Global Financial Stability Report
April 2015

Navigating Monetary Policy Challenges and Managing Risks

INTERNATIONAL MONETARY FUND

Disclaimer: The *Global Financial Stability Report* (GFSR) is a survey by the IMF staff published twice a year, in the spring and fall. The report draws out the financial ramifications of economic issues highlighted in the IMF's *World Economic Outlook* (WEO). The report was prepared by IMF staff and has benefited from comments and suggestions from Executive Directors following their discussion of the report on April 3, 2015. The views expressed in this publication are those of the IMF staff and do not necessarily represent the views of the IMF's Executive Directors or their national authorities.

Recommended citation: International Monetary Fund, *Global Financial Stability Report—Navigating Monetary Policy Challenges and Managing Risks* (Washington, April 2015).

CONTENTS

Statistical Appendix

Available for download from IMF.org

Editor's notes

(April 16, 2015)

Figure 2.9, panel 1 in Chapter 2 (page 68) has been corrected and replaced. The bars in panel 1 for "Selected euro area economies" and "Other euro area economies" were transposed in the original release of the report.

Figure 3.5 in Chapter 3 (page 104) has been corrected and replaced. The circle for "EM bond MF" appeared slightly too small in the original release of the report. The "AE HY corporate bond" circle has been renamed as "AE HY bond."

Figure 3.6 in Chapter 3 (page 105) has been corrected and replaced. The data in this figure as they originally appeared in the report were incorrect.

Annex Figure 3.1.1, panel 3 in Chapter 3 (page 124) has been corrected and replaced. The data in panel 3 as printed in the original report were partially incorrect.

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, 2013–14 or January–June) to indicate the years or months covered, including the beginning and ending years or months;

/ between years or months (for example, 2013/14) to indicate a fiscal or financial year.

"Billion" means a thousand million.

"Trillion" means a thousand billion.

"Basis points" refer 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.

Further Information and Data

This version of the GFSR is available in full through the IMF eLibrary (www.elibrary.imf.org) and the IMF website (www.imf.org).

The data and analysis appearing in the GFSR are compiled by the IMF staff at the time of publication. Every effort is made to ensure, but not guarantee, their timeliness, accuracy, and completeness. When errors are discovered, there is a concerted effort to correct them as appropriate and feasible. Corrections and revisions made after publication are incorporated into the electronic editions available from the IMF eLibrary (www.elibrary.imf.org) and on the IMF website (www.imf.org). All substantive changes are listed in detail in the online tables of contents.

For details on the terms and conditions for usage of the contents of this publication, please refer to the IMF Copyright and Usage website, www.imf.org/external/terms.htm.

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 current report finds that, despite an improvement in economic prospects in some key advanced economies, new challenges to global financial stability have arisen. The global financial system is being buffeted by a series of changes, including lower oil prices and, in some cases, diverging growth patterns and monetary policies. Expectations for rising U.S. policy rates sparked a significant appreciation of the U.S. dollar, while long-term bond yields in many advanced economies have decreased—and have turned negative for almost a third of euro area sovereign bonds—on disinflation concerns and the prospect of continued monetary accommodation. Emerging markets are caught in these global cross currents, with some oil exporters and other facing new stability challenges, while others have gained more policy space as a result of lower fuel prices and reduced inflationary pressures. The report also examines changes in international banking since the global financial crisis and finds that these changes are likely to promote more stable bank lending in host countries. Finally, the report finds that the asset management industry needs to strengthen its oversight framework to address financial stability risks from incentive problems between end-investors and portfolio managers and the risk of runs due to liquidity mismatches.

The analysis in this report has been coordinated by the Monetary and Capital Markets (MCM) Department under the general direction of José Viñals, Financial Counsellor and Director. The project has been directed by Peter Dattels and Dong He, both Deputy Directors, as well as by Gaston Gelos and Matthew Jones, both Division Chiefs. It has benefited from comments and suggestions from the senior staff in the MCM Department.

Individual contributors to the report are Ali Al-Eyd, Nicolás Arregui, Serkan Arslanalp, Jonathan Beauchamp, Rina Bhattacharya, John Bluedorn, Antoine Bouveret, Peter Breuer, Yingyuan Chen, Martin Čihák, Fabio Cortes, Cristina Cuervo, Pragyan Deb, Reinout De Bock, Martin Edmonds, Johannes Ehrentraud, Jennifer Elliott, Michaela Erbenova, Brenda González-Hermosillo, Tryggvi Gudmundsson, Sanjay Hazarika, Geoffrey Heenan, Allison Holland, Eija Holttinen, Hibiki Ichiue, Bradley Jones, David Jones, William Kerry, Oksana Khadarina, Yoon Kim, Frederic Lambert, Daniel Law, Min-Jer Lee, Peter Lindner, Andrea Maechler, Joe Maloney, Alejandro Lopez Mejia, Win Monroe, Hiroko Oura, Evan Papageorgiou, Alexandra Peter, Vladimir Pillonca, Alvaro Piris Chavarri, Jean Portier, Gabriel Presciuttini, Shaun Roache, Luigi Ruggerone, Martin Saldias, Luca Sanfilippo, Tsuyoshi Sasaki, Katharine Seal, Nobuyasu Sugimoto, Narayan Suryakumar, Shamir Tanna, Nico Valckx, Chris Walker, Jeffrey Williams, and Kai Yan. Magally Bernal, Carol Franco, Daniela Mendoza, Juan Rigat, and Adriana Rota were responsible for word processing.

Joe Procopio from the Communications Department led the editorial team and managed the report's production with support from Michael Harrup and Linda Kean and editorial assistance from Cathy Gagnet, Lucy Scott Morales, Sherrie Brown, Gregg Forte, Linda Long, David Einhorn, EEI Communications, and AGS.

This particular edition 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 March 27, 2015. 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 April 3, 2015. However, the analysis and policy considerations are those of the contributing staff and should not be attributed to the IMF, its Executive Directors, or their national authorities.

EXECUTIVE SUMMARY

Macroeconomic shocks pose new challenges for global markets

A wide range of positive and negative macroeconomic and financial developments have occurred in the past six months. On a net basis, these developments have increased financial stability risks.

On the positive side, as discussed in the April 2015 *World Economic Outlook,* growth in 2015 is expected to be slightly higher than that of 2014, improving in advanced economies enough to offset slower growth in emerging market and developing economies. Sharply lower oil and commodity prices, coupled with lower interest rates from expanded monetary accommodation, are expected to support growth through 2016. Bold monetary policy actions have been taken in both the euro area and Japan to arrest and reverse disinflationary pressures. Quantitative easing provides a strong framework for addressing deflation risks, and some key transmission channels are already working. Spreads on credit have narrowed in the euro area, equity prices have surged, and the euro and yen have depreciated significantly, helping to raise inflation expectations.

At the same time, the U.S. dollar has appreciated substantially, reflecting diverging monetary policies. The dollar has strengthened more against major currencies during the past nine months than it has during any similar period since 1981. The resulting movements in real exchange rates have broadly reflected changes in growth prospects and exposures to lower oil prices, and should help support the global recovery.

However, the financial stability risks around this baseline are rising and rotating. Although the benefits of the improving baseline are widely distributed and accrue over time, the adverse impact of recent shocks is concentrated and is already affecting sectors and economies with preexisting vulnerabilities. Meanwhile, continued financial risk taking and structural changes in credit markets are shifting the locus of financial stability risks from advanced economies to emerging markets, from banks to shadow banks, and from solvency to market liquidity risks.

- Continued financial risk taking and search for yield keep stretching some asset valuations. The low inter-est rate environment also poses challenges for long-term investors, particularly for weaker life insurance companies in Europe.

- Oil- and commodity-exporting countries and firms have been severely affected by falling asset valuations and rising credit risks. Energy and commodity firms in emerging markets, which account for more than a third of nonfinancial corporate bonds issued in hard currency since 2007, have been particularly hard hit. Strains in the debt-repayment capacity of the oil and gas sector have become more evident for firms in Argentina, Brazil, Nigeria, and South Africa because of low oil prices, as well as for sovereigns reliant on oil revenues such as Nigeria and Venezuela.

- Rapidly depreciating exchange rates have increased pressures on firms that borrowed heavily in foreign currencies and have sparked significant capital outflows for several emerging markets. These developments could add stress to emerging market sovereigns that have increased their combined exposure to foreign currency borrowings and foreign investor holdings of local currency debt.

- Volatility in major exchange rates has increased by more than during any similar period since the global financial crisis. Reduced liquidity in both the foreign exchange and fixed-income markets, as well as the changing composition of the investor bases in these markets, has added frictions to portfolio adjustments. The resulting tensions in global financial markets have increased market and liquidity risks, given that sudden episodes of volatility could become more common and more pronounced.

Existing legacy challenges add to these pressures, leaving overall financial stability risks higher.

Financial stability is not fully grounded in advanced economies, and risks have increased in many emerging markets

Long-term bond yields in many advanced economies have decreased on disinflation concerns and the prospect of continued monetary accommodation. In the euro

area, almost one-third of short- and long-term sovereign bonds now carry negative yields. But a prolonged low interest rate environment will pose severe challenges for a number of financial institutions. Weak European mid-sized life insurers face a high and rising risk of distress—stress tests (conducted by the European Insurance and Occupational Pensions Authority) show that 24 percent of insurers may not be able to meet their solvency capital requirements under a prolonged low interest rate scenario. The industry has a portfolio of €4.4 trillion in assets in the European Union, with high and rising interconnectedness with the wider financial system, creating a potential source of spillovers.

High debt levels in the private sector continue to hinder growth and financial stability. Accommodative monetary policies in advanced economies have helped reduce private sector debt ratios by supporting inflation and growth and by increasing asset prices. However, the assumptions for growth and inflation in this report suggest that private sector debt levels in a number of major advanced economies will remain high. This continuing high debt calls for an additional response to address the crisis legacies and unshackle economic potential. Gross corporate debt in France, Italy, Portugal, and Spain is expected to remain above or near 70 percent of GDP by 2020, and gross household debt in Portugal and the United Kingdom is projected to remain high compared with that of other major advanced economies.

At the same time there is a clear upside risk to interest rates in the United States. Two possible scenarios characterize the future normalization of U.S. monetary policy: a smooth well-telegraphed exit, or, despite clear communication, a bumpy ride with a more rapid decompression of term premiums leading to rapidly rising yields and substantially higher volatility. Indeed, declines in structural liquidity in fixed-income markets in both the United States and other economies have amplified asset price responses to shocks, increasing potential spillovers. Technological change, increased regulation, and the shifting composition of market participants have altered the microstructure of fixed-income markets. Illiquidity events now spill over to other asset classes and to emerging markets, as witnessed in the U.S. Treasury market and in policy-induced instability in foreign exchange markets following the removal of the Swiss franc floor. These developments highlight some key vulnerabilities in capital markets and the shadow banking system.

Emerging markets are caught in these global crosscurrents, as they address their own domestic challenges.

Lower commodity prices and lower inflationary pressures are benefiting many emerging market economies, providing monetary policy space to combat slowing growth. However, oil- and commodity-exporting countries and countries with high foreign indebtedness face more formidable risks. Although the stronger dollar can help improve competitiveness in emerging market economies in general, and lead to higher growth, the dramatic movements in commodity prices and in the exchange rates of many emerging market economies during the past six months have already had a significant impact on firms' market valuations in these economies. Many companies borrowed heavily in international markets—substituting international borrowings in dollars for local currency borrowing from banks—potentially leading to balance sheet pressures.

In turn, a retrenchment of overinvested industries, real estate sector adjustments, and property price declines—especially in China—could spill over to emerging markets more broadly. The broader impact of a sudden deterioration in corporate health on banking system stability depends on credit exposures. In China, exposures to real estate (excluding mortgages) are almost 20 percent of GDP, and financial stress among real estate firms could lead to direct cross-border spillovers, given the substantial increase in external bond issuance since 2010. In 11 of the 21 emerging market banking systems analyzed in this report, more than half of the bank loan books consists of loans to firms, rendering them more exposed to corporate weakness, particularly in Nigeria, Peru, Turkey, and Ukraine.

In a downside risk scenario, further rapid dollar appreciation and an abrupt rise in U.S. interest rates, coupled with a rise in geopolitical risks, could put added pressure on emerging market currencies and asset markets. After a prolonged period of inflows, foreign investors could abruptly reduce their holdings of local currency debt, thereby adding to turbulence and creating debt rollover challenges. Markets also appear complacent when it comes to geopolitical and political risks. As noted in the April 2015 *World Economic Outlook,* ongoing events in Russia and Ukraine, the Middle East, and parts of Africa could lead to greater tensions and increased disruptions to global trade and financial transactions. Direct financial linkages between Russia and the rest of the world are limited, but the indirect connections with neighboring countries could raise financial stability risks. Stronger institutional frameworks in the euro area have reduced the threat

of contagion from Greece, but risks and vulnerabilities remain.

A range of additional policies are required to increase policy traction and ground stability

This report assesses the policy responses of central banks in both advanced and emerging market economies. A key message is that additional policy measures—beyond monetary policies—are required to make a well-grounded exit from the crisis. Policies must address crisis legacies and facilitate sustainable economic risk taking while containing financial excesses across global markets.

To maximize the impact of quantitative easing in the **euro area,** central bank actions must be complemented with measures to restore balance sheet health in the private sector, unclog credit channels, enhance the soundness of nonbank institutions, and promote structural reforms. In particular,

- Unclogging credit channels requires comprehensive actions to tackle the burden of nonperforming loans. Despite improving bank resilience in the wake of the ECB's Comprehensive Assessment and introduction of the Single Supervisory Mechanism, asset quality continues to deteriorate, although at a slowing pace, with total nonperforming loans now standing at more than €900 billion. Banks should be encouraged to develop and use specialized internal and external capacity for handling the stock of nonperforming assets, actively manage their provisions, and write off their nonperforming assets. Further efforts are needed to improve the effectiveness of legal frameworks governing bankruptcy of companies and individuals. Without corrective policy actions, bank lending capacity could be limited to a meager 1 to 3 percent on average a year.
- The challenges facing life insurers should also be tackled promptly. Regulators need to reassess the viability of guarantee-based products and work to bring minimum return guarantees offered to policyholders in line with secular trends in policy rates. Prompt regulatory and supervisory actions are needed to mitigate damaging spillovers from potential difficulties of individual insurers. The introduction of a more harmonized safety net would further increase the industry's resilience.
- Sources of funding need to be diversified away from banks and toward capital markets. Despite the surge in capital market borrowings, they represent only

about 36 percent of the system. A deeper and broader capital market would improve access to finance, particularly for smaller firms, and make financial markets more efficient. In the euro area, encouraging the use of capital markets requires harmonization of company law, corporate governance, insolvency regimes, and taxation, in line with the latest Capital Markets Union proposal by the European Commission.

In **Japan** the effectiveness of quantitative easing depends on the policies supporting it. Steadfast implementation of Abenomics' second and third arrows (fiscal and structural reforms) is essential. If these reforms are incomplete, efforts to pull the economy out of deflation are less likely to succeed. The Bank of Japan should consider strengthening the portfolio rebalancing effects of its asset purchases by increasing the share of private assets in purchases and extending the program to longer-maturity government bonds, as necessary, to achieve its 2 percent inflation target. To further stimulate bank lending to the private sector, the authorities should expand special lending facilities; jumpstart the securitization market for small and medium enterprise credits and mortgages; and enhance risk capital provision, including by encouraging more asset-based lending and removing barriers to entry and exit for small and medium enterprises.

In the **United States**, the impact of global market forces requires appropriately balanced policies, including continued clear communication of monetary policies. A smooth market adjustment will be more likely if there is extensive discussion and interpretation of key economic variables given that monetary policy is now data dependent. Yet market expectations can differ from the Federal Reserve's guidance, leading to market tensions and raising market and liquidity risks.

In the United States and other economies with significant nonbank financial systems, addressing illiquidity and potential spillovers by strengthening market structures will help enhance stability. As noted in Chapter 3, the asset management industry needs stronger oversight that combines better microprudential supervision of risks with the adoption of a macroprudential orientation. Policies should seek to address the mismatch between the liquidity promised to mutual fund owners in good times and the cost of illiquidity when redemptions must be met in times of stress. Policies can help to accomplish this objective by reducing asset owners' incentives to run (by aligning funds' redemption terms with the

underlying liquidity in the assets invested); enhancing the accuracy of net asset values; increasing liquidity cash buffers in mutual funds; and improving the liquidity and transparency of secondary markets, especially of longer-term debt markets. Market participants in government bond and foreign exchange markets should also have greater incentives to provide secondary market liquidity. Authorities should review current circuit breakers to enhance their functioning. Risk management and control should be reinforced: supervisors should provide coordinated guidance to trading firms, allowing them to set consistent and appropriate risk limits on individual retail investors. Regulators and monetary authorities should consider the correlation between asset classes when evaluating systemic risks in financial markets.

Emerging markets should aim to cushion the impact of global headwinds and safeguard the resilience of their financial systems through enhanced surveillance of vulnerable sectors, particularly in the following areas:

- In China, the overall priority must be to allow an orderly correction of excesses, curtailing the riskiest parts of shadow banking. At the same time, orderly deleveraging requires comprehensive policies that allow credit growth to slow gradually and, where necessary, the mechanisms to be provided for orderly corporate debt restructuring, and the exit of nonviable firms.

- Across emerging markets more generally, the large portion of debt denominated in foreign currencies means that micro- and macroprudential measures have important roles to play in limiting the risks from shocks. Regulators need to conduct bank stress tests related to foreign currency and commodity price risks and more closely and regularly monitor corporate leverage and foreign currency exposures, including derivatives positions.

- To ensure markets function properly, authorities need to prepare for lapses of liquidity in local currency bond markets. Country authorities might potentially use cash balances when needed, or lower the supply of long-term debt to the market to help curtail bond spread increases. Bilateral and multilateral swap line agreements, by providing foreign currency funding in times of stress, can enhance confidence and help reduce excess volatility in currency markets. Multilateral resources such as IMF facilities could also provide additional buffers.

The international financial regulatory reform agenda has strengthened regulatory frameworks, and is helping to make financial institutions and the global financial system more robust. Global standard setters and national regulators now need to provide further clarity about regulatory standards—and thus improve certainty for banks adapting their business models—by finalizing the calibration of recent requirements, including the leverage ratio, the net stable funding ratio, and total loss-absorbing capital requirements. Promptly putting in place regulations to transform shadow banking into a stable source of market-based finance is also a must.

At the same time, micro- and macroprudential policies for nonbanks should be strengthened. Existing regulatory frameworks may need to be reassessed to enable the authorities to better understand the less closely regulated corners of the financial sector that could cause problems for the banking system and the broader economy, and act as needed to mitigate identified vulnerabilities.

Changes in international banking models have reduced risks in host financial systems

On a more positive note, Chapter 2, which examines changes in international banking since the global financial crisis, finds that these changes are likely to promote more stable bank lending in host countries. It also finds a need for more international cooperation for dealing with regional or global shocks to maximize the benefits of cross-border banking while mitigating risks.

International banks, especially those in Europe, have reduced their cross-border lending, while local loans by branches and subsidiaries of foreign banks abroad have remained steady. Local and regional banks have stepped in to offset, at least partially, euro area banks' reduction in exposure to some regions. As a result, intraregional linkages have deepened, in particular in Asia. Regulatory changes and weaknesses in bank balance sheets have contributed significantly in the past to the observed cutback in cross-border lending, whereas accommodative monetary policies may have slowed the cutback.

The relative shift from cross-border lending to more local lending by affiliates should improve the financial stability of host countries. Cross-border lending flows are more sensitive to global shocks than are local lending and international portfolio flows. Cross-border lending also tends to amplify the effect of adverse

domestic shocks on credit. In contrast, lending by foreign subsidiaries is more resilient than lending by domestic banks during domestic crises when the parent bank is well capitalized and less dependent on nondeposit funding sources. However, restrictions on cross-border lending may jeopardize other benefits not examined in the chapter.

Oversight of asset managers must be proportional to the risks they pose to the financial system

Chapter 3 finds that the asset management industry needs to strengthen its oversight framework in two key areas: better microprudential supervision of risks and adoption of some macroprudential concerns as a standard part of its orientation. Asset management firms can provide credit to the real economy even when banks are distressed, and they have certain advantages over banks from a financial stability perspective. However, the sector's growth and the structural changes in financial systems have heightened stability concerns. Although the risks posed by leveraged hedge and money market funds are already widely recognized,

opinions about less leveraged "plain-vanilla" investment products are divided.

However, even plain-vanilla products may pose financial stability risks through two channels: (1) incentive problems between end investors and portfolio managers (which potentially can lead to herding, among other things) and (2) run risk stemming from the presence of liquidity mismatches. The empirical analysis finds evidence of many of these risk-generating mechanisms, although their importance varies across asset markets. Without providing a verdict on whether large asset managers should be designated as systemically important, the analysis indicates that a fund's investment focus is relatively more important than its size when it comes to its contribution to systemic risk.

These findings suggest that securities regulators should shift to a more hands-on supervisory model, supported by global standards on supervision and better data and risk indicators. The roles and adequacy of existing risk-management tools should be reexamined to take into account the asset management industry's role in systemic risk and the diversity of its products.

ENHANCING POLICY TRACTION AND REDUCING RISKS

Financial Stability Overview

Developments over the past six months have increased global financial stability risks. Risks have also rotated from advanced economies to emerging markets, from banks to shadow banks, and from solvency to market liquidity risks. The global financial system is being buffeted by a series of changes in financial markets, reflecting diverging growth patterns and monetary policies as global growth prospects have weakened. Disinflationary forces have strengthened as oil and commodity prices have dropped. Although the latter has benefited commodity- and oil-importing countries and increased the room to maneuver for monetary policy in countries with higher inflation, it has increased financial risks in some exporting countries and in the oil sector. As a result of these developments, inflation expectations and long-term bond yields have fallen. Bold monetary policy actions have been taken in both the euro area and Japan to arrest and reverse this disinflation pressure, while the pull of expectations for rising U.S. policy rates and the push of additional monetary stimulus by other major economies have sparked rapid appreciation of the U.S. dollar. Emerging markets are caught in these global cross-currents and face higher financial stability risks, as companies that borrowed heavily on international markets could face balance sheet strains. Additional policy measures are needed to enhance the effectiveness of monetary policies, address crisis legacies, and facilitate sustainable economic risk taking while containing financial excesses across global markets.

Financial stability risks have increased since the October 2014 *Global Financial Stability Report* and are reflected in the Global Financial Stability Map (Figure 1.1) and in its components (Figure 1.2). As discussed in the April 2015 *World Economic Outlook* (WEO), the distribution of risks to global growth is now more balanced, but still tilted to the downside. Weaker inflation and greater uncertainty are weighing on the macroeconomic outlook. But these forces are broadly offset by favorable developments in high-frequency indicators, reflecting the expected benefits of lower oil prices and additional monetary accommodation, leaving *macroeconomic risks* broadly unchanged since October.

Figure 1.1. Global Financial Stability Map: Risks and Conditions

April 2015 GFSR
October 2014 GFSR
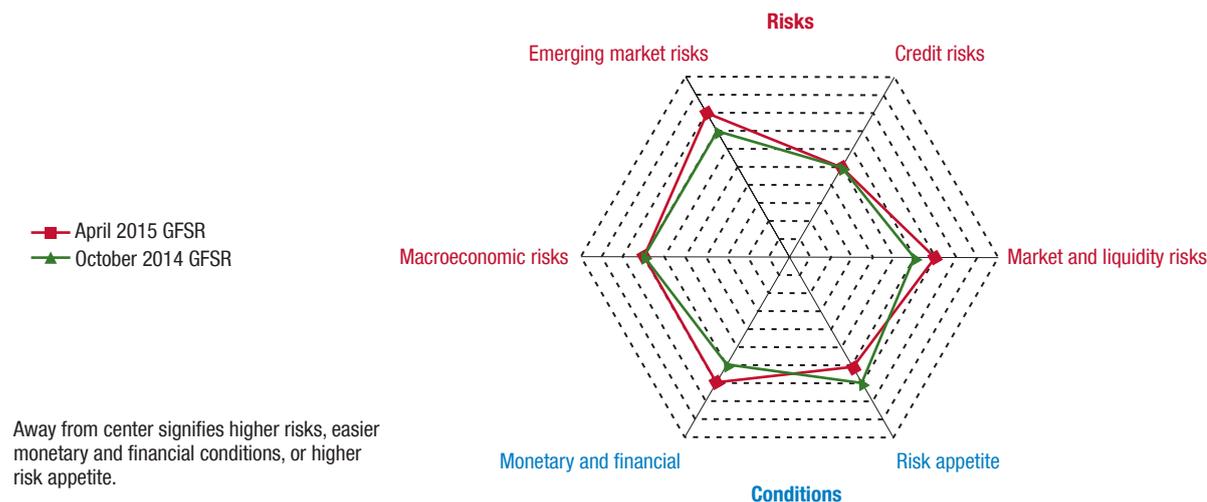
Away from center signifies higher risks, easier monetary and financial conditions, or higher risk appetite.

