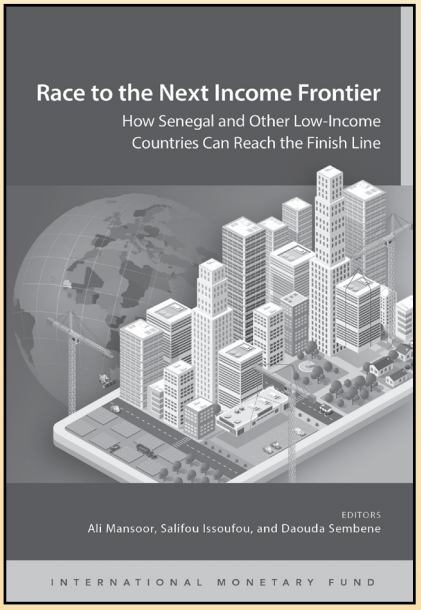

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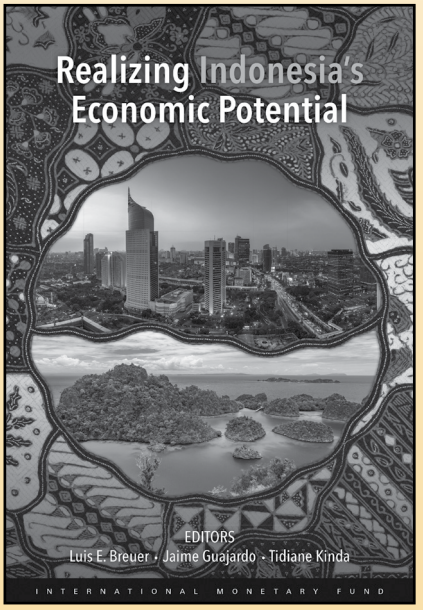

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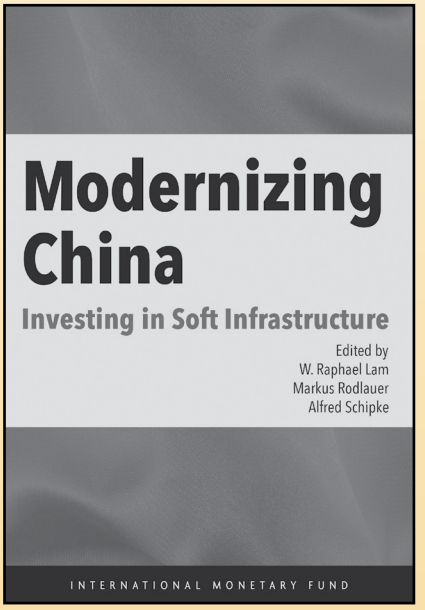

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