Source: IMF staff estimates.
Note: GFSR = *Global Financial Stability Report*.

Figure 1.2. Global Financial Stability Map: Components of Risks and Conditions
(Notch changes since the October 2014 Global Financial Stability Report*)*

Macroeconomic risks are unchanged, as improved economic activity offsets weaker inflation and greater uncertainty.
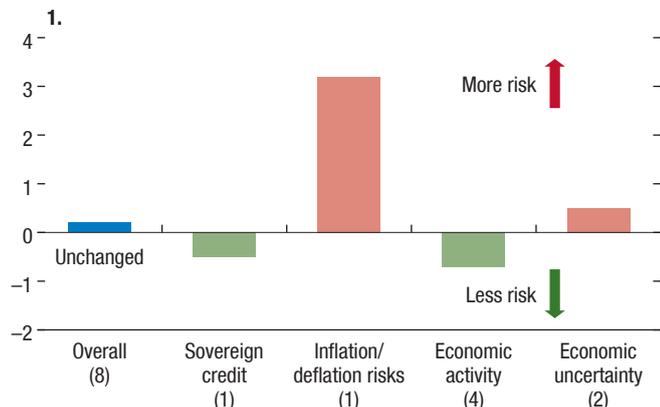
Emerging market risks have increased, driven by elevated volatility and worsening corporate sector and liquidity risks.
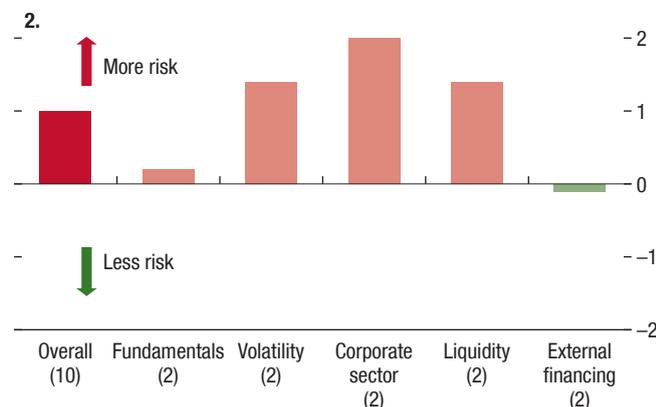
Credit risks are unchanged, as worsening in corporate sector is offset by improvements in banking and household indicators.
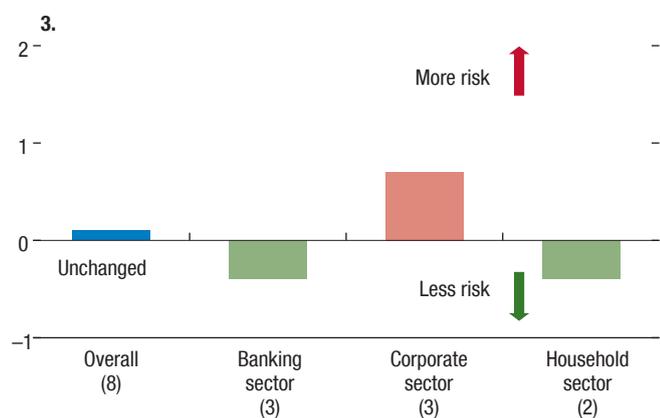
Monetary and financial conditions have been accommodative, with lending conditions easing.
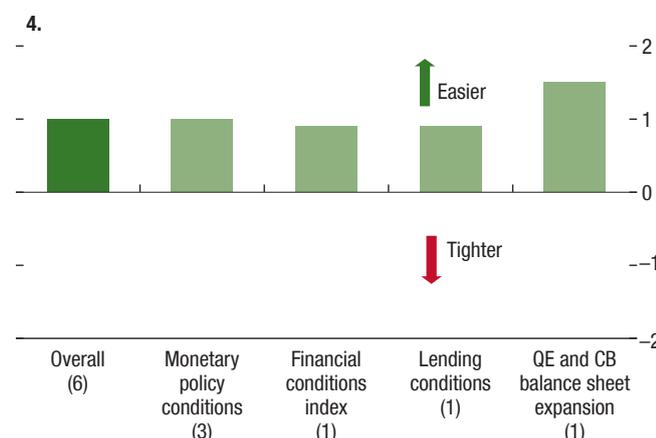
Risk appetite has declined, reflecting lower relative asset returns and rapid outflows from emerging markets.
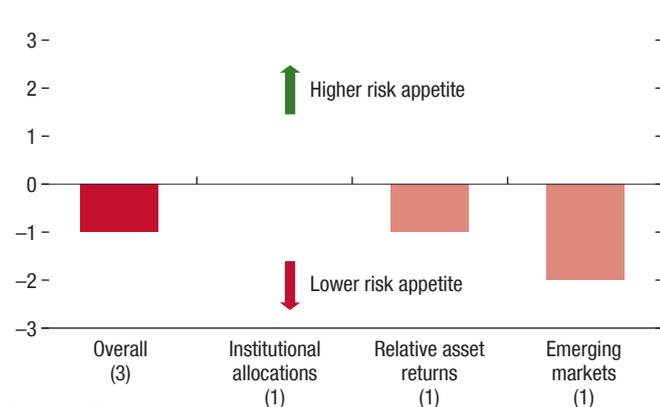
Market and liquidity risks have increased, reflecting heightened volatility and more stretched positioning indicators.
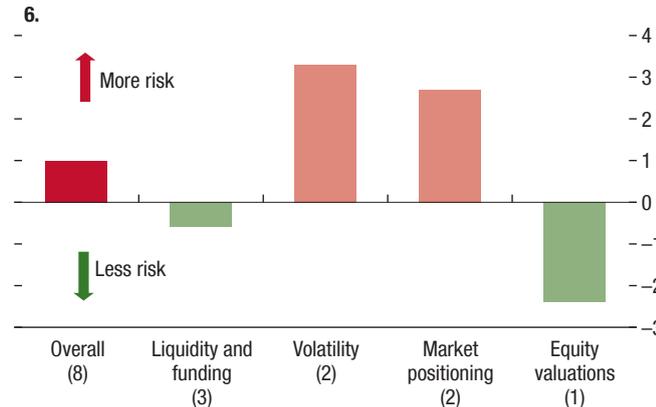
Source: IMF staff estimates.
Note: Changes in risks and conditions are based on a range of indicators, complemented with IMF staff judgment (see Annex 1.1 in the April 2010 *Global Financial Stability Report* and Dattels and others (2010) for a description of the methodology underlying the Global Financial Stability Map). Overall notch changes are the simple average of notch changes in individual indicators. The number below each legend indicates the number of individual indicators within each subcategory of risks and conditions. For lending conditions, positive values represent slower pace of tightening or faster easing. CB = central bank; QE = quantitative easing.

The U.S. economy is expanding, with rising employment and an improving investment outlook, as economic risk taking has taken hold. U.S. monetary authorities have clearly communicated that a process of monetary normalization could begin this year with an increase in policy rates. The bad news is that lower growth prospects elsewhere, relative to October 2014, and disinflationary forces have continued to exert a strong influence on the global economy. The number of countries with low or negative rates of headline inflation, and their share of global output, increased significantly through 2014 (Figure 1.3, panels 1 and 2). Falling commodity prices, particularly oil prices, amplified this disinflation pressure, and the inflation rate in many advanced economies fell below inflation objectives. More emerging market economies than advanced economies have headline inflation above their inflation goals, although many major Asian economies are at their inflation cycle lows (Figure 1.3, panels 3 and 4).

Central banks have responded to increased downward risks to price stability. Since October, the Bank of Japan (BOJ) and the European Central Bank (ECB) have announced bold new monetary measures designed to ward off deflation pressure and move their economies closer to their inflation objectives (Figure 1.3, panel 5). Other central banks have cut rates or loosened their monetary policy stances, and markets are generally pricing in lower policy rates by the end of 2015 for a number of countries (Figure 1.3, panel 6). The policy easing has offset modestly tighter real interest rates and thus loosened *monetary and financial conditions* overall. This report examines some of the financial channels through which quantitative easing (QE) works—and how to maximize its benefits while mitigating the risks to financial stability.

Emerging market financial stability risks have increased. The easing of inflation pressure is benefiting many emerging market economies, giving them monetary policy space to combat slowing growth. However, recent global shocks—including higher political risks—leave several emerging market economies more vulnerable. Oil and commodity price declines have hurt commodity exporters and sectors faced with overcapacity, while companies that borrowed heavily on international markets face balance sheet strains from revalued foreign currency liabilities. In China, the disinflationary force of property price declines could strain bank and shadow bank balance sheets and spill over more broadly. The section "Emerging Markets: Safeguard-

ing the Financial Sector against Global Headwinds" identifies these vulnerabilities and discusses how best to safeguard emerging markets against these forces. Reflecting the challenges facing emerging markets, *risk appetite* is lower as currency volatility and adjustments have prompted a pullback of capital flows by foreign investors. Lower allocations of global funds to risky assets and lower excess returns also point to slightly lower risk appetite compared to October, although appetite remains above its historical average.

Credit risks are broadly unchanged. Although the macroeconomic benefits of lower energy prices should have a favorable impact on household balance sheets, the immediate credit impact of oil and commodity price declines on firms in the energy sector is negative. Box 1.1 and the section "Disinflationary Risks and Financial Stability" examine the energy segments of the high-yield market and highlight the potential strains and exposures to the banking system. Furthermore, the fall in nominal yields—should it be sustained—raises a serious threat to the life insurance and pension fund sectors, especially in Europe, as discussed in the "Disinflationary Risks and Financial Stability" section.

These developments have created various tensions in global financial markets, raising *market and liquidity risks*. Asynchronous monetary policies have led to a sharp increase in volatility in foreign exchange markets amid a rapid appreciation of the U.S. dollar. Despite the prospect of gradual U.S. policy rate tightening, longer-term U.S. bond yields and term premiums remain compressed as the ECB and BOJ ramp up their asset purchases. Asset valuations remain elevated relative to the past 10 years as monetary policies continue to exert downward pressure on spreads (Figure 1.4, panel 1). Market volatility (Figure 1.2, panel 6) has increased across the asset spectrum, rising from the record lows at the time of the October 2014 *Global Financial Stability Report* (Figure 1.4, panel 2). The section "When Market Liquidity Vanishes" examines the structural features that have contributed to reduced market liquidity and warns that economic and policy tensions leave global markets vulnerable to bouts of illiquidity that could prove systemic.

This report takes a closer look at recent challenges to the global economy and central banks' policy responses to these challenges. The report discusses how to maximize the effectiveness of these accommodative monetary policies while minimizing the financial stability side effects, with a particular focus on QE.

Figure 1.3. Global Disinflationary Forces

1. Number of Countries with Low Inflation Rates
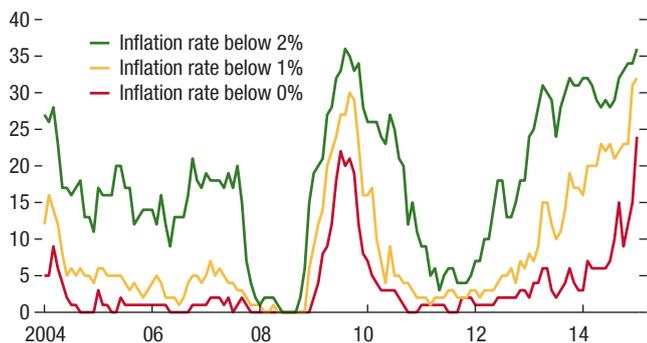
- Inflation rate below 2%
- Inflation rate below 1%
- Inflation rate below 0%

Sources: Bloomberg, L.P.; IMF, World Economic Outlook database; Haver Analytics; and IMF staff calculations.
Note: Annual percent change in consumer prices includes 33 advanced economies and 17 emerging market economies.

2. Share of Countries with Low Inflation Rates
(Percent of global GDP)
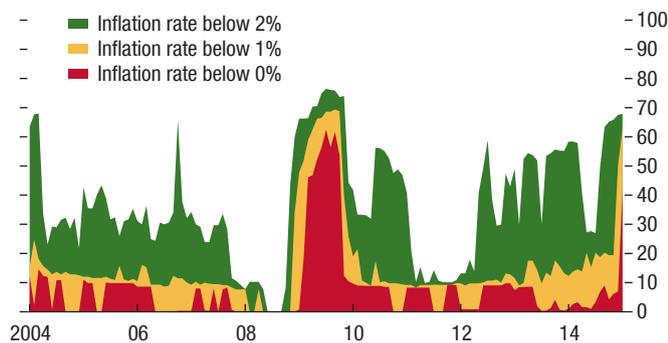
- Inflation rate below 2%
- Inflation rate below 1%
- Inflation rate below 0%

Sources: Bloomberg, L.P.; IMF, World Economic Outlook database; Haver Analytics; and IMF staff calculations.
Note: Annual percent change in consumer prices includes 33 advanced economies and 17 emerging market economies.

3. Advanced Economies Inflation Phase Curve (as of February 2015)

Accelerating inflation — *Decelerating inflation* — *Accelerating inflation*

Neutral zone

Canada
Austria
Euro area, France, Germany, Ireland, Italy, Japan, Netherlands, Portugal, Spain, Switzerland, United Kingdom, United States

4. Emerging Markets Inflation Phase Curve (as of February 2015)

Accelerating inflation — *Decelerating inflation* — *Accelerating inflation*

Neutral zone

Brazil, Colombia, Russia
Turkey
Chile
Indonesia
Peru
Mexico
South Africa
Philippines
India
Hungary, Poland, Thailand
China

Sources: National authorities; and IMF staff estimates.
Note: In panels 3 and 4, countries are placed on the phase curve according to where their February 2015 year-over-year headline inflation print is relative to (1) central bank inflation target band (where available), (2) three-month trend, and (3) the efficacy of monetary policy (using past two years inflation targeting performance). The inflation measure used for Japan excludes tax effects. Data for Japan are as of January 2015. When inflation is in the inflation band it is placed within the dashed lines, otherwise outside, and the distance from the closest dashed line is determined by criterion 3. For advanced economies, the inflation band is taken to be 1–3 percent.

5. Central Bank Balance Sheets
(Percent of GDP)

Projections

- Federal Reserve
- Bank of Japan
- European Central Bank
- Bank of England
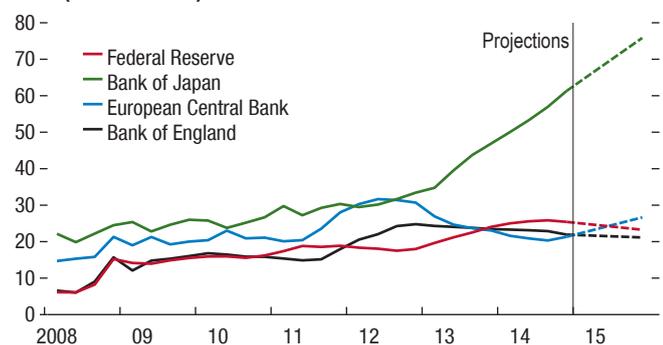
Sources: Bloomberg, L.P.; and IMF staff estimates.

6. Market-Implied Interest Rate Moves
(Basis points)

- Since October 1, 2014
- Next 12 months

Norway, Australia, Turkey, Korea, New Zealand, Hungary, Euro area, Japan, Sweden, Poland, Switzerland, Canada, United Kingdom, Brazil, United States, Indonesia, South Africa, Mexico
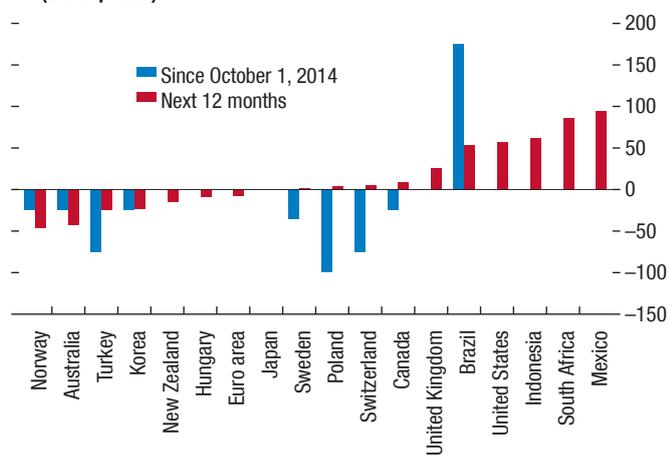
Sources: Bloomberg, L.P.; and IMF staff estimates.

Box 1.1. The Oil Price Fallout—Spillovers and Implications for the Financial Sector

The recent steep decline in oil prices reflects to a significant extent supply factors, providing a net benefit to the global economy. Nevertheless, the speed and magnitude of the movement in oil prices raise questions about how stress can be transmitted through the financial sector. This box addresses several channels through which lower oil prices could spawn financial vulnerabilities: a self-reinforcing cycle of rising credit risk and deteriorating refinancing conditions for countries and companies, a decline in oil surplus recycling in world funding markets, and strains on the financial market infrastructure's ability to accommodate prolonged heightened energy price volatility.

Background: As one of the steepest on record (Figure 1.1.1, panel 1), the recent decline in oil prices appears to reflect supply factors, a net benefit to the global economy over the medium term.[1] Nevertheless, the speed and magnitude of the movement in oil prices may produce financial strains in selected areas as markets adjust to a new pricing environment. This box discusses three channels through which such an adjustment could potentially contribute to an increase in market volatility.

Amplification of credit risk: Countries and companies dependent on oil revenues have already been significantly repriced by investors since summer 2014, as reflected in bond spreads, equity prices, and currency movements (Figure 1.1.1, panel 2). Although risk premiums have widened, however, the impact has probably not yet fully hit in several areas. These effects include refinancing risk for energy-producing sovereigns and firms, and the reduction in bank funding lines to energy companies in response to breaches in lending covenants.

Country refinancing risk: Fiscal breakeven prices vary widely across oil-producing countries in emerging markets, from $54 a barrel for Kuwait to as much as $184 a barrel for Libya. Barring spending cuts, new sources of revenue, or tapping fiscal buffers, the loss in oil revenue will require new sources of financing. U.S. dollar–based bond spreads for emerging market oil-exporting countries have already doubled since summer 2014, which suggests that refinancing conditions are now more problematic. Local currency depreciation may also put upward pressure on inflation where domestic inflation expectations are not well anchored, further raising the risk premium on sovereign debt.

Corporate refinancing in the energy sector: Scaled-back energy sector exposure by banks and corporate bond investors could amplify strains associated with falling revenue and higher funding costs. Historically, corporate defaults in the energy sector have tended to pick up in response to falling oil prices, with a lag of about 12 months, (Fitch 2015b) likely reflecting a typical one-year hedging horizon by producers. Since the downdraft in oil prices did not begin to accelerate until September 2014 (at which point Brent and West Texas Intermediate prices were still higher than $100 a barrel), aftershocks for the corporate sector may not yet have fully filtered through.

The outstanding worldwide notional value of bank loans and corporate debt extended to the energy sector amounts to about $3 trillion,[2] $247 billion of which is attributable to the U.S. high-yield bond market alone (Fitch 2015a) (see Figure 1.16 and Table 1.4 for further discussion of energy and the U.S. high-yield sector). Global syndicated loan issuance in the oil and gas sector has risen markedly in recent years, with €450 billion in issuance in 2014 alone, almost double that of the previous cycle peak in 2007 (Figure 1.1.1, panel 3). In addition, the leveraged (that is, high-yield) share of syndicated oil and gas loan issuance has steadily increased, from 17 percent in 2006 to 45 percent in 2014. The majority of global systemically important banks have about 2 to 4 percent of their total loan book exposures devoted to the energy sector.[3] Available data suggest that there are higher exposures by selected banks in emerging markets and among some U.S. regional banks (although firm estimates are difficult to determine). A prolonged period of low oil prices will jeopardize the debt-servicing capacity of exploration and production firms that have high cost bases.[4]

Oil surpluses and global liquidity: Foreign exchange reserves accumulated by net oil-exporting countries have increased $1.1 trillion, or almost fivefold, over the past decade (Figure 1.1.1, panel 4). Accounting for about 15 percent of the cumulative rise in world foreign exchange reserves since 2004, these funds have been an important source

---

The authors of this box are Bradley Jones, Gabriel Presciuttini, Peter Breuer, Peter Lindner, Tsuyoshi Sasaki, and Fabio Cortes.

[1] See the April 2015 *World Economic Outlook*.

[2] Bank for International Settlements (BIS), Dealogic.

[3] Bernstein Research; Bloomberg, L.P., industry reports; and IMF staff.

[4] Among U.S. energy companies, about $380 billion is owed by firms with a ratio of debt to earnings before interest, taxes, depreciation, and amortization (EBITDA) that is negative or with a debt-to-EBITDA ratio in excess of 5, amounting to 33 percent of debt.

Box 1.1. *(continued)*

Figure 1.1.1. Developments in Oil Markets

1. Largest Annual Oil Price Declines
(Percent)
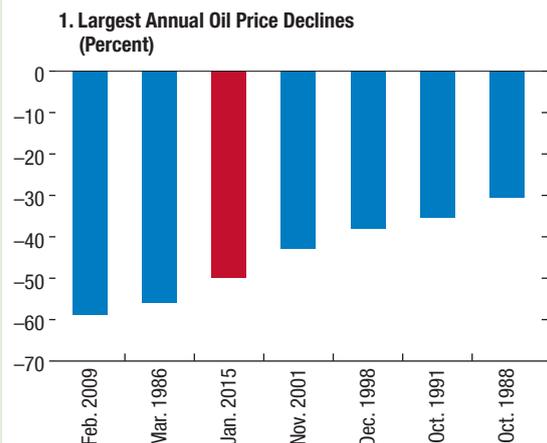
Sources: Haver Analytics; and IMF staff calculations.
Note: Based on monthly West Texas Intermediate oil price. End of rolling 12-month period on horizontal axis. Figure depicts episodes where the rolling 12-month fall in oil prices exceeded 30 percent, broadly equivalent to a one standard deviation event.

2. Emerging Markets Bond Index Global Spreads
(Basis points over Treasuries)

— Oil exporters[1]
— Oil importers[2]
— Nonoil commodity exporters[3]
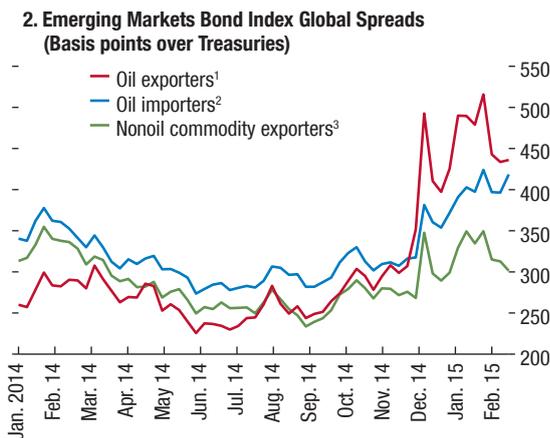
Sources: Bloomberg, L.P.; and IMF staff calculations.
[1]Colombia, Gabon, Kazakhstan, Nigeria, and Russia.
[2]Argentina, Bosnia, Brazil, Bulgaria, Chile, China, Costa Rica, Côte d'Ivoire, Croatia, the Dominican Republic, Egypt, El Salvador, Ghana, Guatemala, Hungary, Indonesia, Jamaica, Lebanon, Malaysia, Mexico, Pakistan, Panama, Peru, the Philippines, Poland, Romania, South Africa, Sri Lanka, Turkey, Ukraine, Uruguay, and Vietnam.
[3]Chile, Côte d'Ivoire, South Africa, Uruguay, and Zambia.

3. Global Syndicated Loan Issuance from the Oil and Gas Sector
(Billions of euros)

Leveraged   Investment grade
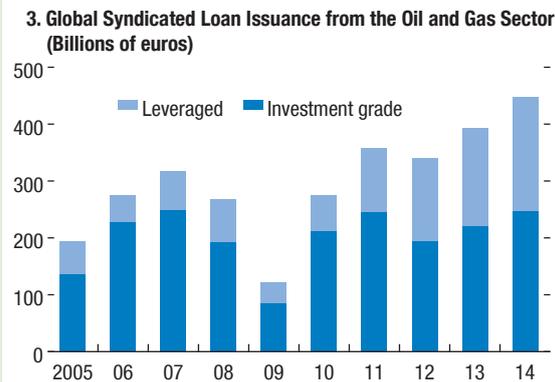
Sources: Dealogic; and IMF staff calculations.

4. Oil Surplus Reserve Growth and Oil

Annual change in oil surplus reserves (billions of U.S. dollars; left scale)

Average oil price (dollars per barrel; right scale)
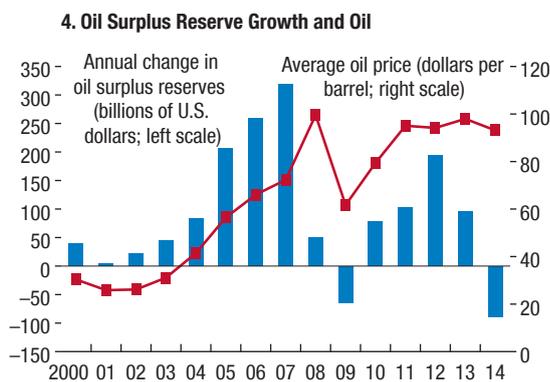
Sources: Bloomberg, L.P.; Haver Analytics; and IMF staff calculations.
Note: Oil exporter reserves include Bahrain, Canada, Colombia, Ecuador, Gabon, Kazakhstan, Kuwait, Nigeria, Norway, Qatar, Russia, Saudi Arabia, Trinidad and Tobago, United Arab Emirates, and Venezuela. Oil prices are based on the average monthly West Texas Intermediate oil price through the calendar year.

5. Foreign Holdings of U.S. Asset Classes
(Trillions of U.S. dollars)

All other countries
Oil-exporting countries[1]
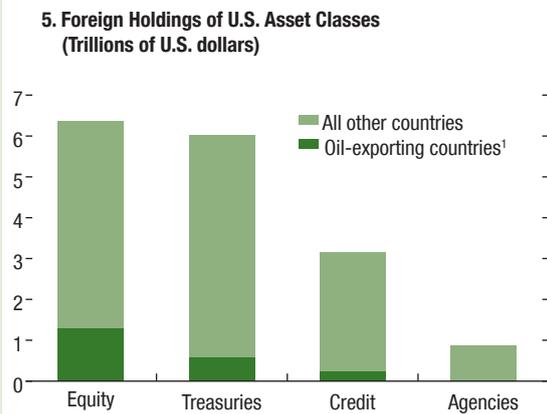
Sources: U.S. Treasury Department; and IMF staff calculations.
[1]Includes data for Algeria, Bahrain, Canada, Colombia, Ecuador, Gabon, Iran, Iraq, Kazakhstan, Kuwait, Libya, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, Trinidad and Tobago, United Arab Emirates, and Venezuela.

6. Net Positioning of Speculators in West Texas Intermediate
Oil Futures and Options
(Thousands of contracts)
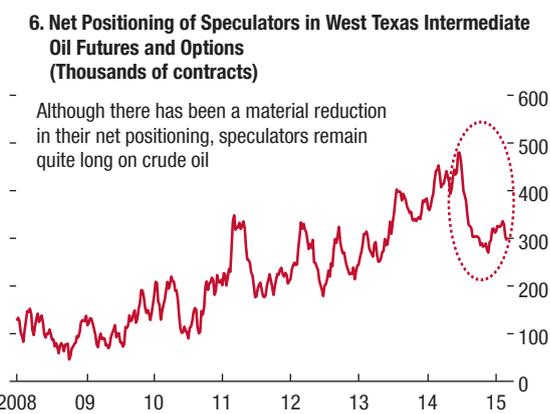
Although there has been a material reduction in their net positioning, speculators remain quite long on crude oil

Sources: Commodities Futures Trading Commission; Intercontinental Exchange; and IMF staff calculations.

Box 1.1. *(continued)*

of funding for the global banking sector and capital markets more broadly. Deposits from oil-exporting countries in Bank for International Settlements–reporting banks have doubled to $972 billion since 2004, and this group of countries (private and public sector) now holds more than $2 trillion in U.S. assets (Figure 1.1.1, panel 5), spread across equities ($1.3 trillion), Treasuries ($580 billion), credit ($230 billion), and agency debt ($21 billion).[5] Following the $88 billion contraction in oil-exporter reserves in 2014, sensitivity analyses point to further significant declines in 2015 if oil prices follow the path implied by futures markets. In principle, the decline in investable oil surpluses is part of global rebalancing and ought to be counterbalanced—at least to some extent—by wealth gains on the part of oil importers. But such redistribution between agents with potentially varying savings and portfolio preferences may also have market repercussions, particularly if the pace of adjustment creates market dislocations.

   Strains on financial infrastructure: Oil and other commodity markets have attracted much greater focus from the institutional investment community over the past decade. For example, noncommercial (that is,

speculative) investors held about 45 percent of West Texas Intermediate futures contracts in 2014, about triple the level held during the 1990s. Banks have also retreated from their market-making and structuring roles in energy markets, with a shift in trading activity to centrally cleared contracts (as desired by regulators) and physical commodity trading houses. With such major changes in market structure, questions have been raised as to whether an additional wave of selling pressure might destabilize markets. There has already been substantial selling—net investment exposure is nearly what it was at its peak in early 2014 (Figure 1.1.1, panel 6), and mutual fund data suggest that U.S. high-yield bond funds are already underweight in energy compared with the benchmark. Assets under management in commodity funds, combined with commodity-linked exchange-traded products, are nearly half their 2010 peak. Implied volatility (a measure of insurance value) has increased, but only to levels recorded in 2011–12 and well shy of levels reached in 2008. On balance, few indicators point to severe dislocations in oil markets. Commodity exchanges have a long history of managing counterparty risk during heightened volatility (through changes in margining requirements and circuit breakers). Nevertheless, financial intermediaries should remain on the alert for threats to efficient market functioning.

[5]We concentrate here on assets held in U.S. dollars given this is the currency in which oil revenues are denominated.

In principle, QE can durably boost inflation and growth through several key transmission channels (Figure 1.5). First, the QE program itself—and an associated commitment to a significant expansion of the central bank's balance sheet—should help raise *expectations* of higher inflation and build confidence in the economy. Second, central bank purchases of government bonds will *lower risk-free interest rates* in the economy, which has a direct impact on real interest rates and triggers various transmission channels to real activity (see also Draghi 2015 and Box 1 in ECB 2015).[1] Among these transmission channels, investors selling government bonds will seek to *rebalance portfolios* toward other higher-yield assets; higher asset prices and lower risk-free rates will drive down borrowing costs in capital markets. This should, in turn, help rekindle *bank lending* as banks pass on lower funding costs by reducing interest rates on their loans. These channels, in combination, will also lead to a depreciation of the exchange rate, particularly

if there is a strong rebalancing toward foreign assets, lifting inflation and boosting competitiveness. QE should then lead to greater economic risk taking, with firms investing more and households increasing their consumption. This should also help improve the financial position of households and firms as a stronger economy and increased asset values help improve balance sheet health.

   QE is appropriate for addressing disinflationary pressures in the euro area and Japan, and some of the key transmission channels are already working. Financial markets have responded swiftly and positively, appreciably lowering sovereign and private borrowing costs and weakening currencies. This has helped to significantly reduce fragmentation and lift demand for loans in the euro area. Inflation expectations have improved, and strong gains in equity markets underscore further progress through portfolio rebalancing channels, laying the basis for positive wealth effects.

Figure 1.4. Asset Valuation and Volatility Heat Maps

1. Asset Valuation Heat Map
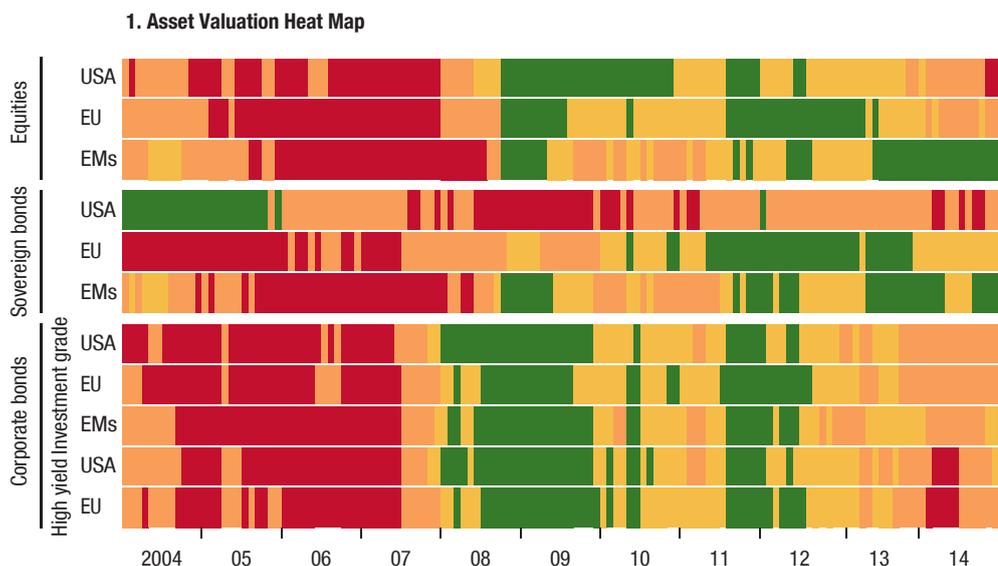
Source: IMF staff calculations.
Note: Red, orange, yellow, and green = the four quartiles of the price (spread) distribution of equity valuations (bond spreads), with red denoting the top (bottom) quartile of the distribution over July 2004–February 2015. EM = emerging market; EU = European Union; USA = United States.
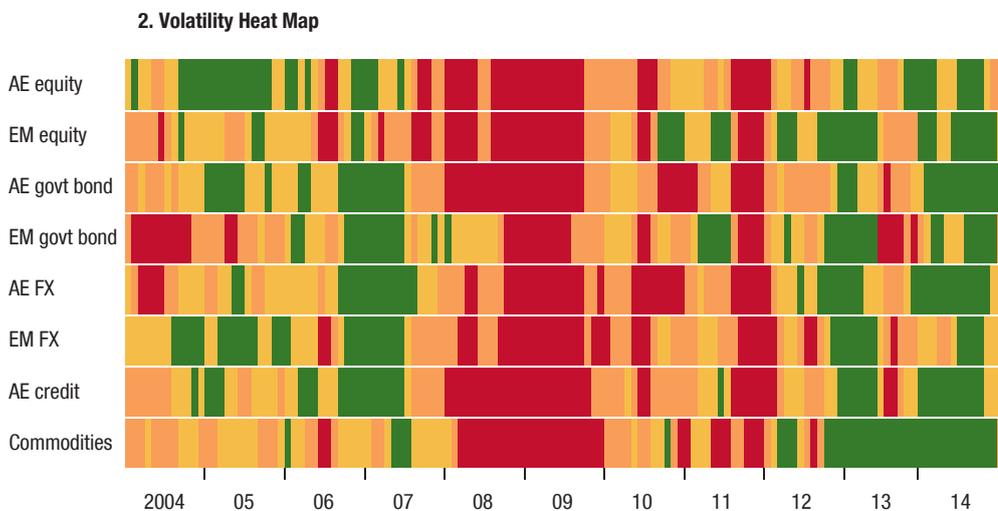
2. Volatility Heat Map

Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: Red, orange, yellow, and green = the four quartiles of the volatility distribution, with red denoting the top quartile of the distribution over 2004–15. Based on percentiles of three-month realized asset volatility. AE = advanced economy; EM = emerging market; FX = foreign exchange; govt = government.

However, to maximize the benefits of QE in boosting real activity through higher credit growth, additional measures are needed to restore balance sheet health in the private sector, particularly policies aimed at comprehensively tackling the burden of nonperforming assets in the euro area.

Moreover, steps should be taken to mitigate some of the challenges that arise with QE. By design, QE encourages greater financial risk taking, yet monitoring and eventually addressing any ensuing financial excesses and other undesirable financial side effects is necessary. Although a *wealth effect* is a benefit of

Figure 1.5. Quantitative Easing Impact Channels
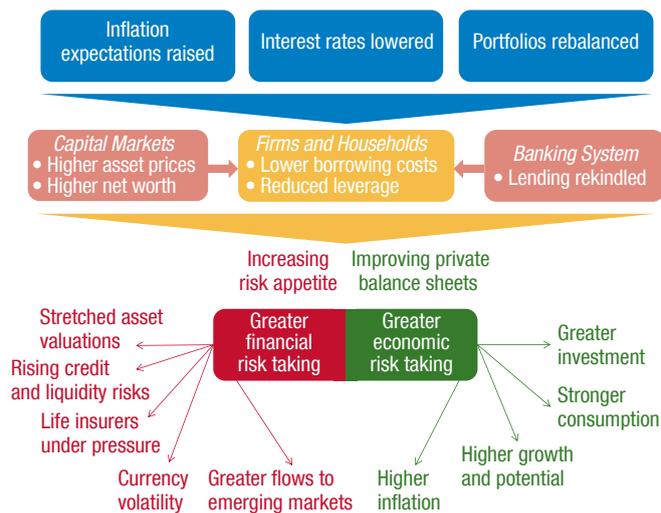
Source: IMF staff.

increased asset prices, there is also a risk of stretched asset prices. Lower interest rates also place strains on the profitability of financial institutions that derive interest income by exploiting the slope of the yield curve. Life insurers with guaranteed payouts on their liabilities are at particular risk in a low-interest-rate environment. Low interest rates may also lead to a search for yield by investors, prompting them to take on greater credit and liquidity risks to generate more income. A sharp depreciation of the domestic exchange rate from significant portfolio rebalancing into foreign assets could increase volatility in currency markets.

This report examines the risk landscape as the BOJ and ECB augment their expanded asset purchase programs while the Federal Reserve is expected to start gradually raising policy rates. A key message of this report is that additional policy measures are required to enhance the effectiveness of accommodative central bank policies. These measures are needed to facilitate sustainable economic risk taking, contain the resulting financial excesses, address crisis legacies, and engineer a successful exit from the global financial crisis.

Macroeconomic Versus Balance Sheet Deleveraging: What Is in the Mix?

Accommodative monetary policies in advanced economies have helped reduce private nonfinancial debt ratios by supporting inflation and growth and increasing asset prices. Balance sheet deleveraging through

debt repayment and write-offs has reduced debt levels in a number of euro area countries, while macroeconomic deleveraging through growth and inflation has played a larger role in the United Kingdom and the United States. But private sector leverage remains elevated in many economies. Looking forward, expected growth and inflation under existing monetary policies will likely be insufficient to reduce debt levels significantly. A more complete set of policy actions is required to complement accommodative monetary policies and address the debt overhang in the private sector.

In the years leading up to the global financial crisis, the private sector in many advanced economies, including in the euro area, the United Kingdom, and the United States, increased leverage on the strength of rising growth expectations and favorable financial conditions (Figure 1.6). The crisis exposed the fragility of this credit-driven growth model and the risks to growth associated with high debt. In particular, high private debt levels raise the sensitivity of borrowers to adverse shocks, reduce profitability, and put upward pressure on nonperforming loans and corporate bankruptcies, increasing risks to bank asset quality and broader financial stability.[1] Furthermore, when highly indebted private agents are unable to benefit from lower funding rates to increase their borrowing, high debt also undermines monetary policy transmission mechanisms. This hampers private balance sheet cleanup and economic recovery, as is discussed in the section "Disinflationary Risk and Financial Stability." In countries where private balance sheets remain overextended, debt reduction necessary to reduce financial stability risks, but debt reduction must be handled in a way that is consistent with the recovery. The pace and composition of deleveraging have important macroeconomic implications.

Major advanced economies have made mixed progress in deleveraging private nonfinancial sector balance sheets. Households—especially in the United Kingdom and the United States—have sharply reduced their gross debt as a share of GDP, but gross household debt is still high in many countries. Although lever-

[1]High debt can impede growth, which in turn can undermine financial stability. Studies have shown that high debt is generally associated with low medium-term growth, although at different debt thresholds (see references in Chen and others 2015). Other studies have shown that high private sector leverage has been detrimental to postcrisis economic performance (see Bornhorst and Ruiz Arranz 2013; ECB 2012).

Figure 1.6. Private Nonfinancial Sector Gross Debt
(Percent of GDP)

1. Major Advanced Economies

Household debt / Nonfinancial corporate debt

Legend: Euro area, Japan, United Kingdom, United States

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

2. Selected Euro Area Countries

Household debt / Nonfinancial corporate debt

Legend: Greece, Portugal, Italy, Spain

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

age among nonfinancial firms is down from its peak in many advanced economies, the corporate sector in some euro area countries is still highly leveraged, in part because resolution of impaired assets has progressed slowly. In the United States, where corporate leverage is relatively low, companies have stepped up borrowing in recent years amid favorable financing conditions and increased financial risk taking.

What factors have contributed to deleveraging?

Reductions in gross debt ratios can come from two sources: macroeconomic deleveraging (through growth and inflation) and balance sheet deleveraging (through debt repayment and write-offs). Countries that have been able to generate higher growth and inflation have been able to minimize the need for balance sheet deleveraging and the associated credit contraction (Figure 1.7). But the deleveraging process has varied substantially across countries.

Write-offs can play an important role in tackling high debt burdens where efficient debt resolution mechanisms are in place. In particular, the cleanup of impaired assets on balance sheets can contribute to private sector deleveraging as long as countries have efficient mechanisms for debt restructuring (Figure 1.8). These mechanisms may allow countries to limit the macroeconomic costs of debt restructuring and restart credit flows more rapidly. A key lesson from the

crisis is that addressing weak balance sheets early on can improve the financial and economic responses to unconventional monetary policies.

Asset price appreciation due to accommodative monetary policies (conventional and unconventional) can also contribute to deleveraging. The appreciation of household and corporate financial assets can help reduce the net financial debt of the private sector, even if gross debt remains unchanged. This is an important channel for policy, especially for countries in which central bank asset purchases have helped to lower the risk-free rate. Asset-side deleveraging has not operated much in the euro area so far, but it has played an important role in Japan, the United Kingdom, and the United States. Since 2007, the net financial debt of households and firms in these economies has declined by about 10 percentage points of GDP or more solely as a result of asset price gains (Tables 1.1 and 1.2, asset revaluation columns). In contrast, euro area countries such as France, Greece, Portugal, and Spain have not benefited as much from this channel so far.

How much more deleveraging could be achieved through unconventional monetary policies?

Macroeconomic deleveraging through 2020 could reduce corporate and household indebtedness, but in a number of economies it would not be sufficient to eliminate high debt loads. Although it is difficult to

Figure 1.7. Episodes of Private Sector Deleveraging in Selected Advanced Economies

1. Household Gross Debt: Contributions of Macroeconomic Factors and Balance Sheet Deleveraging since 2007
(Percent of GDP)

Legend: Growth, Inflation, Debt repayment, Debt write-offs, ◇ Change in debt

Countries (left to right): United States, Latvia, Spain, United Kingdom, Germany, Portugal, Lithuania, Austria, Japan, Slovenia, Italy, France, Greece

2. Nonfinancial Corporate Gross Debt: Contributions of Macroeconomic Factors and Balance Sheet Deleveraging since 2007
(Percent of GDP)

Legend: Growth, Inflation, Debt repayment, Debt write-offs, ◇ Change in debt

Countries (left to right): Spain, Lithuania, United Kingdom, Germany, United States, Slovenia, Austria, Latvia, Japan, Italy, Greece, Portugal, France

Sources: Bank of Japan; Eurostat; Federal Reserve; and IMF staff estimates.
Note: Debt write-offs reflect "other" changes in debt unexplained by flows and may also capture revaluation of marketable debt.

3. Household Gross Debt: Range and Projection of Debt Levels
(Percent of GDP)

Legend: ◆ 2014, ◆ 2020, — Minimum since 1999, — Average 1999–2006, — Maximum since 2006

Countries (left to right): GRC, ITA, PRT, ESP, AUT, FRA, DEU, JPN, GBR, USA

4. Nonfinancial Corporate Gross Debt: Range and Projection of Debt Levels
(Percent of GDP)

Legend: ◆ 2014, ◆ 2020, — Minimum since 1999, — Average 1999–2006, — Maximum since 2006

Countries (left to right): GRC, ITA, PRT, ESP, AUT, FRA, DEU, JPN, GBR, USA
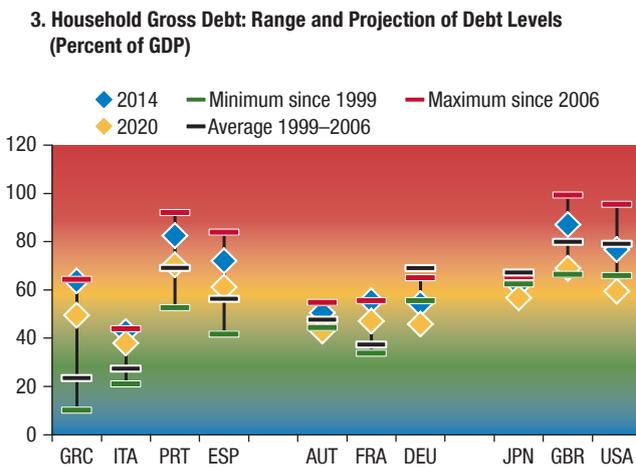
Sources: Bank of Japan; Eurostat; Federal Reserve; and IMF staff estimates.
Note: Expected deleveraging estimates are based on latest *World Economic Outlook* projections of growth and inflation. See Table 1.1 for further details. AUT = Austria; DEU = Germany; ESP = Spain; FRA = France; GBR = United Kingdom; GRC = Greece; ITA = Italy; JPN = Japan; PRT = Portugal; USA = United States.
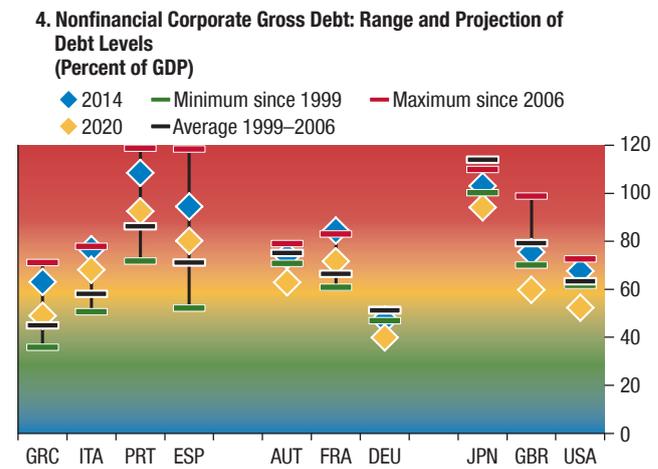
Sources: Bank of Japan; Eurostat; Federal Reserve; and IMF staff estimates.
Note: Expected deleveraging estimates are based on latest *World Economic Outlook* projections of growth and inflation. See Table 1.2 for further details. AUT = Austria; DEU = Germany; ESP = Spain; FRA = France; GBR = United Kingdom; GRC = Greece; ITA = Italy; JPN = Japan; PRT = Portugal; USA = United States.

define a threshold for a safe level of debt, a number of major advanced economies whose debt increased sharply are still likely to have debt above their precrisis average.[2] For example, gross corporate debt in France,

[2]High debt is generally associated with low medium-term growth (see Cecchetti, Mohanty, and Zampolli 2011; Kumar and Woo 2010; Baum, Checherita, and Rother 2013; Reinhart and Rogoff 2010), albeit at different thresholds (Chen and others 2015).

Italy, Portugal, and Spain would remain above or near 70 percent of GDP by 2020 under current *World Economic Outlook* projections for growth and inflation, higher than their precrisis averages and higher than those of other major advanced economies (Table 1.2; Figure 1.7, panel 4). Similarly, under current *World Economic Outlook* projections for growth and inflation, by 2020, gross household debt in Portugal and the

Figure 1.8. Insolvency Frameworks and Macroeconomic Deleveraging

Cumulative macroeconomic deleveraging, 2007–14 (percent of GDP)
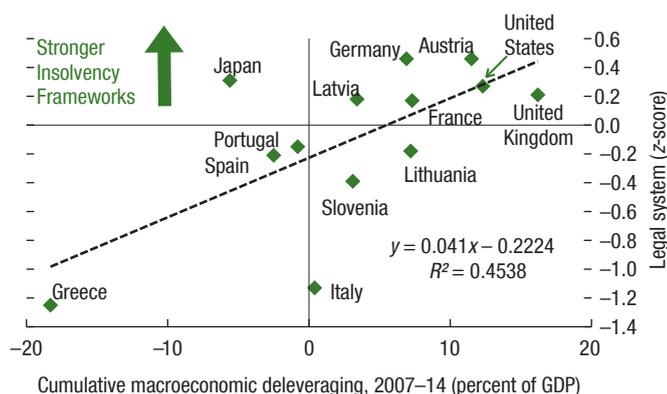
Sources: National statistics offices; World Bank, Doing Business Survey (2014); IMF, Financial Soundness Indicators; and IMF staff estimates.
Note: The legal system indicator is an average of *z*-scores from seven different indicators of legal system strength from the Doing Business Survey, relating to resolving insolvency, enforcing contracts, and the strength of legal rights.

United Kingdom would remain relatively high compared with that of other major advanced economies (Table 1.1; Figure 1.7, panel 3).[3]

Policies to facilitate further private sector deleveraging

High private sector debt levels can continue to pose obstacles to growth and financial stability. Contributions may be needed from all three deleveraging sources: macro deleveraging (growth and inflation), balance sheet deleveraging (debt repayment and restructuring), and asset revaluation (for net indebtedness). A complete set of policies is necessary to return debt to safer levels:

- First, accommodative monetary policies (including QE) should help support private sector deleveraging, including by boosting asset prices and generating wealth effects. But these will likely not be sufficient if potential growth remains low. In such cases, countries need to enhance their longer-term growth potential through a comprehensive program of structural reforms.
- Second, debt restructuring and write-offs can improve the financial and economic response to unconventional monetary policies by unclogging the monetary transmission mechanism.

[3]The projections for growth and inflation are based on the latest WEO forecasts and assume no new debt and no debt write-offs.

- Third, minimizing the negative impact of debt restructuring on the economy requires efficient legal and institutional mechanisms for the prompt cleanup of impaired assets.
- Finally, countries with high public debt must improve their fiscal frameworks, as highlighted in the April 2015 *Fiscal Monitor*. High debt and deleveraging in all three sectors (public, corporate, household) has been shown to be especially deleterious to growth (see Bornhorst and Ruiz Arranz 2013). Fiscal frameworks with better guidance on the medium-term objectives can provide more flexibility on the conduct of fiscal policy over the economic cycle.

Disinflationary Risks and Financial Stability

Quantitative Easing in the Euro Area and Japan: What Are the Channels and Risks?

While the U.S. Federal Reserve is expected to start gradually raising policy rates, the euro area and Japan have recently embarked on further asset purchases (QE) to significantly strengthen their responses to persistent disinflationary pressures. Some key transmission channels of QE are already beginning to work. Financial markets have responded swiftly and positively, appreciably lowering sovereign and private borrowing costs and weakening currencies. To maximize the impact of QE, it is necessary to complement central bank actions with measures to restore balance sheet health in the private sector, including through expeditious debt write-downs and restructuring, enhance the soundness of nonbank institutional investors, and promote structural reforms. Failure to support current monetary policies will leave the economy vulnerable and risks tipping it into a downside scenario of increased deflation pressure, a still-indebted private sector, and stretched bank balance sheets. Finally, QE—by design—entails a continued low-interest-rate environment. While this should help the macro economy, it will pose severe challenges to institutional investors, particularly weak European life insurers, further weighing on their ability to rerisk their balance sheets in support of QE.

Central banks have embarked on further monetary easing in the euro area and Japan

In October 2014, amid weak demand and continuing downward price pressures, the BOJ introduced

Table 1.1. Household Debt in the Euro Area, Japan, the United Kingdom, and the United States
(Percent of GDP)

	Gross Debt		Net Financial Debt			Contributing Factors						Expected Deleveraging from Growth and Inflation by 2020	Gross Debt	
	2007	2014	2007	2014	Change from 2007 (percentage points)	Growth	Inflation	Net Debt Issuance	Debt Write-Offs	Asset Accumulation	Asset Revaluation		2020 (with growth and inflation only)	Precrisis average (1999–2006)
Euro area														
Austria	51.9	50.5	−81.6	−83.4	−1.8	−2.1	−5.9	3.3	3.3	3.9	−4.2	7.6	43.0	47.7
France	46.5	55.6	−76.3	−71.9	4.4	−1.2	−3.8	13.2	0.9	−3.0	−1.7	8.4	47.1	37.4
Germany	61.2	54.4	−55.4	−56.7	−1.3	−2.7	−5.6	1.2	0.2	0.7	4.9	8.5	45.9	69.1
Greece	46.0	63.8	−89.3	−60.7	28.6	17.9	−0.9	−2.6	3.4	−44.2	55.1	14.2	49.5	23.5
Italy	38.2	42.8	−149.4	−151.4	−2.0	3.8	−4.0	5.3	−0.5	−9.6	2.9	4.8	38.0	27.4
Latvia	43.6	26.9	−4.0	−34.7	−30.6	4.6	−4.5	−12.1	−4.7	−20.4	6.5	7.5	19.5	29.4
Lithuania	26.5	22.0	−25.2	−39.4	−14.2	0.1	−4.8	1.4	−1.2	2.3	−11.9	6.2	15.8	14.4
Portugal	86.9	82.6	−53.7	−68.3	−14.6	7.0	−5.5	−4.9	−0.9	−15.6	5.2	12.2	70.4	69.2
Slovenia	24.5	28.6	−62.1	−58.3	3.9	1.2	−2.6	4.5	1.0	−24.7	24.5	4.6	24.1	17.6
Spain	81.1	72.0	−61.6	−77.5	−15.9	4.3	−2.5	−8.3	−2.7	−12.1	5.3	10.9	61.2	56.4
Japan	63.1	62.2	−143.3	−174.1	−30.8	−0.4	3.7	−3.2	−1.0	−28.7	−1.2	5.4	56.8	67.2
United Kingdom	96.2	87.1	−23.8	−34.9	−11.1	−2.9	−14.3	11.3	−3.2	18.5	−20.5	18.1	69.0	80.0
United States	95.5	76.9	−84.5	−118.2	−33.7	−6.1	−9.3	3.7	−7.0	13.0	−28.0	17.3	59.5	79.2

Sources: Bank of Japan flow of funds; Eurostat financial accounts and consolidated debt statistics; Federal Reserve flow of funds; and IMF staff estimates.

Note: Figures for 2014 are preliminary and as of 2014:Q3. Gross debt includes securities and loans. Net financial debt is defined as gross debt minus financial assets in the forms of cash and deposits, debt security holdings, and equity and mutual fund shares. For euro area countries, debt figures are on a consolidated basis as of end-2013 (that is, netting out intrasectoral borrowing). Growth contribution is derived as $-g/(1+g+\pi+g\pi)$ times previous period debt ratio; inflation contribution is derived as $-\pi/(1+\pi)$ times previous period debt ratio in which π = growth rate of GDP deflator and g = real GDP growth rate. Net debt issuance and debt write-off contributions come from flow of funds. Debt write-offs reflect "other" changes in debt unexplained by flows and may also capture revaluation of marketable debt. Asset accumulation indicates changes in asset-to-GDP ratios, excluding asset revaluation effects, which come from flow of funds. Expected deleveraging estimates are based on latest *World Economic Outlook* projections of growth and inflation. For Latvia and Lithuania, the precrisis averages are from 2004 to 2006; for Slovenia the precrisis average is from 2001 to 2006. Color coding is based on the percentile, with factors reducing (increasing) debt shown in green (orange).

Table 1.2. Corporate Debt in the Euro Area, Japan, the United Kingdom, and the United States
(Percent of GDP)

	Gross Debt		Net Financial Debt			Contributing Factors						Expected Deleveraging from Growth and Inflation by 2020	Gross Debt	
	2007	2014	2007	2014	Change from 2007 (percentage points)	Growth	Inflation	Net Debt Issuance	Debt Write-Offs	Asset Accumulation	Asset Revaluation		2020 (with growth and inflation only)	Precrisis average (1999–2006)
Euro area														
Austria	75.3	73.9	21.5	7.4	-14.1	-2.9	-8.6	9.4	0.8	-7.4	-5.3	11.1	62.9	75.1
France	69.1	84.4	-10.0	-3.7	6.4	-1.8	-5.6	20.0	2.7	-10.2	1.3	12.8	71.6	66.4
Germany	49.7	47.3	-20.5	-30.6	-10.1	-2.2	-4.7	4.7	-0.3	4.5	-12.1	7.4	39.9	51.2
Greece	55.9	63.0	23.3	22.5	-0.8	20.3	-1.6	11.2	-22.7	2.0	-10.0	14.1	49.0	44.9
Italy	71.5	76.7	23.2	26.0	2.7	7.0	-7.2	5.3	0.1	-7.7	5.2	8.6	68.1	58.1
Latvia	59.6	59.8	41.4	39.3	-2.1	4.2	-7.9	0.9	2.9	-5.5	3.3	16.6	43.2	53.1
Lithuania	48.1	35.5	30.4	-1.2	-31.6	0.8	-7.9	-2.9	-2.7	-4.9	-14.0	10.0	25.5	36.5
Portugal	98.2	108.5	62.7	66.0	3.3	8.7	-6.8	17.7	-9.3	-5.3	-1.7	16.0	92.5	86.2
Slovenia	71.8	69.4	46.1	50.1	4.0	4.0	-7.4	8.9	-7.8	-1.5	7.9	11.1	58.4	51.8
Spain	110.7	94.4	43.5	19.3	-24.1	6.2	-3.4	-10.0	-9.1	-7.7	-0.1	14.2	80.2	71.1
Japan	100.2	103.0	3.2	-22.9	-26.0	-0.6	6.1	-2.6	-0.1	-20.6	-8.2	9.0	94.1	113.9
United Kingdom	87.8	75.4	6.7	3.6	-3.1	-2.5	-13.7	-0.2	4.0	-1.7	10.9	15.7	59.7	79.2
United States	69.8	67.5	58.7	56.9	-1.8	-4.9	-7.2	11.1	-1.3	0.6	-0.1	15.2	52.3	63.3

Sources: Bank of Japan flow of funds; Eurostat financial accounts and consolidated debt statistics; Federal Reserve flow of funds; and IMF staff estimates.

Note: Figures for 2014 are preliminary and as of 2014:Q3. Gross debt includes securities and loans. Net financial debt is defined as gross debt minus financial assets in the forms of cash and deposits, debt security holdings, and equity and mutual fund shares. For euro area countries, debt figures are on a consolidated basis as of end-2013 (that is, netting out intrasectoral borrowing). Growth contribution is derived as $-g/(1+g+\pi+g\pi)$ times previous period debt ratio; inflation contribution is derived as $-\pi/(1+\pi)$ times previous period debt ratio in which π = growth rate of GDP deflator and g = real GDP growth rate. Net debt issuance and debt write-off contributions come from flow of funds. Debt write-offs reflect "other" changes in debt unexplained by flows and may also capture revaluation of marketable debt. Asset accumulation indicates changes in asset-to-GDP ratios, excluding asset revaluation effects, which come from flow of funds. Expected deleveraging estimates are based on latest *World Economic Outlook* projections of growth and inflation. For Latvia and Lithuania, the precrisis averages are from 2004 to 2006; for Slovenia the precrisis average is from 2001 to 2006. Color coding is based on the percentile, with factors reducing (increasing) debt shown in green (orange).

Figure 1.9. Quantitative Easing and Financial Markets

QE began working well before it was announced...

1. Changes in 10-Year Sovereign Yields
(Percentage points)
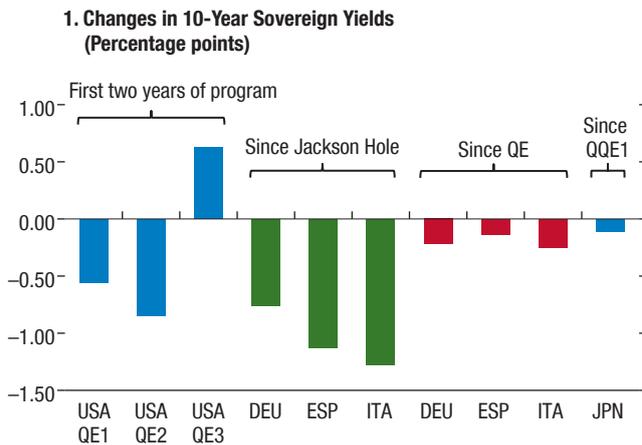
...and has delivered some price improvements.

2. Changes in Equities and Exchange Rates
(Percent)
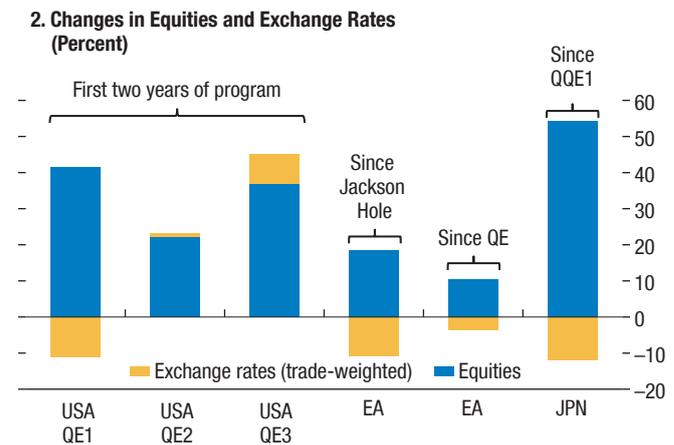
An increasing number of short- and long-term European government bonds carry a negative yield.

3. European Government Bonds with Negative Yields
(Years to maturity)
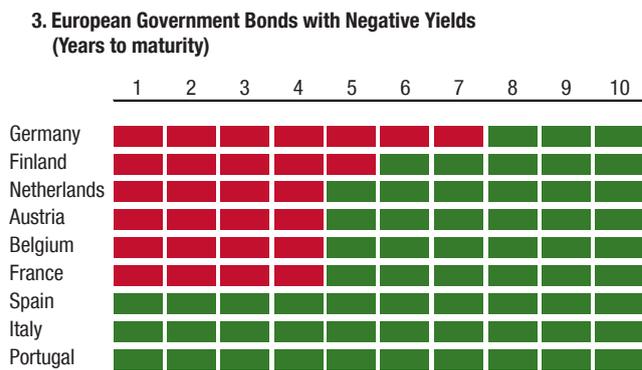
Negative policy rates in some European countries have reinforced negative yield dynamics.

4. Policy Rate and Two-Year Government Bond Yields
(Percent)
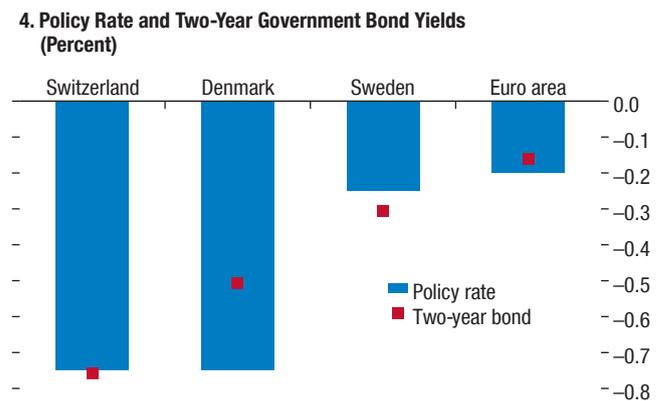
Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: Jackson Hole refers to ECB President Draghi's speech in August 2014 at the U.S. Federal Reserve's Economic Policy Symposium in Wyoming. ECB QE was announced in January 2015. Japan's QQE1 is taken from April 2013. U.S. Fed programs QE1 November 2008; QE2 November 2010; QE3 September 2012. DEU = Germany; EA = Euro area; ESP = Spain ITA = Italy; JPN = Japan; QE = quantitative easing; QQE = quantitative and qualitative easing; USA = United States. In Figure 1.9.4, policy rates comprise the ECB deposit rate, Riksbank repo rate, Swiss National Bank Libor target, and Danmarks National Bank CD rate. The two-year bond for the euro area is a debt-weighted yield of negative yielding two-year government bonds.

an expanded program of quantitative and qualitative easing (QQE2). The BOJ announced that it was accelerating the pace of Japanese government bond purchases from an annual pace of ¥50 trillion to about ¥80 trillion, and extending the average remaining maturity of government bond purchases to about 7 to 10 years. The BOJ's balance sheet is expected to exceed 70 percent of GDP by the end of 2015.

Similarly, the ECB increased its monthly asset purchases to €60 billion, after averaging about €12 billion under the existing asset-backed securities and covered bond purchase programs, to address the risks of persistently low inflation. This will result in a total program of about €1.1 trillion by September 2016 and will

largely be accommodated in sovereign markets, with a small portion also coming from European Union (EU) institutions. If fulfilled, QE will take the ECB's balance sheet from an estimated 22 percent to 31 percent of GDP, in line with the initial QE programs of the Federal Reserve and the BOJ, which each subsequently increased their programs to about 20 percent and 45 percent of respective GDP.

Although at different stages, QE programs in Japan and the euro area have already had a significant impact on financial markets. In the euro area, much of this was achieved in the wake of ECB President Draghi's speech at Jackson Hole in August 2014—a date widely taken as the trigger for QE. Ten-year sovereign yields

in Germany, Italy, and Spain, among others, declined before the implementation of QE by as much as 10-year U.S. Treasury bonds did during the first two years of the Federal Reserve's QE programs (Figure 1.9, panel 1). Positive market impacts were reinforced following the official announcement of QE in January (Figure 1.9, panel 2). As of late March 2015, more than 30 percent (or €2.4 trillion) in short- and long-term euro area government bonds had negative yields (Figure 1.9, panel 3). These improvements and associated positive ripple effects through credit markets have helped significantly to reduce fragmentation, improve credit conditions, and raise demand for loans.[4] Moreover, strong gains in equity markets in both Japan and the euro area underscore progress through the portfolio rebalancing channel, laying the basis for positive wealth effects. There has also been a positive impact on inflation expectations in the euro area, as measured by inflation swaps. In Japan, different measures of inflation expectations, which steadily rose until mid-2014, have fallen recently and converged to about 1 percent.

The ECB's QE program complements a broader set of measures to address tail risks and safeguard monetary transmission, for example, the lowering of policy rates to historic levels—including negative territory, in line with some other European countries (Figure 1.9, panel 4).[5] Although providing a credible signal of the ECB's accommodative stance, prolonged negative rates could cause disruptions to short-term funding markets, particularly money market funds.[6] Bank term funding has been ensured through a combination of expanded collateral eligibility, fixed-rate full allotment facilities, and longer-term refinancing operations. The announcement of the Outright Monetary Transactions program eliminated euro redenomination risks and lowered spreads on euro area government bonds. Progress toward banking union, including the Single Supervisory Mechanism, has helped strengthen the health of banks through enhanced and harmonized regulation and supervision. The Comprehensive Assess-

ment, through the combined Asset Quality Review and Stress Tests, has credibly boosted the transparency of bank balance sheets, while the establishment of the European Stability Mechanism, along with the Single Resolution Mechanism and Fund, has enhanced the capacity of the euro area economies to safeguard financial stability. These actions have supported the foundations for recovery, helped reduce fragmentation, and boosted investor confidence in the euro area.

A strong portfolio rebalancing channel will be key to the transmission of QE

A strong portfolio rebalancing channel is a key transmission channel for QE. Rebalancing could occur in three central ways. First, rebalancing lowers risk-free rates, which translates into lower funding costs. Second, rebalancing from sovereign bonds into more risky assets should reduce lending spreads and thus credit costs. However, this is most likely to benefit large companies that have access to markets, with limited direct support for small and medium-sized enterprises. Third, there could be portfolio outflows from the economies engaging in QE, primarily to the United States, but also increasingly to emerging markets.

Institutional investors are key to the transmission of QE to the private sector in the euro area. In particular, substantial intra-euro-area portfolio rebalancing within credit markets would directly lower private funding costs and have similar beneficial knock-on effects for smaller entities. However, European life insurers, which hold about 20 percent of EU government bonds, may have limited incentive to sell bond portfolios to the ECB, partly because of regulatory considerations, but also as a result of their weak balance sheets (as discussed later in this chapter). Given significant duration mismatches, the cash from a bond sale would need to be reinvested into similar-duration bonds, which have less attractive yields, putting further pressure on life insurers' already weak cash flow positions. Since rerisking by taking on lower-quality credit will further eat into their fragile capital buffers, rebalancing will likely take place primarily in investment-grade sovereign and corporate bonds, particularly in U.S. bonds, given the combination of attractive yields, long duration, and low foreign currency hedging costs.

In Japan, the government bond maturity extension under QQE2 is expected to lead to more portfolio rebalancing at life insurers and pension funds. Life insurers and pension funds are now the largest holders of Japanese government bonds and are in a better position to rerisk their balance sheets, including toward

---

[4]See the ECB's Euro Area Bank Lending Survey for the fourth quarter of 2014.

[5]See IMF 2014a for a more complete discussion of these policies.

[6]If interest rates were to turn sharply negative and remain at those levels for a protracted period, including at the retail level, larger distortions could arise with far-reaching financial stability implications. For example, savers could stop saving, bank deposits could be turned into cash, new forms of cash management could emerge, and borrowers could be encouraged to take on excessive leverage, with long-term consequences for some asset markets, such as housing markets.

higher-yielding securities. This partly follows the reform of the Government Pension Investment Fund (GPIF), which encourages higher allocations away from government bonds, and will induce other public and private pension funds to follow the GPIF's lead. Finally, the combination of low domestic yields and low foreign exchange hedging costs should boost the incentives of insurers and pensions funds to rebalance their portfolios abroad, particularly to the United States.

One way to gauge the potential portfolio flows is to simulate the effects of alternative policy outcomes on portfolio choices through three stylized scenarios:

- **Under a "baseline" scenario,** central bank asset purchases under QE reduce risk-free rates and boost some asset prices, putting a floor under growth and inflation and supporting inflation expectations. But clogged bank balance sheets and continued private sector indebtedness limit a fuller transmission of QE to real activity. As a result, confidence and activity are slower to recover, prompting investors to rebalance a portion of their assets abroad.

- **But there is a risk that a slower recovery will leave the economy vulnerable to adverse shocks or policy slippages, leading to a "downside" scenario.** Here negative shocks leave QE (in its current form) unable to put a floor under growth and inflation, resulting in further balance sheet weakness and drifting inflation expectations. The situation is exacerbated by a lack of progress on policies to repair private balance sheets, further eroding confidence and prompting additional capital flight.

- **This underscores the need for additional structural measures to repair private balance sheets, a "QE-plus" scenario,** complementing monetary policy and helping boost growth and inflation. In this case, investors would want to increase their relative domestic exposures, resulting in fewer portfolio outflows. And although this would limit exchange rate depreciation, it would reinforce positive domestic price effects as demand for higher-yielding assets increases.

The scenarios suggest that QE in the euro area and Japan could lead to significant portfolio outflows. In the "baseline" scenario, additional gross outflows from the euro area economies amount to €1.2 trillion by the end of 2015, raising gross outflows from 50 percent to 55 percent of GDP. Similarly, insurance companies and pension funds in Japan could invest as much as ¥42 million ($350 billion), or 8 percent of GDP, in foreign assets by the end of 2017 (Annex 1.2; Figure 1.10,

panels 1 and 2). Such heavy foreign rebalancing would weaken domestic currencies, underscoring the impact of QE on the exchange rate, and could pose some risks by adding to movements in global exchange rates. While these potential flows could also partly offset the risks of outflows from emerging markets as the Federal Reserve begins to exit, the potential for short-term volatility could increase.

Bank lending may take time to fully recover

In previous episodes of QE, bank credit has taken time to fully recover. Bank lending has accelerated only modestly in Japan and the United Kingdom since the launch of their QE programs (Figure 1.11, panel 1).[7] Even in the United States, where bank credit is now growing quickly, it took at least a year after the launch of its third QE program before lending started to pick up. Although the overall economic and policy environment was different in these cases—and QE should help credit conditions as it reduces bank funding costs, which should be reflected in lower lending rates—past experience suggests that bank lending in the euro area and Japan may pick up with a lag.

Furthermore, the ability and willingness of banks to supply more credit will depend on the business environment and regulatory conditions they are facing. Before the global financial crisis, banks were primarily concerned about meeting risk-weighted capital regulations. However banks now need to operate their businesses under a multidimensional set of regulatory and economic targets that they need to meet simultaneously, including regular supervisory stress testing and the new Total Loss-Absorbing Capacity requirement for global systemically important banks (Figure 1.11, panel 2).[8] Although differences in national implementation are complicating this picture

---

[7]This, however, does not imply that there has been no impact on bank lending from QE. For example, Saito and Hogen (2014) find that a decrease in the interest rate risk at major Japanese banks under QQE1 has been associated with higher bank lending, after controlling for loan demand, interest rate spreads, and the nonperforming loan ratio.

[8]See, for example, EBA 2015 for a discussion of the implications of regulatory measures on bank business models. The target ratios used in Figure 1.11, panel 2, are profitability (10 percent return on equity target), loss-absorbing capital (estimated total loss-absorbing capacity ratio at 18 percent of risk-weighted assets and 6 percent of total assets), leverage (minimum 3 percent but requirements higher in Switzerland, the United Kingdom, and the United States), asset quality (nonperforming loans 10 percent of gross loans), stable funding (estimated net stable funding ratio of 100), and capital (Tier 1 common capital of 7 percent, plus systemically important financial institution buffers, or plus 0.5 percent for large domestic banks). The figure is based on a sample of more than 300 advanced economy banks.

Figure 1.10. Illustrative "Baseline" QE Portfolio Rebalancing Scenarios in Japan and the Euro Area

1. Portfolio Outflows of Japanese Insurance Companies and
   Pension Funds
   (Trillions of yen)

2. Euro Area Portfolio Outflows
   (Percentage of euro area GDP)

Sources: Bank of Japan; and IMF staff projections.
Note: See Annex 1.2 for a description of the assumptions.
QE = quantitative easing.

Source: Bloomberg L.P.; Coordinated Portfolio Investment Survey (CPIS);
European Central Bank; and IMF staff calculations.
Note: Foreign currency-denominated flows exclude central banks, banks and
government holdings, and are determined by European insurer asset allocations
as of 2013, while destinations are based on data for 2013 international portfolio
flows (CPIS). Data for 2014 are IMF estimates. Emerging markets (EM) comprise
Argentina, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia,
Mexico, Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa,
Thailand, and Turkey. Other Advanced Economies (OA) comprise Australia,
Canada, Denmark, Japan, New Zealand, Norway, Sweden, Switzerland, and the
United Kingdom.

for global banks, the introduction of the Single Supervisory Mechanism has helped strengthen bank balance sheets and further fostered the process of supervisory and regulatory harmonization across euro area countries, as discussed in Box 2.3.

The ECB's Comprehensive Assessment has credibly boosted the transparency of bank balance sheets and fostered significant improvements in capital. This has made capital and leverage less of a constraint for most banks in both the euro area. Nonetheless, institutions may be reluctant to use current buffers to increase their lending, particularly given the challenges that historically low profitability are posing for business models, as discussed in the October 2014 *Global Financial Stability Report*. One reason for this is that banks may be reluctant to reduce capital ratios in the absence of clarity on the amount of capitalization that will be required by regulators over the medium term. A second reason is that in many countries, the average risk weight of bank assets is low relative to the past, reflecting a high share of

government bond holdings. So banks may face limits on the degree to which they can reallocate sovereign bond portfolios toward riskier assets, because the average risk weight would rise, eroding bank buffers.

Even if banks have the capacity to expand their loan portfolios, there is a risk that they may reallocate their portfolios toward more profitable strategies. Table 1.3 provides some stylistic examples of possible alternative investment choices. According to these estimates, banks may have incentives to invest in higher-yielding bonds, such as U.S. and emerging market sovereign bonds.

In the euro area, improving asset quality is important to boost bank lending

In the euro area, improving asset quality at some banks could further bolster bank credit. Asset quality continued to deteriorate in the euro area as a whole in 2014, although at a slowing pace, with total nonperforming loans now standing at more than €900 billion (Figure 1.12, panel 1). Furthermore, the stock of nonperforming

Figure 1.11. Bank Lending and Constraints

Bank lending growth has lagged in past QE episodes...

1. Bank Credit Growth to the Nonfinancial Private Sector (Percent)
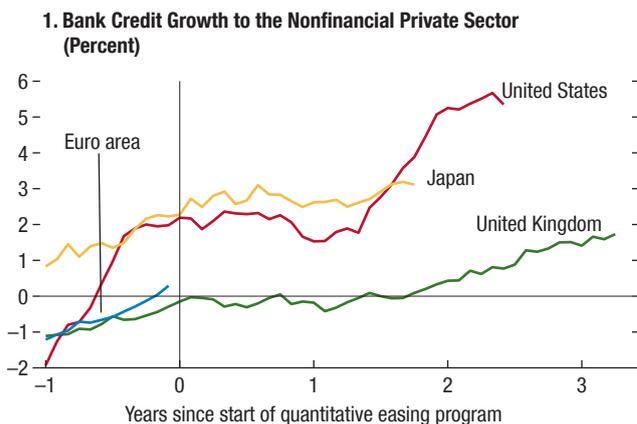
Sources: Bank of England; Haver Analytics; and IMF staff calculations.
Note: Quantitative easing (QE) programs are United Kingdom (QE2, Oct. 2011); United States (QE3, Sep. 2012); Japan (QQE1, Apr. 2013); and euro area (QE, Mar. 2015). QE = quantitative easing; QQE = quantitative and qualitative easing.

...and banks now face new constraints.

2. Proportion of Banks Missing Target Ratios (Percent of sample assets)
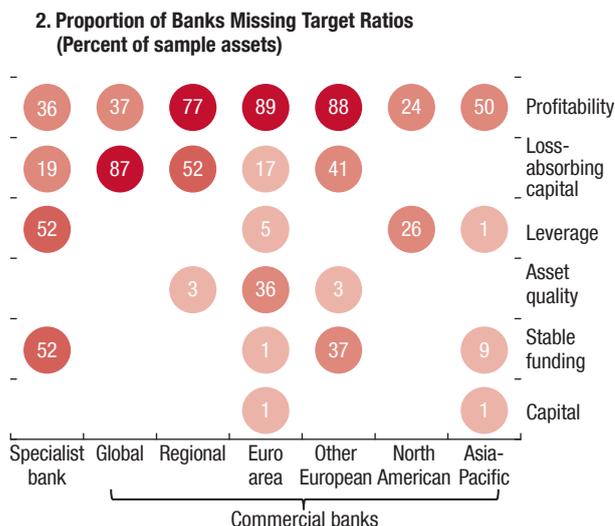
Sources: SNL Financial; and IMF staff calculations.
Note: See footnote 8 for a description of the targets.

3. Nonperforming Assets and Credit
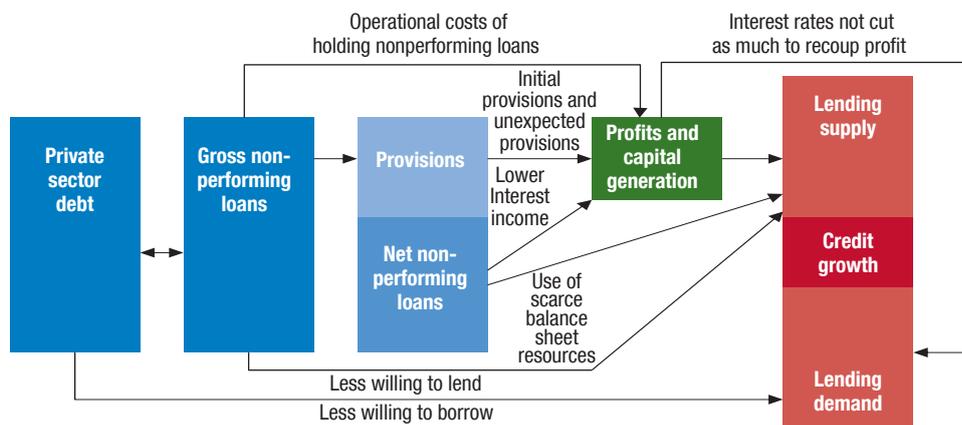
Source: IMF staff.

loans in the euro area is unevenly distributed, with about two-thirds located in six euro area countries.[9] In Cyprus, Greece, Ireland, Italy, Portugal, and Slovenia, a majority, if not all, of the banks involved in the ECB's Asset Quality Review were found to have nonperforming assets of 10 percent or more of total exposure (Figure 1.12, panel 2). These bad assets are large relative to the size of the economy (Figure 1.12, panel 3), even net of provisions. Euro area banks have lagged the United States and Japan in the early 2000s in their write-offs of these bad assets,

suggesting less active bad debt management and more limited improvement in corporate indebtedness.

Nonperforming assets reduce banks' willingness and ability to supply credit (Figure 1.11, panel 3) in three key ways. First, nonperforming assets are a drag on profitability because they require provisioning and generate less interest income than performing assets (Figure 1.12, panel 4).[10] There are also operating costs to holding nonperforming assets on balance sheets

[9]The stock of nonperforming loans in Cyprus, Greece, Ireland, Italy, Portugal, and Spain in total amounts to more than €600 billion.

[10]Banks with large nonperforming loan portfolios may also face higher funding costs, although banks may seek to offset this by charging a higher interest rate on new loans.

Table 1.3. Reallocating Assets: Stylized Investment Choices
(Percent)

	Sovereign Bond					Corporate Loan			SME Loan	
	DEU	ITA/ESP	JPN	USA	EM IG	DEU	ITA/ESP	JPN	DEU	ITA/ESP
Investment Return	0.4	1.4	0.4	2.1	3.9	1.0	1.7	0.9	2.4	3.7
Foreign Exchange Hedge	—	—	—	–0.3	–0.3	—	—	—	—	—
Credit Risk	—	–0.2	—	—	–0.2	–0.1	–0.3	–0.2	–0.5	–1.0
Operations	—	—	—	—	–0.1	–0.3	–0.3	–0.3	–0.4	–0.4
Pretax Return	0.4	1.2	0.4	1.9	3.3	0.6	1.1	0.4	1.5	2.3
Required Capital	3	3	3	3	5	6	6	8	10	10
Pretax Return on Required Capital	13	40	13	62	67	10	19	5	15	23

Sources: Bank of America Merrill Lynch; Bank of Japan; European Central Bank (ECB); and IMF staff estimates.
Note: Investment returns using current yields for 10-year sovereign bonds and an index of emerging market investment-grade sovereign bonds. Corporate loan rates proxied using broad bond indices for large European firms, ECB (interest rate on all new loans), and Bank of Japan (average contracted interest rate on new loans). SME loan rates are proxied using ECB data (interest rate on new loans under €1 million). The foreign exchange (FX) hedge has a one-year roll-over period; hedging costs are currently comparable for European and Japanese banks. Credit risk is based on the probability of default for an investment-grade loan rated A/BBB+ and for an SME loan rated BBB–/BB, using sovereign credit risk as a floor. Operational costs are based on usual cost-to-income ratios for corporate and SME loans. Emerging market credit risk assumed for a sovereign rated BBB–. Capital requirements are the maximum of a leverage requirement of 3 percent and a Common Equity Tier 1 target of 10 percent with risk-weighted assets of 50 percent for emerging market sovereign bonds, 60 percent for corporate loans, 100 percent for SME loans, and 80 percent for loans to Japanese firms. DEU = Germany; EM IG = emerging market investment grade; ESP = Spain; ITA = Italy; JPN = Japan; SME = small- and medium-sized enterprise; USA = United States.

(including administrative expenses, legal costs, and maintenance of repossessed property). And even if banks appear adequately provisioned at a given point in time, additional provisioning may be needed over time if economic conditions do not improve. Second, nonperforming assets—net of provisions—use scarce resources on bank balance sheets. Net nonperforming assets need to be backed by capital. They are particularly costly for risk-weighted capital because net nonperforming loans on average have a significantly higher risk weight than do performing loans. Third, banks with high levels of nonperforming loans on their balance sheets may be less willing to lend to borrowers with borderline credit quality. While many banks are chasing the same good-quality firms—often in competition with capital markets—other weaker companies are finding it more difficult to obtain loans.

As a result, banks with high levels of nonperforming assets may hamper the transmission of QE via banks. Figure 1.12, panel 4 shows that banks with a higher ratio of nonperforming loans have tended to lend less recently, even relative to average lending by banks in the same economy that have faced similar demand conditions. This negative relationship between bank lending and nonperforming loans was also illustrated in the April 2014 *Global Financial Stability Report*.

Policy actions are needed to support bank lending capacity

These observations suggest that policy actions are needed to further help bank lending in the euro area and Japan. This can be illustrated through a simulation, which is based on the assumption that necessary actions are not taken. The simulation is estimated using more than 100 banks in the euro area and about 80 banks in Japan. The capacity of these banks to supply credit is estimated for the period 2015–17. The banks are assumed to preserve their capital buffers through the simulation, so lending capacity is a function of retained earnings, which here are based on analysts' forecasts. Banks also reallocate portfolios by selling government bonds, in line with the scenarios presented earlier in this chapter. However, the overall effect is limited, because this reallocation raises the average risk weight of banks' portfolios. The results suggest that without corrective policy actions, outlined later in this chapter, median bank lending capacity could be limited to a meager 1 to 3 percent on average a year, though some individual institutions may be able to increase lending by more (Figure 1.12, panel 5). For banks that have excess capital and are willing to run down their capital buffers, bank lending growth could be higher than suggested by these simulations.

Figure 1.12. Bank Nonperforming Loans and Lending Conditions

Nonperforming loans remain at high levels...

1. Nonperforming Loan Stock
   (Billions of euros)

Legend: Other; Cyprus, Greece, Ireland, and Portugal; Spain; Italy
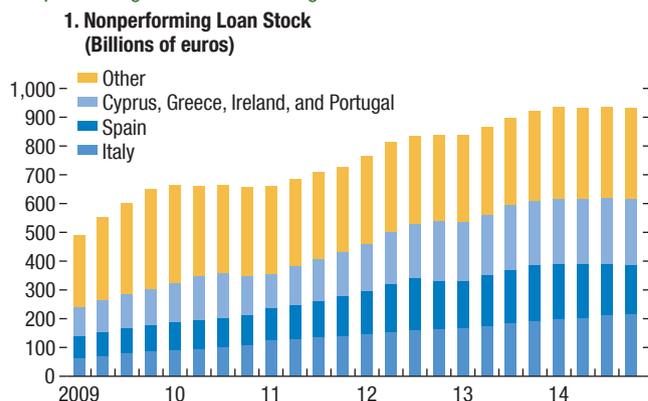
Sources: National central banks; IMF Financial Soundness Indicators; and IMF staff estimates.
Note: National definitions have been adjusted according to Barisitz (2013). Other comprises Austria, Belgium, France, Germany, and the Netherlands.

...concentrated in a few economies.

2. Nonperforming Assets: Distribution by Country
   (Percent of sample assets)

Legend: 0–5; 5–10; 10–25; Over 25

Countries: NL, FR, DE, BE, ES, AT, CY, PT, IT, SI, IE, GR
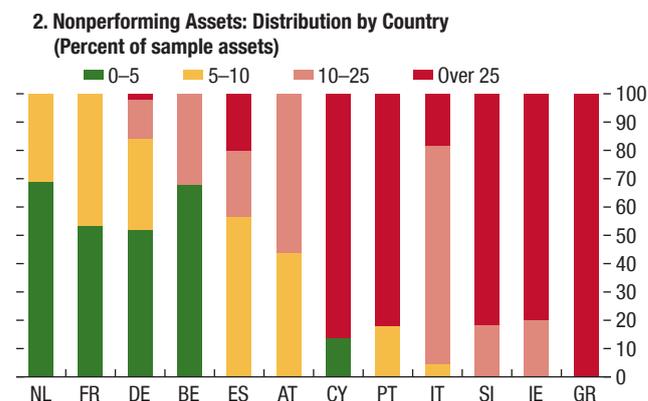
Sources: European Central Bank; and IMF staff calculations.
Note: Based on a sample of 106 banks from 12 of the countries that took part in the European Central Bank's Asset Quality Review (AQR). Banks are sorted by their nonperforming exposure (NPE) ratio. NPE ratio = AQR-adjusted NPE level as a percentage of total credit exposure. Data labels use International Organization for Standardization (ISO) codes.

Provisioning and write-offs have lagged...

3. Nonperforming Loans, Provisions, and Write-offs

Legend: Net NPLs; Provision; Provision ratio (right scale); Write-off ratio (right scale)

(Percent of GDP) / (Percent of gross NPLs)

United States: 2010, 11, 12, 13, 14
Euro area: 2010, 11, 12, 13, 14
Japan: 2000, 01, 02, 03, 04
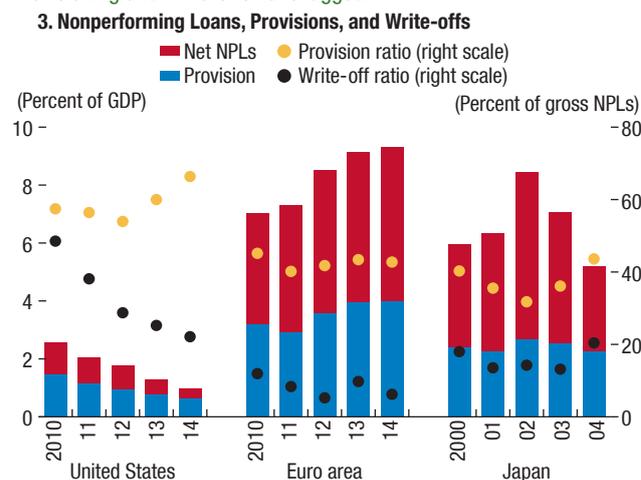
Sources: European Central Bank; Financial Services Agency; and IMF staff calculations.
Note: NPL = nonperforming loan; net NPL = gross NPL plus provisions; provision ratio = provisions as a percentage of gross NPL; write-off ratio = write-offs as a percentage of gross NPL.

...and so bank income and lending have been reduced.

4. Interest Income, Lending Growth, and Nonperforming Loans
   (Percentage points)

Interest income to gross loans (relative to average) — Nonperforming loan quartiles 1, 2, 3, 4

Lending growth (relative to average) — Nonperforming loan quartiles 1, 2, 3, 4
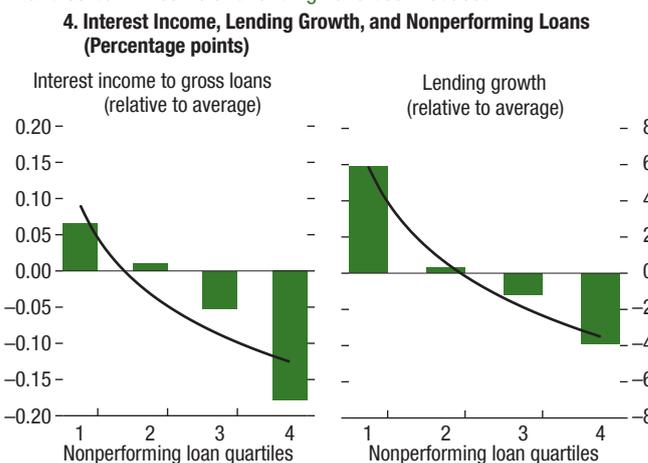
Sources: European Banking Authority; SNL Financial; and IMF staff calculations.
Note: Left chart shows annual interest income to gross loans, for over 100 euro area banks, relative to the yearly average for banks with the same nationality, calculated over the period 2009–13. The right chart shows annualized lending growth relative to average lending growth in the same economy, and uses European Banking Authority data for a sample of more than 60 banks over the period 2010–13. Outliers have been excluded, based on extreme values for lending growth, nonperforming loans and interest margins.

(continued on next page)

Addressing the corporate debt overhang will help support healthy credit demand

Boosting credit demand will require tackling high corporate indebtedness. In the euro area, there is a close correlation between countries with a high volume of nonperforming loans and those with high corporate debt. This is illustrated by information on the distribution of corporate interest coverage ratios, a key indicator of borrower distress (Figure 1.12, panel 6). Companies with high levels of debt are less likely to demand more credit, potentially hampering growth in bank credit. High indebtedness is also likely to reduce the sensitivity of loan demand to a change in bank lending rates, reducing the effectiveness of a further compression in yields under QE.

Figure 1.12. Bank Nonperforming Loans and Lending Conditions *(continued)*

Policy actions are needed to support bank lending.

5. Simulated Bank Lending Capacity, 2015–17
(Percent of sample)

Corporate debt-servicing capacity remains weak.

6. Corporate Interest Coverage Ratios
(Percent of debt)

■ Below 1 ■ 1 to 2 ■ 2 to 3 ■ Above 3
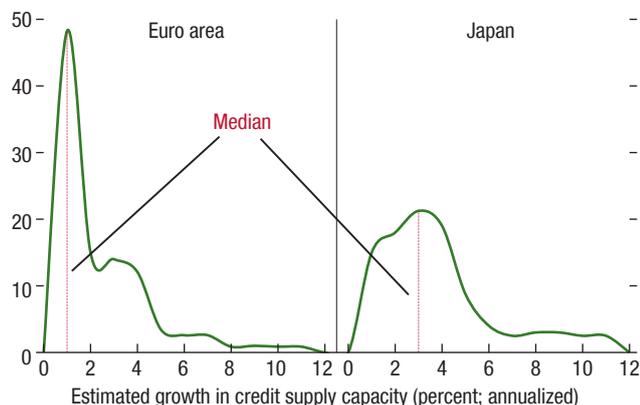
Source: IMF staff estimates.
Note: Shows the average annual bank lending capacity over the period 2015–17 for a sample of more than 100 euro area banks and around 80 Japanese banks.
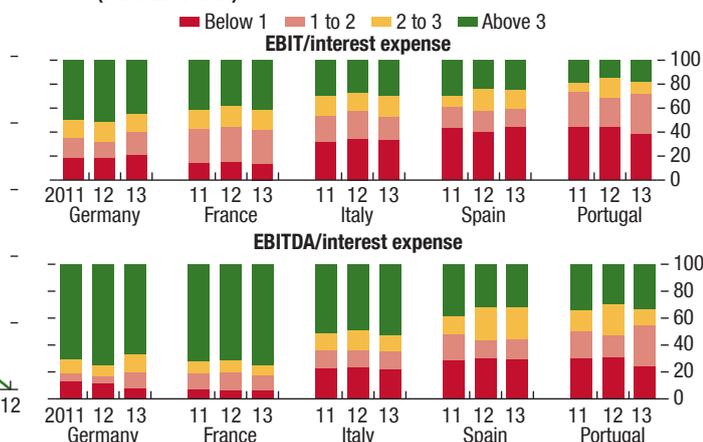
Sources: Amadeus database; national central banks; and IMF staff estimates.
Note: French data for 2012–13 are estimated using central bank data for a smaller number of firms. EBIT = earnings before interest and taxes. EBITDA = earnings before interest, taxes, depreciation, and amortization.

In Japan, corporate leverage may also limit credit demand for some smaller firms. Companies now have significant cash holdings, amounting to 50 percent of GDP, up from 37 percent at the end of 2007. Firms with large cash holdings are likely to demand less credit from banks. At the same time, firm-level data and sectoral balance sheets show that some small and medium-sized enterprises face the structural challenges of high leverage and low profitability. Again, these indebted firms are likely to be less willing to take on more credit.

European life insurance: An unsustainable business model in a low-interest-rate environment

In the past three years, European life insurers' equities have paid one of the most attractive dividends, outperforming on the back of waning euro area fragmentation risk, high capital gains on bond holdings, and the release of excess capital due to lower claims inflation. This trend, however, is likely to slow in response to rising vulnerabilities, particularly in countries exhibiting large duration mismatches.

The current low-interest-rate environment, which QE will further exacerbate, poses severe challenges to the EU life insurance industry. The industry's practice of writing long-term policies, sometimes of more than 30 years, without assets of a correspondingly long duration has resulted in undesirable negative dura-

tion gaps. Moreover, many policies contain generous return guarantees, which are unsustainable in today's low-interest-rate environment. According to the European Insurance and Occupational Pensions Authority (EIOPA), more than half of European life insurers are guaranteeing an investment return to policyholders that exceeds the yield on the local 10-year government bond, thereby incurring undesirable negative investment spreads (EIOPA, 2013).[11]

Countries that suffer from both large duration mismatches and negative investment spreads are particularly vulnerable to a prolonged low-interest-rate environment. According to EIOPA, Germany and Sweden, which together accounted for about 20 percent of gross written premiums at the end of 2013, suffer from both duration mismatches of more than 10 years and negative investment spreads (Figure 1.13, panel 1). In contrast, countries with positive duration gaps (reflecting a higher share of saving- and unit-linked products), such as Ireland and the United Kingdom, are less sensitive to the risks arising from low or falling interest rates. They may, however, face

[11]In Germany, for example, despite a recent reduction in the guaranteed policy rate on new products to 1.25 percent, the guaranteed return on total policies is about 3.2 percent, whereas the 10-year bond yield is about 0.3 percent. For more information on the health and challenges of German life insurers, see Elekdag and others 2014.

Figure 1.13. Life Insurance Industry Characteristics

1. Duration Mismatches and Negative Investment Spreads
(Baseline; percent)
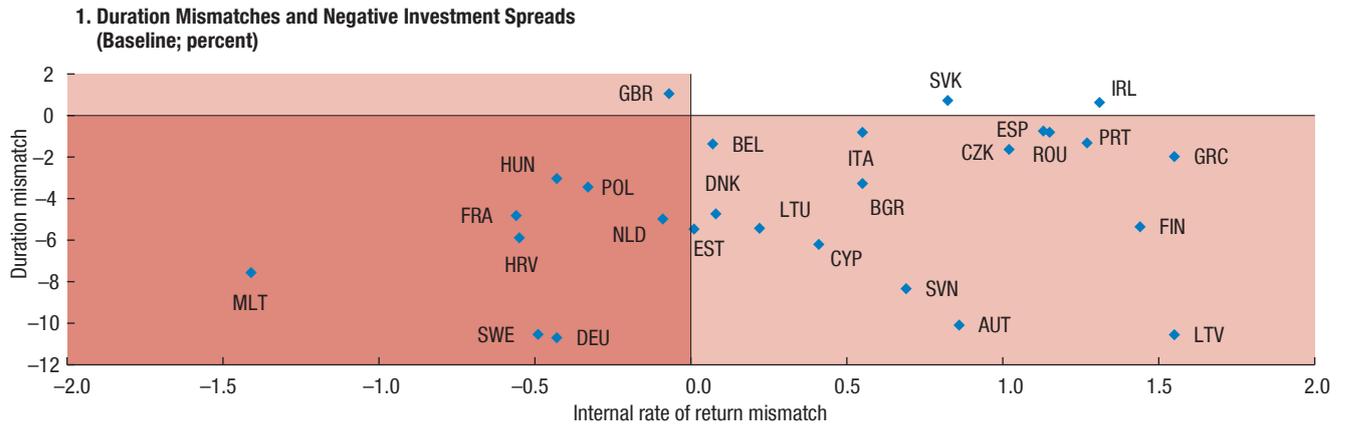
Source: European Insurance and Occupational Pensions Authority.
Note: AUT = Austria; BEL = Belgium; BGR = Bulgaria; CYP = Cyprus; CZK = Czech Republic; DEU = Germany; DNK = Denmark; ESP = Spain; EST = Estonia; FIN = Finland; FRA = France; GBR = United Kingdom; GRC = Greece; HRV = Croatia; HUN = Hungary; IRL = Ireland; ITA = Italy; LTU = Lithuania; LTV = Latvia; MLT = Malta; NLD = Netherlands; POL = Poland; PRT = Portugal; ROU = Romania; SVK = Slovak Republic; SVN = Slovenia; SWE = Sweden.

2. EIOPA Interest Rate Assumptions Relative to Current Euro Area Yield Curve
(Percent)
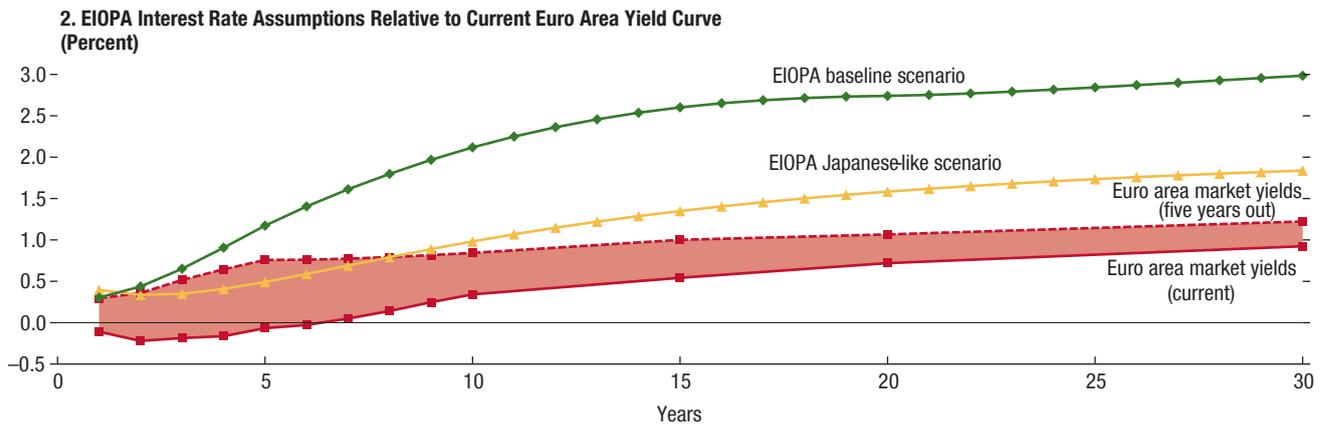
Sources: Bloomberg, L.P.; European Insurance and Occupational Pensions Authority (EIOPA).

3. Share of European Asset Classes Held by Insurers
(Percent of outstanding)
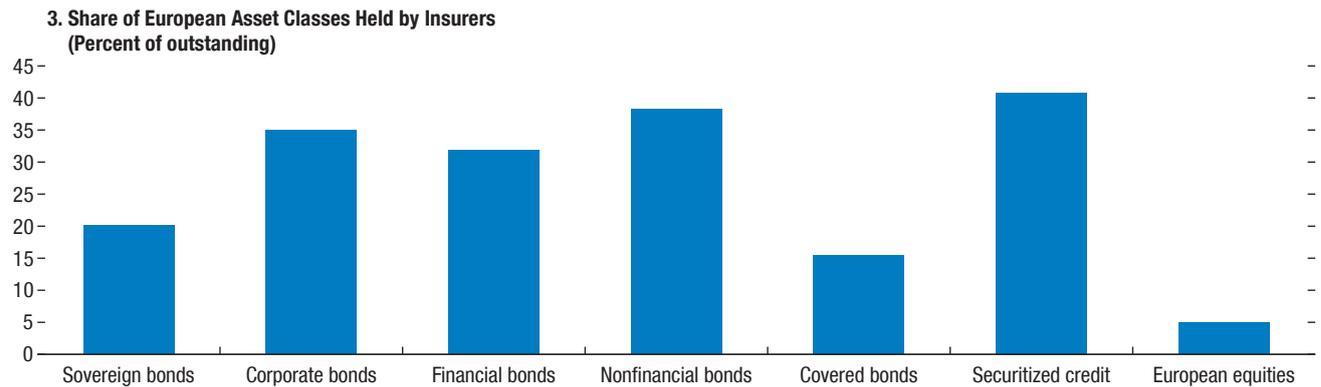
Sources: Morgan Stanley; and IMF staff estimates.

other vulnerabilities, including high volatility in equity markets. In the United States, life insurance companies also appear less sensitive to the risks associated with low interest rates, reflecting their product mix, which is similar to that of U.K. insurers, and the more favorable U.S. economic outlook.[12]

A low interest rate scenario is materializing in Europe

The results of the 2014 stress tests conducted by EIOPA indicate the urgency and size of the insurance industry problem. The stress tests show that 24 percent of insurers were not able to meet their 100 percent Solvency Capital Ratio requirement under a "Japanese-like scenario."[13] Although the industry was expected to have about 8 to 11 years before running into serious cash-flow pressures, even these results seem optimistic, as interest rates are now significantly lower than in the stress test scenarios (Figure 1.13, panel 2).

Solvency II adjustments (the "Long-Term Guarantee" measures) help to mitigate the impact of stress but may not be realistic under industry-wide stress.[14] Under the Japanese-like scenario, these Solvency II adjustments eradicated the impact of the scenario on insurers' cash profiles by allowing the value of insurers' assets to grow faster than that of their liabilities, which is counterintuitive in a prolonged low-interest-rate environment.[15] It seems reasonable for Solvency II adjustments to help an individual life insurer overcome temporary capital shortfalls, particularly in light of the long-term nature of its liabilities. But vulnerabilities become difficult to mitigate, even with regulatory adjustments, once an insurer hits negative cash flows or the source of the vulnerabilities are industry wide and likely to affect many insurers simultaneously.

European life insurers are vulnerable to distress

Midsize insurers in Europe face a high and rising risk of distress. The failure of one or more midsize insurers could trigger an industry-wide loss of confidence if the failure is believed to reflect a generalized problem.

The absence of a policyholder protection scheme or set of common minimum standards for the entire EU—arrangements similar to those in Japan and the United States—magnifies the risk of market disruptions.

The high and rising interconnectedness of the insurance industry and the wider EU financial system is another source of potential spillovers. The industry has a portfolio of €4.4 trillion in EU credit. Furthermore, insurers are traditionally closely linked to banks through liquidity swaps and bank bond holdings, a trend that could increase with the new Total Loss-Absorbing Capacity requirements. A large mark-to-market shock could force life insurers into asset reallocations and sales that could engulf the financial system (Figure 1.13, panel 3).

Policies needed to maximize the effectiveness of QE in the euro area

QE provides a strong framework for addressing deflation risks, and some key transmission channels are already beginning to work. But given the potential limits to bank credit growth, further steps to repair private balance sheets are needed for the full potential benefits of QE to materialize:

- First, regulators need to provide clarity about regulatory standards—and thus certainty for banks adapting business models—by promptly finalizing the calibration of recent requirements, including the leverage ratio, net stable funding ratio, and Total Loss-Absorbing Capacity requirements.
- Second, a number of actions are needed to comprehensively tackle the burden of nonperforming loans. Supervisors must continue to provide strong incentives for banks to maintain adequate provisioning levels and help reduce the current gap between bank and market valuation of nonperforming loans. This includes encouraging banks to develop and use specialized internal and external capacity for handling the stock of nonperforming assets, actively manage their provisions, and write off their nonperforming assets (see Bergthaler et al, 2015).
- Third, authorities should also ensure that legal frameworks for bankruptcy of firms and individuals continue to be reviewed and reformed, where necessary, and that institutional frameworks (judiciary and insolvency practitioners) and out-of-court procedures—possibly combined with corporate equity financing—are adequately resourced and supported to deal with large volumes of distressed debt. Regulatory measures should also be taken to encourage the speedy disposal of problem loans by banks. In

---

[12]Further analysis of U.S. insurers can be found in the forthcoming 2015 U.S. Financial Sector Assessment Program.

[13]"Japanese-like scenario" is used in EIOPA 2014a to test the resiliency of the insurance sector by assuming a persistent low-interest-rate environment. See also EIOPA 2014b.

[14]The measures include both transitional arrangements and permanent adjustments to eliminate the economic loss from negative investment spreads.

[15]For example, Solvency II requires insurers to recognize valuation gains on the asset side fully and immediately, whereas losses on long-term liabilities can be smoothed over a 16-year transitional period, adjusting for short-term credit spread volatility and other sources of volatility.

addition, an active market for nonperforming loans should be encouraged (for sample, Jassaud and Kang 2015).

- Fourth, the resilience of the financial system should be strengthened by diversifying the sources of funding from banks to capital markets. A deeper and broader capital market would improve access to finance, particularly for smaller firms, and make financial markets more efficient. In the euro area, this would require harmonization of company law, corporate governance, insolvency regimes, and taxation, in line with the latest Capital Markets Union proposal by the European Commission.

The challenges facing life insurers should also be tackled promptly to ensure these institutions can play an active role in the portfolio rebalancing channel. Regulators need to reassess the viability of guarantee-based products and promptly bring minimum return guarantees offered to policyholders in line with any secular trend in policy rates. At the same time, they must improve the sector's asset-liability matching and hedging capabilities. Prompt regulatory and supervisory actions are needed to mitigate damaging spillovers from a failure of a medium-sized insurer. Introducing a nationally harmonized policy holder protection scheme would further increase the resilience of the industry by enhancing confidence. Partnerships combining the credit risk expertise of banks with the balance sheet capacity of insurers could also help promote growth.

Finally, regulators should continue to improve transparency and public disclosure of life insurers. Despite EU regulators' significant efforts to strengthen transparency, including through the publication of comprehensive stress test results, it remains difficult to assess insurers' true solvency positions. This situation could undermine public confidence and exacerbate industry pressures if vulnerabilities start materializing in smaller firms.

The effectiveness of QQE in Japan depends on supporting policies

Steadfast implementation of fiscal and structural reforms is essential to boosting growth and making QQE more effective. If these reforms are incomplete, efforts at pulling the economy out of deflation are less likely to succeed, hampering the effectiveness of QQE. The BOJ should consider strengthening the portfolio rebalancing effects of its asset purchases by increasing the share of private assets in purchases and

extending the program to longer-maturity government bonds, as necessary to achieve its 2 percent inflation target. A more forecast-oriented monetary policy communication would increase the transparency of the BOJ's assessment of inflation prospects and also signal commitment to its inflation target, mainly through the discussion of envisaged policy changes if inflation is not on track. To further stimulate bank lending to the private sector, authorities should expand the special lending facilities; jump-start the securitization market for bank loans to small and medium-sized enterprises and mortgages; and enhance risk capital provision, including by encouraging more asset-based lending and removing barriers to entry and exit of small and medium-sized enterprises.

United States

Despite the much-anticipated start of the process for monetary policy normalization in the United States, long rates have been lower than expected as concerns over global growth and disinflation feed back into U.S. markets. Plummeting crude oil prices have raised concerns regarding the recent flurry of high-yield debt issued by speculative-grade energy companies. Divergence between the expectations of financial market participants and those of policymakers regarding the pace of U.S. monetary tightening reflects the challenge of normalizing monetary policy in a world still addressing legacy problems and trying to encourage economic risk taking.

U.S. recovery solidifies as economic risk taking takes hold

The fundamentals of the U.S. economy continue to strengthen. The April 2015 *World Economic Outlook* projects growth of 3.5 percent in 2015 amid low interest rates, dissipating fiscal headwinds, and lower energy prices. More people are returning to the workforce, and wage growth is widely expected to start picking up. The *World Economic Outlook* projects three-year average growth at an annual rate of about 3 percent, the fastest annual pace since 2005.

Other indicators support the view that U.S. growth is successfully making the transition from dependence on asset appreciation and financial risk taking to an economy led by economic risk taking. Capacity utilization is returning to precrisis levels, and business fixed investment is rising, although at a slower pace than in previous cycles (Figure 1.14, panels 1 and 2). Growth in credit extended to nonfinancial firms is on the rise, in contrast to growth

Figure 1.14. United States: Nonfinancial Corporations

1. Credit Growth and Capital Expenditures
(Percent)

Historical average since 1999

Credit growth to firms (year over year; four-quarter moving average; percent; left scale)

Capital expenditures (percent of operating cash flow; right scale)

2. Capacity Utilization and Business Fixed Investment
(Percent)

Capacity utilization (left scale)

Nonresidential fixed investment (year-over-year growth; right scale)

Sources: Federal Reserve; and IMF staff calculations.

in the euro area, where the trend is still negative. Funds raised through corporate debt issuance are increasingly devoted to capital expenditure rather than to equity buybacks and other forms of financial engineering. The tepid recovery of housing activity, however, remains a concern.

These developments are setting the stage for a normalization of U.S. monetary policy. U.S. authorities are preparing markets for a shift toward monetary policy tightening in 2015. Even though much anticipated, such an exit remains challenging, as discussed in the next section.

Financial risk taking continues at a strong pace in U.S. markets

Alongside positive developments in economic fundamentals, the search for yield has continued in U.S. credit markets. Signs of excesses in credit markets include the following: (1) underwriting standards continue to deteriorate, with covenant-light loans now accounting for two-thirds of new issuance of leveraged loans; (2) issuance of other types of lower-standard loans, such as second-lien loans, is at near-record rates; (3) there is an ongoing rise in leveraged buyouts and heightened activity in mergers and acquisitions. Although the leveraged loan market is still a relatively small part of the U.S. credit market and does not pose an immediate systemic threat, the sector is growing rapidly, and weak underwriting standards could pose problems down the road, as highlighted by U.S. supervisors in their annual shared national credit

review program. These developments are also indicative of broader trends toward weaker underwriting standards. Relatively easy financing conditions and slower earnings growth could encourage higher leverage in future deals. Reflecting the search for yield, credit spreads remain below historical averages (Figure 1.15, panel 1), and—despite recent improvement—default cushions are thin in lower-rated segments of high-yield corporate bonds (Figure 1.15, panel 2).

U.S. companies generally continue to add leverage, as indicated by rising ratios of net debt to assets. However, measuring leverage through net debt to earnings shows a widening disparity between large-capitalization and small-capitalization firms (the latter with equity value between $100 million and $1 billion). The median small-cap firm has pushed leverage far higher than the median large-cap firm, to levels above those preceding the global financial crisis (Figure 1.15, panel 3). Smaller corporations are more vulnerable than the largest U.S. companies, which have the highest credit ratings among U.S. corporations and the easiest access to both the capital markets and banks. An examination of the "weak tail" of corporations with the lowest debt repayment capacity, reveals a stark picture (Figure 1.15, panel 4). The weakest quartile of small-cap corporations are operating with relatively low interest-coverage ratios, leaving them more dependent on cash reserves and the continued ability to roll over debt to service interest.

Figure 1.15. U.S. Credit Spreads, Firm Leverage, and Interest Coverage

1. Investment-Grade and High-Yield Credit Spreads
(*Z*-score vis-à-vis the respective historical distribution)

- U.S. investment grade
- EU investment grade
- U.S. high yield
- EU high yield
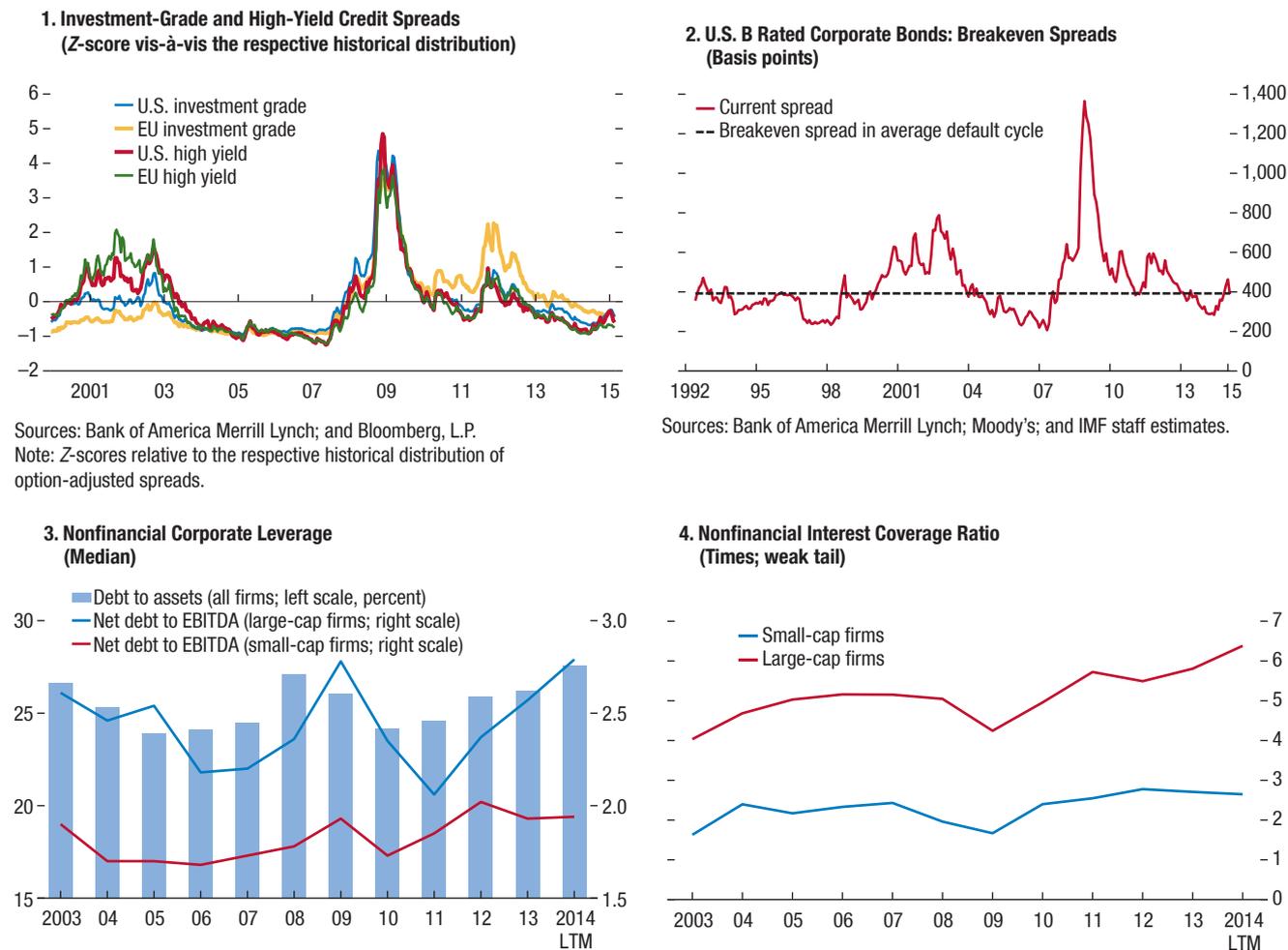
Sources: Bank of America Merrill Lynch; and Bloomberg, L.P.
Note: *Z*-scores relative to the respective historical distribution of option-adjusted spreads.

2. U.S. B Rated Corporate Bonds: Breakeven Spreads
(Basis points)

- Current spread
- Breakeven spread in average default cycle

Sources: Bank of America Merrill Lynch; Moody's; and IMF staff estimates.

3. Nonfinancial Corporate Leverage
(Median)

- Debt to assets (all firms; left scale, percent)
- Net debt to EBITDA (large-cap firms; right scale)
- Net debt to EBITDA (small-cap firms; right scale)

Source: Standard & Poor's Capital IQ.
Note: Small-cap and large-cap firms are defined as having market capitalizations of $100 million to $1 billion, and greater than $5 billion, respectively. The sample is a balanced panel of 1,695 firms. Standard & Poor's Capital IQ classifies duty taxes related to exploration and production in the energy sector as operating expenses. EBITDA = earnings before interest, taxes, depreciation, and amortization; LTM = last 12 months.

4. Nonfinancial Interest Coverage Ratio
(Times; weak tail)

- Small-cap firms
- Large-cap firms

Source: Standard & Poor's Capital IQ.
Note: The weak tail is defined as the 25th percentile of the distribution of the interest coverage ratio within the sample. Small-cap and large-cap firms are defined as having market capitalizations of $100 million to $1 billion, and greater than $5 billion, respectively. The sample is a balanced panel of 1,695 firms. S&P Capital IQ classifies duty taxes related to exploration and production in the energy sector as operating expenses. LTM = last 12 months.

Leverage is being increasingly employed by equity market participants. Although there are some recent signs of stabilization, margin debt as a percentage of market capitalization remains higher than it was during the late-1990s stock market bubble. The increasing use of margin debt is occurring in an environment of declining liquidity. Average weekly trading volumes continue to decline, and although the 52-week moving average of turnover has improved somewhat over recent lows, it remains below its historical long-term average. Lower market liquidity and higher market leverage in the U.S. system increase the risk of minor shocks being propagated and amplified into sharp price corrections.

Declining oil prices could undermine credit quality in high-yield debt markets

In the wake of the sharp drop in oil prices, market participants have grown concerned about exposed credit in the high-yield sector. Since oil prices started to decline in June 2014, the cumulative decline in total returns on energy-related issues in the Barclays High-Yield Index peaked at 13 percent in January of this year, but a recov-

Figure 1.16. U.S. High-Yield Energy Markets

1. Cumulative Total Returns in High-Yield Index and High-Yield Energy
(Percent)

High-yield indices
- Composite
- Energy
- Exploration and production
- Oil field services

Sources: Barclays; and IMF staff estimates.

2. U.S. High-Yield and High-Yield Energy Spreads
(Percent)

High-yield indices
- Composite
- Energy
- Exploration and production
- Oil field services
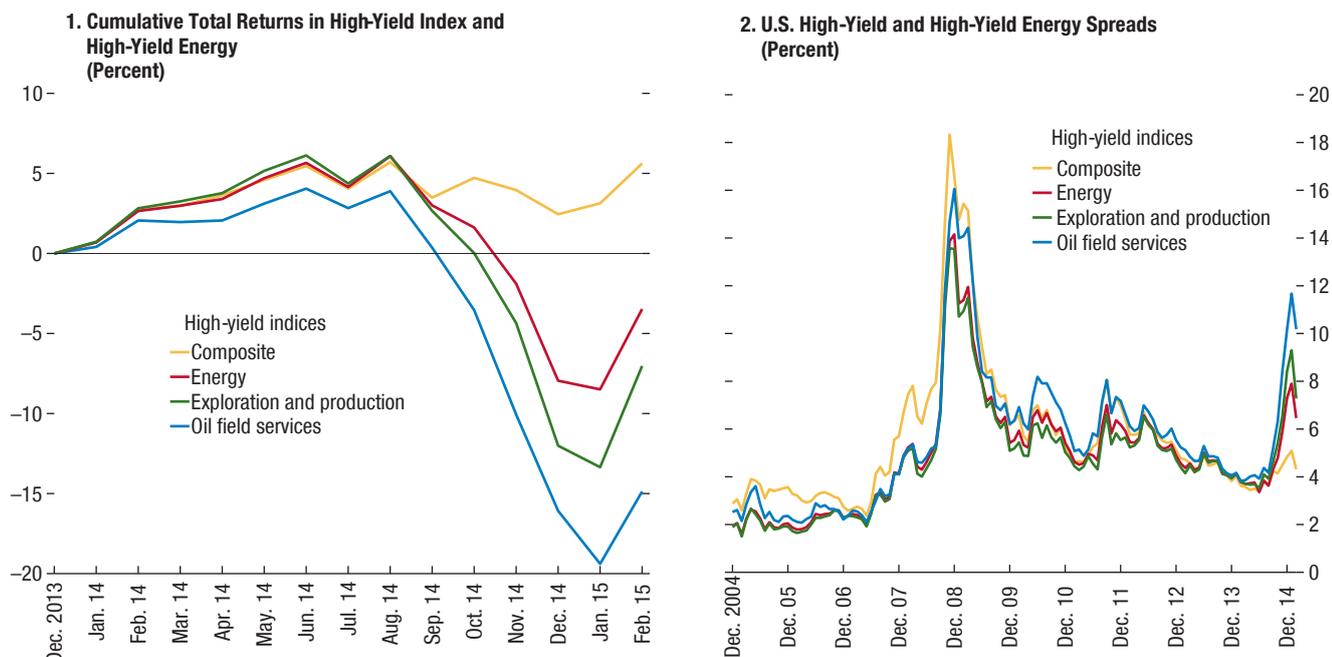
Sources: Barclays; and IMF staff estimates.

ery in February on the back of rising oil prices limited the cumulative decline to 9 percent (Figure 1.16, panel 1). Accordingly, the divergence between the spreads of the energy subcomponents of the Barclays High Yield Index and the broader index was in January at the widest it has been in the past 10 years (Figure 1.16, panel 2).

Oil-related issues comprise a significant portion of the U.S. high-yield bond market. The share has tripled during the past 10 years, largely because of the U.S. shale oil boom. Combining the high-grade and high-yield markets, energy-related bonds account for 56 percent of the bonds trading at distressed levels, and virtually all were issued by firms engaged in extraction and production and oil field servicing (Table 1.4). A positive point in this regard is that U.S. high-yield mutual funds have relatively limited exposure to the energy sector, and accordingly they have only a limited ability to amplify volatility in any potential sell-off in the high-yield energy sector. Also, thus far the contagion to the rest of the high-yield bond market has been limited.

Table 1.4. Energy's Impact on Two Barclays Corporate Credit Indices

	U.S. High-Grade Index	U.S. High-Yield Index
Number of Issues in Distress, January 30, 2015[1]		
Total Index	16	182
Energy	5	101
Exploration and Production	0	67
Servicers	5	33
Number of all Issues in Index	6,039	2,238
Index Amount (US$ trillion)		
December 31, 2008	2.5	0.4
January 30, 2015	5.3	1.3

Sources: Barclays; and IMF staff calculations.

[1]Distress is defined as a bond trading below $80 per $100 par; this is a rule of thumb often used by market participants.

Figure 1.17. U.S. Interest Rates and Term Premiums

1. U.S. 10-Year Bond Yield and Term Premiums
(Percent)

2. Expected Terminal Federal Funds Rate
(Percent)
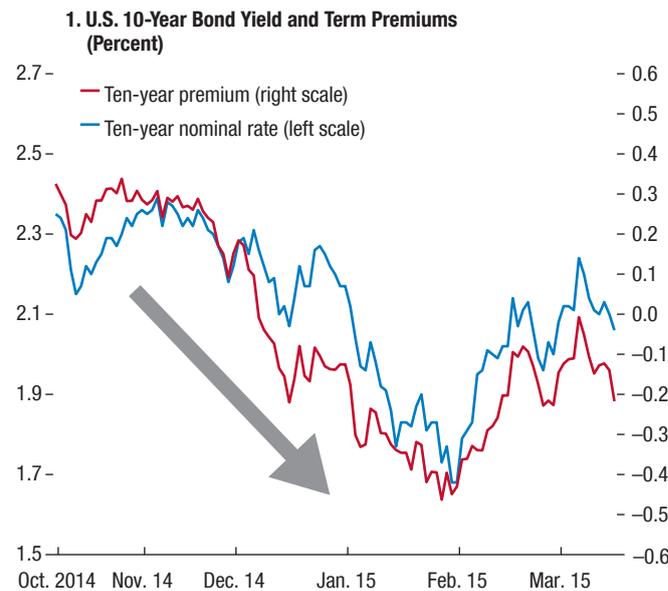
Sources: Haver Analytics; and IMF staff estimates.
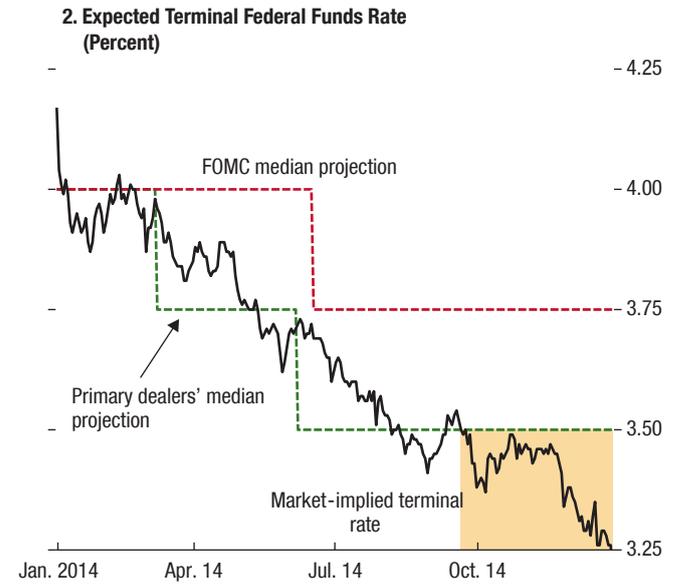
Sources: Bloomberg, L.P.; Kim and Wright (K&W) (2005, updated); and IMF staff estimates.
Note: The market-implied terminal rate is derived from the 10-year Treasury rate, the 10-year term premium (Kim and Wright 2005), and the expected months to liftoff in the federal funds rate. The pace of rate hikes is assumed to be 100 basis points per year until the terminal rate is reached. FOMC = Federal Open Market Committee.

Markets remain concerned that global disinflationary forces and downside risks may yet delay the U.S. recovery

Global developments are exercising strong influence on U.S. Treasury markets. The strengthening of the dollar and lower yields in the euro area and Japan have made U.S. Treasury bonds more attractive on a relative value basis, because buyers can benefit from both the favorable yield differential and potential exchange rate gains. As a result, 10-year Treasury yields declined by 80 basis points between October 2014 and the end of January 2015, before rebounding by 50 basis points by mid-March. A large part of this movement can be attributed to a recompression of the term premium. Indeed, the term premium on U.S. Treasuries briefly declined into negative territory, pulling down U.S. long rates, even as the expected terminal federal funds rate remained steady at about 3.25 to 3.50 percent (Figure 1.17), and expected short-term rates remained stable.

Monetary developments in the euro area have had a particularly strong effect on U.S. interest rates. At the Jackson Hole Conference in August 2014, the ECB president indicated a willingness to consider additional unconventional policy measures. Statistical analysis

indicates that, before this event, changes in the 10-year Treasury rate were more likely to precede (Granger cause) changes in the 10-year German bund rate; after Jackson Hole, changes in bund yields were likely to precede (Granger cause) changes in Treasury yields (Figure 1.18, panel 1).

Recent developments in global asset markets also reflect dissonance between financial market concerns over global disinflationary pressures and the Federal Reserve's signaling of the path of U.S. monetary policy. Both market-based and survey-based expectations continue to point to mid- to late 2015 for the first hike in the U.S. policy rate. But market-based expectations for the future path of policy rates remain notably below the forecasts of most of the participants in the Federal Open Market Committee's "dot" forecasts (Figure 1.18, panel 2).[16] These influences have persisted despite the continuing improvements in the

[16]Some market analysts' forecasts for the first U.S. rate hike extend to early 2016, citing the absence of price pressure and an expectation for a U.S. recovery slowed by a strong dollar and weak foreign growth. Rates implied by futures contracts are also affected by risk premiums, and declines in those premiums can lower the implied path of the policy rate.

Figure 1.18. Global Interest-Rate Developments

1. Granger Causality Tests for Precedence in 10-Year Bond Yields

January 1, 2010–August 21, 2014

August 22, 2014–March 15, 2015
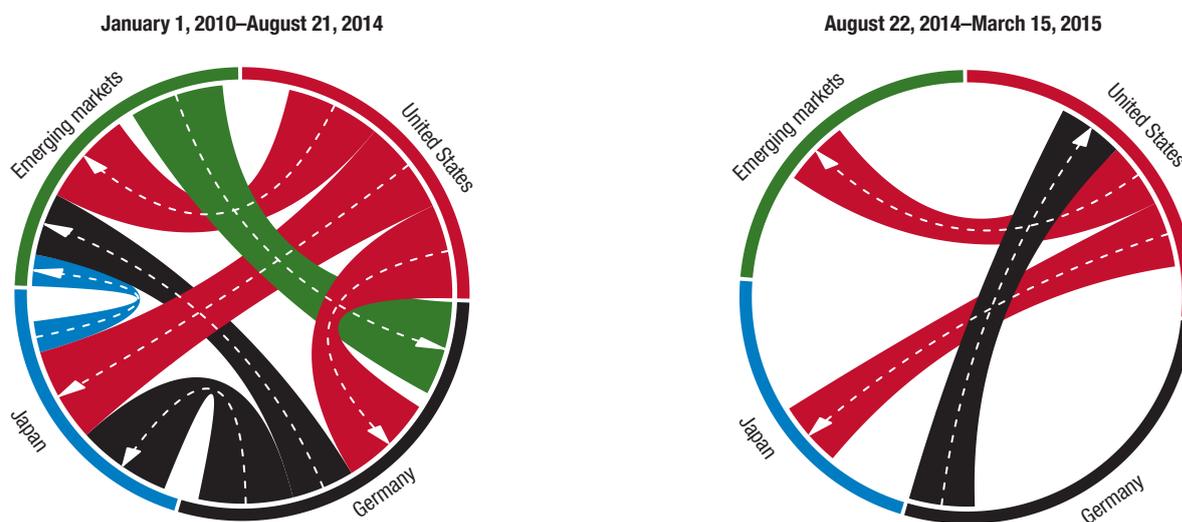
Sources: Bloomberg, L.P.; and IMF staff estimates.
Note: The Jackson Hole Economic Policy Symposium was held on August 22, 2014. The arrows indicate the direction of the Granger Causality. The width of bands indicates the significance of the chi-squared statistic from the Granger causality test. The widest band represents significance at the 1 percent level, the medium band at the 5 percent level, and the narrowest at the 10 percent level.

2. U.S. Policy Expectations
(Percent)
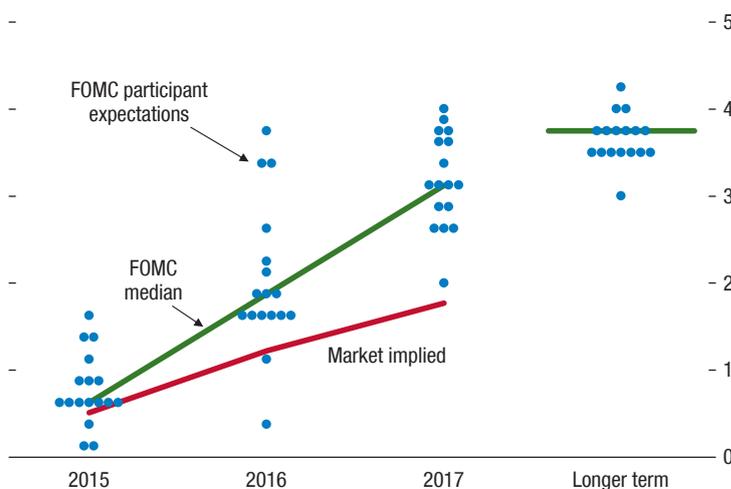
Sources: Bloomberg, L.P.; and IMF staff estimates.
Note: Data is as of March 2015. Federal Open Market Committee (FOMC) meeting.

U.S. economic outlook and consistent signals from the committee on the likely trajectory for policy rates.

Financial markets are effectively signaling a significant risk that policy will not normalize as soon as the central bank is forecasting, because disinflationary forces at work in the global economy will keep inflation contained below target. Inflation swap markets are signaling a lower level of expected inflation for both the United

States and the euro area, suggesting that markets are taking a more benign view of inflation prospects. If this view is correct, it is possible that the Federal Reserve may act more slowly than currently anticipated.

On the other hand, as the Federal Reserve approaches exit and rate hikes appear more imminent, Treasury yields could spike. This risk is not currently a major focus for market participants. However, as was

seen in May–June 2013, a sudden rise of 100 basis points in the 10-year Treasury yield is quite conceivable, even in a generally disinflationary context and even when central banks work to communicate their intentions in advance. Shifts of this magnitude can generate negative shocks globally, especially in emerging market economies. The anticipation of an imminent policy move could temporarily overwhelm global disinflation concerns and cause rapid decompression in the term premium. Reduced structural liquidity could exacerbate the volatility of yield adjustments.

Policies need to support economic risk taking, avert financial excesses, and enhance financial resilience

The impact of international market forces requires appropriately balanced policies, including strong macroprudential policies. In particular, regulators must continue their efforts to understand the less closely regulated corners of the financial sector that could cause problems for the banking system. Existing regulatory frameworks may need to be reassessed to enable authorities to better identify and measure the activities of nonbank entities. Policymakers should support further economic risk taking, such as tax reforms that could encourage firms to build capacity and increase employment.

Given the risks and uncertainties surrounding the normalization of U.S. monetary policy, central bank officials must continue to follow a transparent and carefully calibrated communications strategy to manage the policy-tightening process that is expected to commence this year. The potential impact of increased volatility and portfolio adjustments that could accompany the move toward policy rate normalization makes this task especially crucial. The section titled "When Market Liquidity Vanishes" examines some of the potential risks from decreased market liquidity and changing patterns of correlation in key financial markets.

When Market Liquidity Vanishes

As U.S. monetary policy normalizes, the temporary boost to market liquidity provided by monetary accommodation will ebb, revealing a changed capital market landscape. Without the buoyant liquidity provided by the Federal Reserve, the liquidity-inhibiting impact of regulatory changes, industry consolidation, and other secular factors will likely become more pronounced. Markets could be increasingly susceptible to episodes in which liquidity suddenly vanishes and volatility spikes.

Two recent price disruptions—the October 15, 2014, volatility in U.S. Treasuries and the January 15, 2015, surge in the Swiss franc—involved an initial shock that was likely amplified by market makers' withdrawal of liquidity support. Many of the factors responsible for lower market liquidity also appear to be exacerbating risk-on/risk-off market dynamics and increasing cross-asset correlations during times of market stress. These phenomena suggest that low market liquidity may act as a powerful amplifier of financial stability risks.

Rising market liquidity risks

As discussed in the October 2014 *Global Financial Stability Report,* capital markets are now more important providers of credit than they were in the past, with a growing share of fixed-income instruments held by mutual funds. Inflows into mutual funds have provided an illusion of liquidity in credit markets, but changes in market structure may exacerbate illiquidity in times of stress.[17] Banks have reduced their market-making activities, and more investors are now following benchmarks. A combination of lower dealer inventories, elevated asset valuations, flight-prone investors, and vulnerable liquidity structures have increased the sensitivity of key fixed-income markets to increasing market and liquidity risks.

Economic and policy tensions leave global markets vulnerable to bouts of illiquidity that could prove systemic

Asynchronous monetary policies and divergent economic prospects have led to a sharp increase in volatility in foreign exchange markets. Global disinflationary pressures and accompanying policy responses have compressed longer-term U.S. bond yields. A sudden shift in market views that unwinds compressed premiums and sends yields higher could trigger a market liquidity shock. Asset valuations remain elevated relative to the past 10 years as monetary policies continue to exert downward pressure on spreads, but could widen on U.S. exit from monetary accommodation. This could reverse recent causality channels discussed elsewhere in this chapter, sending shock waves through global markets.

Policy tensions led the central bank of Switzerland to unexpectedly abandon its support for a ceiling on the value of the franc against the euro on January

---

[17]Financial stability risks related to mutual funds are also discussed in Chapter 3.

Figure 1.19. The October 15 Flash Rally in U.S. Treasuries

1. U.S. 10-Year Treasury Yields
(Percent)

Source: Bloomberg, L.P.

2. U.S. 10-Year Treasury
(Daily trading range in basis points)

Source: Bloomberg, L.P.
Note: October 8, 2008: Federal Reserve bailed out American International Group; March 18, 2009: Federal Reserve upsized quantitative easing; August 9, 2011: Federal Reserve added "mid-2013" language in the Federal Open Market Committee statement.

3. Treasury Futures Contracts (10-Year) Available for Trading
(Number of contracts offered at the 10 best price limits)

Sources: CME DataMine; and IMF staff estimates.
Note: Liquidity is measured by the number of contracts offered to buyers and sellers at the top 10 best price limits.

15, 2015. The franc immediately surged by as much as 41 percent against the euro, and not surprisingly, some participants widened bid-ask spreads or refused to quote in the currency. Foreign exchange liquidity overall collapsed and became less available than it was during the 2011–12 euro crisis or the 2013 "taper tantrum" concerning prospective U.S. monetary policy.

On October 15, 2014, U.S. Treasuries and related markets experienced one of their largest intraday changes in yields in the past 25 years.[18] Yields on 10-year bonds fell by 37 basis points from the previous day before rebounding quickly (Figure 1.19, panel

[18]See Bouveret and others, forthcoming, for a detailed analysis of the events of October 15.

1), and volatility spread to closely related asset classes (U.S. dollar swaps) and to equities (with a lag). To put this event in perspective, the decline in yields was larger than that on September 15, 2008, when Lehman Brothers filed for bankruptcy. When compared with recent trading, the massive intraday price change on October 15 was an extremely rare occurrence (Figure 1.19, panel 2).

The rally in Treasuries on October 15 was reportedly initiated by a variety of poor data releases and one-sided positioning, but was likely amplified by the retreat of traditional market makers from their customary role of warehousing risk. As the number of Treasury futures contracts available for purchase or sale declined, individual trades had a larger effect on the market

price than they would normally have had (Figure 1.19, panel 3). Although the rising price and vanishing liquidity allowed the "flash dynamic" to take off more than an hour into the ongoing market reaction to the data releases, both were just as quickly reversed. The event remains under investigation by U.S. authorities, but a number of factors are likely to have contributed to it.

Why have market shocks become more amplified?

Market shocks are easily propagated when liquidity is low. As highlighted elsewhere in this chapter, technological change, regulation, and the shifting composition of market participants have altered the microstructure of the Treasury market and fixed-income markets more broadly. As a result, participants cannot always rely on dealers to provide sufficient liquidity in volatile markets, making them more vulnerable to liquidity shocks. Moreover, market safeguards may no longer be appropriately calibrated to changing market conditions. More specifically,

- *Automation and the rise of high-frequency trading*—Treasury bonds and Treasury futures trade almost exclusively on electronic platforms, which allow algorithmic and high-frequency traders to capture an expanding market share. High-frequency trading is estimated to account for at least 50 percent of cash market volumes and 60 to 70 percent of futures trading activity (Jiang, Lo, and Valente 2014; Tabb 2012; and Chicago Mercantile Exchange 2010). Responding to competition from these sources, even traditional market makers have increasingly adopted algorithmic trading strategies. Market participants report that liquidity provision has become more dependent on programmed reaction functions and less on client-based relationships. In a more anonymous, short-term, profit-oriented trading environment, fewer participants make their pools of liquidity available in risky conditions to help stabilize the market.

- *Reduction in market making by traditional dealers*—Banks claim that their ability to make markets and therefore provide liquidity has diminished with the tightening of regulation in recent years.[19] Similarly, pension funds and insurance companies are less able to play a countercyclical role in financial markets

because of tighter requirements to minimize asset-liability mismatches.

- *Inadequate market safeguards*—Existing safeguards can fail to limit abnormal price movements in markets dominated by automated trading. On October 15, 2014, circuit breakers were not triggered on futures markets because trades continued to take place as the market moved through successive price levels without gaps. But because the number of contracts available at each price level was small, prices rose rapidly with each successive execution, giving market participants no real opportunity to liquidate significant positions at the market price.

- *Emergence of less-regulated nonbank market intermediaries*—Access of leveraged retail investors to foreign currency brokers allowing bets against the Swiss franc exacerbated the price surge. In many cases, heavily leveraged positions involved little coordination or oversight by authorities. Many retail investors were either unaware of the risks or had explicit or implicit guarantees from their foreign exchange brokers that they could not lose more than their deposits. However, when the franc suddenly and sharply moved against their positions, their high degree of leverage generated losses far greater than their account equity. Two firms were driven into insolvency, and a retail broker reported losses of nearly $225 million.

- *Benchmarking*—More market participants are using benchmarks by investing in indices or in underlying baskets of securities.[20] Several factors are driving this trend, including restricted access to leverage from prime brokers and demands from investors for tighter risk management and greater transparency. As more asset managers focus on benchmarks, assets not in the benchmark index suffer a decline in liquidity.

- *Use of derivatives and exchange-traded funds*—The increasing trading of index-based instruments such as derivatives and exchange-traded funds may amplify the effects of benchmarking in limiting liquidity. When dealers use the cash market to hedge their exposure to a client's derivatives contract on an equity index, they need to replicate a simultaneous opposing order for each stock in the index.[21] This

---

[19]To a degree this may be related to restrictions on proprietary trading and to more demanding capital requirements, which may have limited the capacity of banks to hold inventories and conduct repurchase agreement operations (see Powell 2015).

[20]Mutual funds own a rising share of risky assets, particularly in the less liquid credit markets, and hedge funds are increasingly behaving in a more benchmark-centric manner (see the October 2014 *Global Financial Stability Report*).

[21]Similar dynamics apply to broad-index exchange-traded funds. Although buying a future does not directly lead to the purchase of the

Figure 1.20. Asset Comovements and Correlation Spillovers

Correlations among major asset classes have risen markedly since 2010.

1. Correlation Levels

Cross-asset correlations increase with higher market volatility (VIX).

2. Cross-Asset Correlations

Declining liquidity is driving correlations.

3. Correlation and Market Liquidity

Greater use of derivatives is also driving correlations higher.

4. Correlation and Derivative Usage
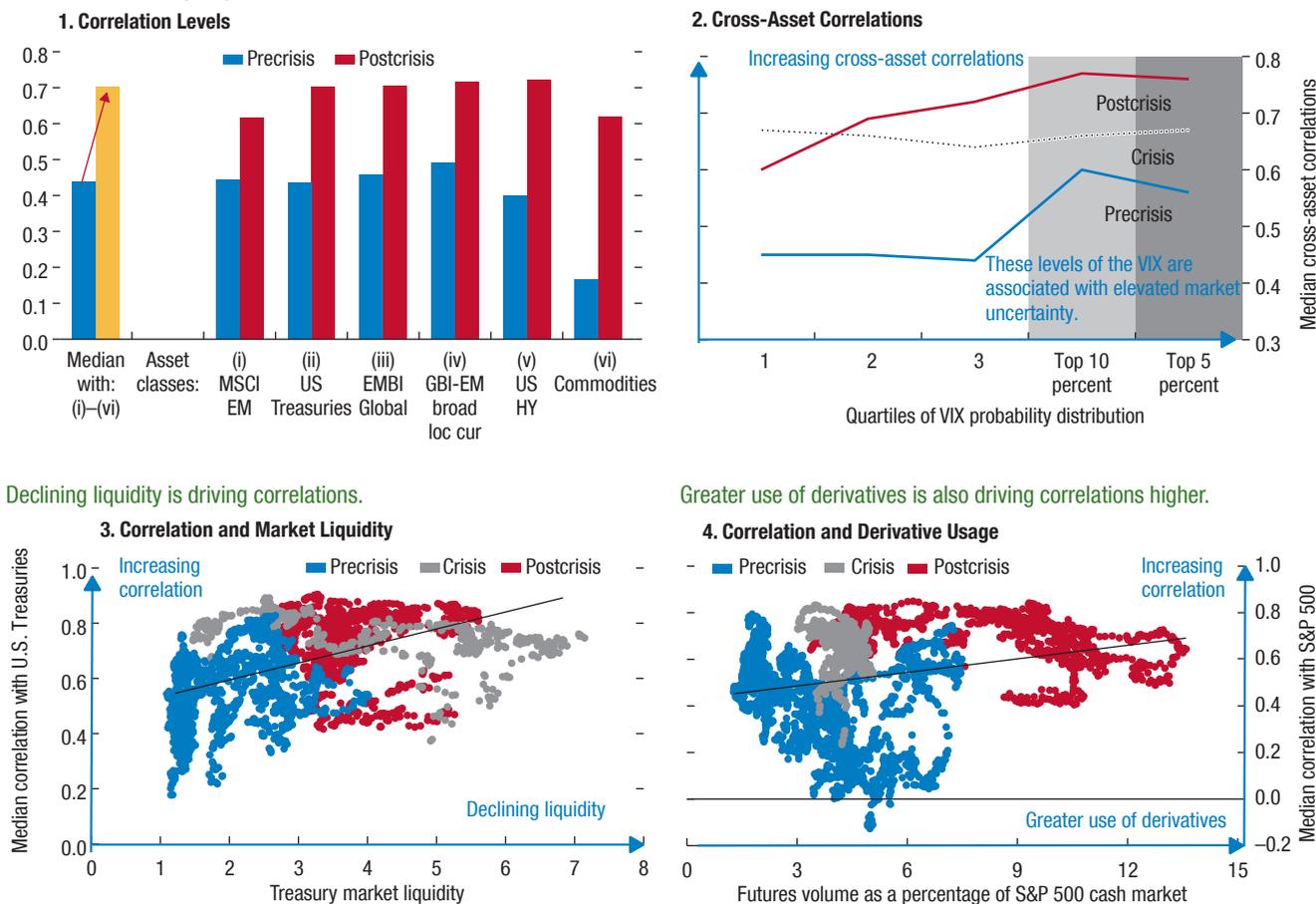
Sources: Bank of America Merrill Lynch; Bloomberg, L.P.; Federal Reserve; JPMorgan Chase and Co.; and IMF staff calculations.
Note: Precrisis period denotes January 1, 1997, to June 30, 2007; crisis period July 1, 2007, to December 31, 2009; and postcrisis period January 1, 2010, to December 31, 2014. Cross-asset correlation is measured as the median of the absolute values of pair-wise correlations over a 60-day window between the daily Sharpe ratios of the asset classes listed in panel 1. Market liquidity is measured as the ratio of returns on the U.S. Treasury–wide index to the turnover of the U.S. Treasury market. The higher the ratio the lower the liquidity, because large amounts cannot be traded without a significant impact on prices. The median correlations in panels 3 and 4 are of the U.S. Treasury 7–10-year index and the S&P 500 index against all six other asset classes as shown in panel 1. MSCI EM = MSCI Emerging Markets Equity Index; U.S. Treasuries = 7–10-year U.S. Treasury Index; EMBI Global = JPMorgan Emerging Markets Bond Index Global; GBI-EM broad loc cur = JPMorgan Government Bond Index-Emerging Markets in local currency; US HY = U.S. High-Yield Index; Commodities = Credit Suisse Index; VIX = Chicago Board Options Exchange Market Volatility Index.

leads to further differentiation in liquidity between securities included and excluded from indices.

Illiquidity events can spill over to other asset classes and emerging markets

These structural shifts in markets may have also contributed to higher asset price correlations. With lower liquidity, less market making, and more benchmarking, asset prices are more likely to be driven by common shocks, particularly at higher frequencies, than by their

---

constituents in the index, it will have an impact on the underlying securities through the actions of index arbitrageurs such as hedge funds.

respective idiosyncratic fundamentals. Both the decline in market liquidity and the increasing use of derivatives are associated with higher asset price correlations over the past five years (Figure 1.20, panels 3 and 4).[22] This is particularly evident during periods of stress, when flow liquidity reverses and volatility increases.[23]

[22]The replication impact on the securities that make up an index when derivatives are traded naturally pushes up intra-asset correlations. Increasing trading of derivatives also drives up cross-asset correlations. For example, it is not uncommon for credit investors to hedge their portfolios with liquid futures and options on equity indices.
[23]Flow liquidity, or the capacity to trade assets cheaply during normal market conditions, has been enhanced by the rise in flows

A rise in correlations during periods of stress is often seen as one of the main attributes of contagion (see, for example, Pericoli and Sbracia 2004).

Correlations among risk-adjusted returns of major asset classes have increased markedly since 2010 (Figure 1.20, panel 1).[24] The correlation of the S&P 500 with U.S. high-yield indices has shown a steep increase, and the correlation with commodities has increased fourfold. The substantial rise in correlations between asset markets in advanced and emerging market economies points to an increased possibility of contagion or spillovers in periods of stress.

Asset price comovement has become stronger during periods of high market volatility. Correlations normally increase during periods of market turbulence. However, over the past five years, correlations have been rising to much higher levels, often to 0.7 or beyond, in periods of high volatility (Figure 1.20, panel 2).

The increase in correlations during stress periods suggests greater risks of contagion across asset classes or borders. It also points to the importance of liquidity as an amplifier of other risk factors. Consequently, policies that address the sources of low liquidity should be seen as part of a comprehensive financial stability framework.

What can policymakers do to address illiquidity and stability spillovers?

Policymakers should seek to address the liquidity mismatch in the asset management sector. As discussed in the October 2014 *Global Financial Stability Report,* a major concern is the market liquidity risk arising from the mismatch between the liquidity promised to mutual fund owners in good times and the cost of illiquidity when meeting redemptions in times of stress, particularly in the less liquid corporate and emerging market bond markets. Policymakers should seek to address this mismatch by adopting policies that remove incentives of asset owners to run by aligning redemption terms of funds with the underlying liquidity in the assets in which they are invested. They could also adopt policies that enhance the accuracy of net asset values, increase liquidity cash buffers in mutual funds,

and improve the liquidity and transparency of secondary markets, specifically for longer-term debt markets.

Chapter 3 finds that the asset management industry needs stronger oversight that combines better microprudential supervision of risks with the adoption of a macroprudential orientation. These findings suggest that securities regulators should shift to a more hands-on supervisory model, supported by global standards on supervision and better data and risk indicators. The roles and adequacy of existing risk management tools should be reexamined, taking into account the industry's role in systemic risk and the diversity of its products.

Policies are also needed to strengthen market structures, including in the more liquid fixed-income markets such as government bond markets. Authorities could consider encouraging market participants in government bond markets to provide liquidity in normal trading conditions, thereby forestalling the deterioration of trading liquidity. Drawing on examples from other advanced markets, authorities could consider either rewarding primary dealers with incentives and/or obligating them to maintain their willingness to trade passively (by providing quotes) or to participate actively. Importantly, these approaches should not necessarily require dealers to maintain a market presence during unusual bouts of extreme volatility. Reporting requirements could reinforce these approaches, typically on an ex-post basis.

Futures exchanges for U.S. Treasury markets could consider introducing designated market makers.[25] Unlike some equity markets, futures markets for Treasuries do not have designated market makers who provide liquidity. By providing fee rebates and other incentives, exchanges could effectively charge market participants for the provision of risky market-making services. Authorities could also consider best-practice guidelines for market makers.

Market safeguards can help stop panics in periods of heightened volatility. In the U.S. Treasury futures markets, current market safeguards should be recalibrated to prevent a market dislocation of the scale observed on October 15, 2014, and periodically reviewed to ensure that they are up to date and relevant. The authorities could consider introducing similar market safeguards in the U.S. Treasury cash market. Adequate coordination of such safeguards across cash and related derivatives markets would help prevent liquidity arbitrage across platforms.

into mutual funds and exchange-traded funds. The effect may be masking the negative impact of declining market making on other measures of market liquidity, such as depth and breadth (see the October 2014 *Global Financial Stability Report.*

[24]The median correlation of the risk-adjusted returns between the S&P 500 and the six major asset classes in the figure has almost doubled from 0.44 in 1998–2007 to 0.70 in the past five years. Sharpe ratios are used to calculate risk-adjusted returns to control for differing risk characteristics across asset classes.

[25]For a discussion of how designated market makers with well-designed obligations can support liquidity and price efficiency in order-driven markets, see Bank of England 2012.

Figure 1.21. Wide Range in the Inflation Outlook of Emerging Market Economies

Inflationary pressures in emerging market economies are broad...

… but inflation is expected to decelerate in most countries in 2015, with a few exceptions.

1. Headline Inflation Phase Curve
(February 2015)

Sources: National authorities; and IMF staff calculations.
Note: Countries are placed on the phase curve according to where their February 2015 year-over-year headline inflation print is relative to (1) central bank inflation target band (where available), (2) three-month trend, and (3) efficacy of monetary policy (using inflation targeting performance in previous two years). When inflation is in the central bank band, it is placed within the dotted lines, otherwise outside, and the distance from the closest dotted line is determined by criterion 3, because inflation expectations are not considered. Future inflation prints may not follow the arc trajectory.

2. 2015 Forecast Headline Inflation
(Year over year, percent)

Source: IMF, World Economic Outlook database.
Note: UAE = United Arab Emirates.

Real rates are expected to remain high in 2015, and higher than in the previous four years for many emerging markets.

3. Real Policy Rates in Major Emerging Markets
(Ex post, percent)
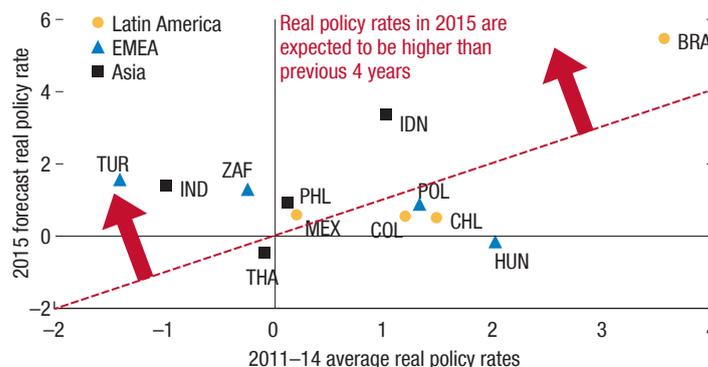
Sources: Bloomberg, L.P.; IMF, World Economic Outlook database; and IMF staff calculations.
Note: The 2015 forecast real policy rate is calculated using the end-2015 policy rate as implied by the market (using forward-rate agreements or interest rate swaps) and the *World Economic Outlook* end-2015 headline inflation forecast. BRA = Brazil; CHL = Chile; COL = Colombia; EMEA = Europe, Middle East, Africa; HUN = Hungary; IDN = Indonesia; IND = India; MEX = Mexico; PHL = Philippines; POL = Poland; THA = Thailand; TUR = Turkey; ZAF = South Africa.

Risk management at trading firms should be reinforced, including from a macroprudential perspective. Supervisors should provide coordinated guidance to trading firms, allowing them to set consistent and appropriate risk limits on individual retail investors, or at the level of the exchanges (circuit breakers and limits on trading firms' positions), or at the level of the clearing firms. Supervisors should also investigate whether retail platforms are adequately capitalized to honor guarantees on loss limits for leveraged retail investors under stressed conditions. Retail firms need to improve their ability to monitor the aggregate risk of their

clients in real time while, as discussed in Chapter 3, regulators should enhance the microprudential supervision of risks from individual institutions that builds on their own risk analysis and stress testing. Regulators and monetary authorities should take the dynamics of asset correlations and volatility into account when evaluating systemic risks in financial markets.[26]

Emerging Markets: Safeguarding the Financial Sector against Global Headwinds

Commodity price declines are exacerbating ongoing corporate balance sheet strains in some emerging market economies, adding to headwinds from overcapacity, real estate sector adjustments, and property price declines (particularly in China). This is despite the benefits of additional monetary policy space provided by lower commodity prices and lower inflationary pressures. Elevated volatility and the rapid depreciation of local currencies for some economies jeopardize financial stability of firms that have borrowed heavily in foreign currencies. These developments outweigh the financial stability benefits from improved competitiveness provided by depreciating currencies. Overall, these shocks have increased financial stability risks in emerging market economies, given the increased leverage in the public and private sectors, and authorities need to enhance surveillance of vulnerable sectors.

Inflation dynamics vary across emerging market economies, and some of those economies are gaining monetary policy space to support growth

Inflation dynamics in emerging market economies are diverse (Figure 1.21, panel 1). Most of South American economies and Russia continue to experience accelerating inflation pressure or above-target inflation, while Hungary, Poland, and many Asian economies have seen falling or low inflation (Figure 1.21, panel 2). Some economies are benefiting substantially from the impact of lower oil prices and increased monetary policy space. India and South Africa, for example, are expected to have inflation

decelerate to their target bands by the end of 2015.[27] As net commodity-importing economies, India, and to a lesser extent Turkey, are expected to reduce their external imbalances and have a chance to improve their resilience by enabling necessary reforms.

Easing inflation pressure provides a welcome increase in monetary policy space for countries in which growth is expected to decelerate. Markets expect real policy rates to decline relative to recent years in economies with large inflation gaps, such as Hungary, Poland, and Thailand (Figure 1.21, panel 3), which in turn can help strengthen financial stability by reducing the debt burden of domestic currency debt. Elsewhere, central banks may have only limited ability, or willingness, to significantly cut rates. For Brazil, India, Indonesia, and Turkey, the expected increase in real policy rates in 2015 relative to the previous four years may boost the cost of debt service in the private sector, where credit has grown strongly in recent years.

The following challenges confront some emerging market economies to varying degrees:

- Retrenchment of overinvested industries, real estate sector adjustments, and property price declines, particularly in China, which could spill over to emerging markets more broadly.
- Price declines in oil and other commodities, which hurt commodity-exporting countries and related corporate sectors.
- Ongoing dollar appreciation and the resulting upward revaluation of foreign currency liabilities, which creates balance sheet strains for indebted emerging market firms and sovereigns.

Disinflationary pressures in China may complicate the transition to slower but safer growth, while real estate sector adjustments and overcapacity in leveraged industries are key financial stability risks

In addition to food and energy prices, China's disinflation pressure may reflect more durable forces, including debt-financed supply-demand imbalances that have built up since 2008. Overcapacity in some heavy industries and excess supply in the real estate market are likely contributing to downward pressure on inflation. Disinflationary pressures are keeping real interest rates high (even when calculated using less volatile core infla-

---

[26]Other initiatives, such as the G20 Financial Stability Board's recent proposal (issued jointly with the International Organization of Securities Commissions) on the supervision of global systemically important financial institutions to cover traditional funds and their managers (rather than just the funds), also merit attention.

[27]Hong Kong SAR and Singapore are categorized as advanced economies, but they are included in this section because as international financial centers that cater primarily to emerging market economies, their banking and corporate sectors are influenced by the forces analyzed here.

Figure 1.22. China: Real Estate and Interest Rate Developments

1. Effective Real Bank Lending Interest Rate
(Contribution to deviation from average; percentage points)
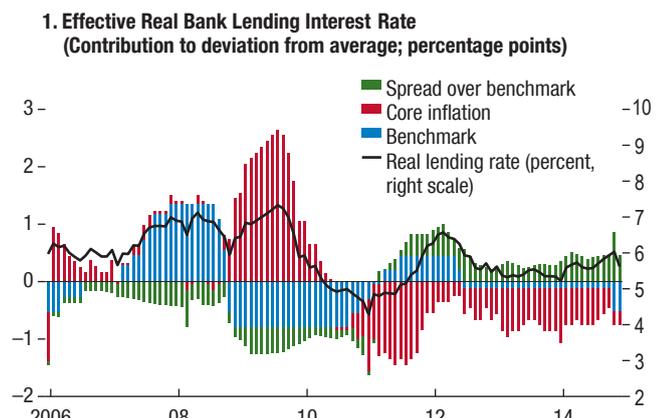
Sources: CEIC; and IMF staff calculations.
Note: Percentage point contribution to deviation of weighted average lending rate from the 2005–15 average. Weighted average interpolated from quarterly data and estimated from a linear model using benchmark rates and new loan relative pricing before 2009.

2. New Home Price Growth
(Percent, year over year)
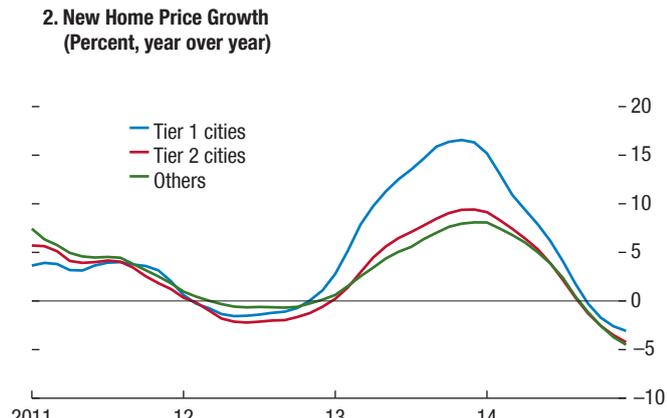
Sources: CEIC; National Bureau of Statistics (NBS); and IMF staff calculations.
Note: New home price growth is the simple average of year-over-year change of NBS-compiled property price indices for newly constructed residential buildings in 70 medium and large cities grouped by different tiers. Tier 1 cities include Beijing, Guangzhou, Shanghai, Shenzhen, and Tianjin.

3. Lending to Real Estate Sector
(Trillions of renminbi, unless otherwise noted)
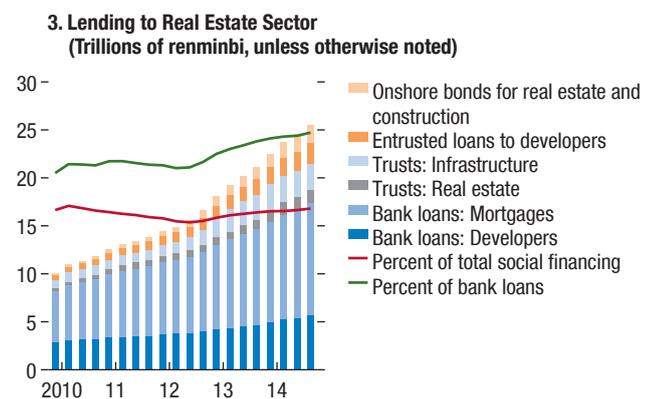
Sources: CEIC; China Trust Association; People's Bank of China; and IMF staff calculations.
Note: Assumed 20 percent of entrusted loans are to the real estate sector. The entrusted loans to developers and onshore bonds for real estate and construction are captured by the total social financing (TSF).

4. Listed Firms' ROA and Inflation
(Percent)
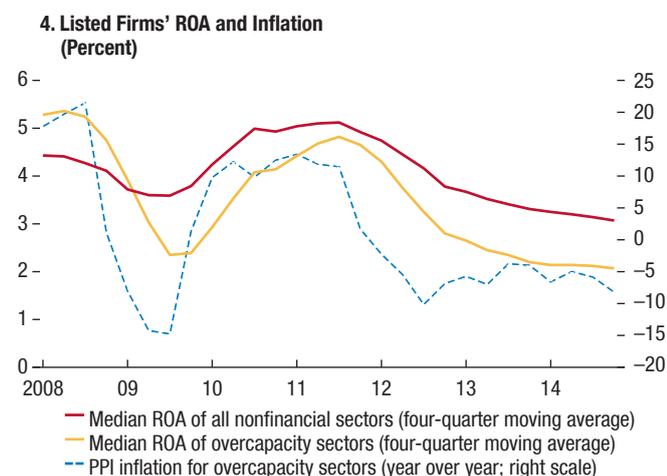
Sources: CEIC; WIND Information Co.; and IMF staff calculations.
Note: Overcapacity sectors include building materials, chemicals, and mining.
PPI = producer price index; ROA = return on assets.

tion) and contributing to tighter real financial conditions, notwithstanding slowing growth (Figure 1.22, panel 1). If these trends intensify, they could engender a disinflationary feedback loop in which further declines in inflation raise the real cost of debt service for highly leveraged firms in weaker sectors, leading to potentially abrupt and disorderly deleveraging, a further slowdown in activity, and more downward pressure on prices.

Lower real estate prices are necessary in China for an improved supply-demand balance, but they could lead to higher-than-expected losses in the financial sector

(Figure 1.22, panel 2). Currently, levels of nonperforming property loans reported by banks remain subdued. Credit exposures to real estate, excluding mortgages, stood at about 12 trillion yuan ($1.9 trillion, or 19 percent of GDP) at the end of 2014 (Figure 1.22, panel 3).[28] Moreover, financial stress among real estate firms

[28]Assuming most trust real estate and infrastructure assets (often related to property development) are in the form of loans. However, the true total may be higher if lenders and borrowers found ways to overcome tighter restrictions placed in 2010 on lending for property development, such as by classifying loans for other purposes.

Figure 1.23. Emerging Market Nonfinancial Corporate Investment Continues to Shrink

Emerging market firms are expected to continue reducing capital spending across most sectors...

1. Emerging Market Capital Expenditure Growth by Sector (Percent)

...and stripping out maintenance reveals reduced investment, particularly among commodity firms.

2. Net Capital Expenditures to Total Debt (Percent)
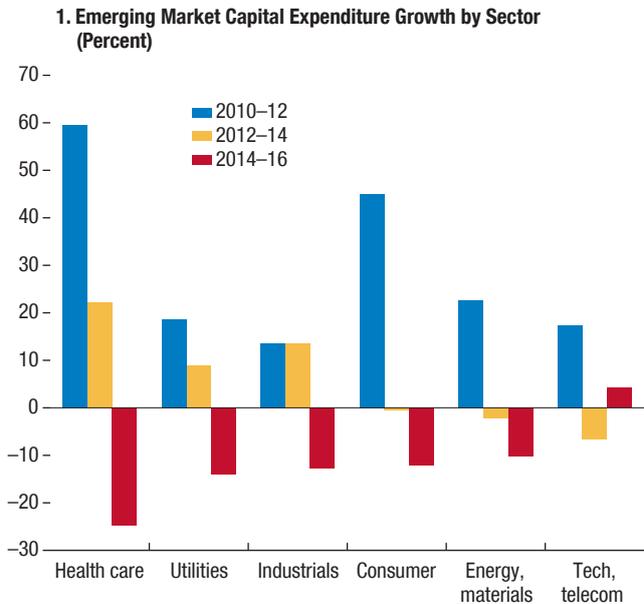
Sources: S&P Capital IQ; and IMF staff calculations.
Note: Calculated on a balanced panel of 2,075 firms from 20 major emerging market economies. Estimates for 2014–16 from S&P Capital IQ.
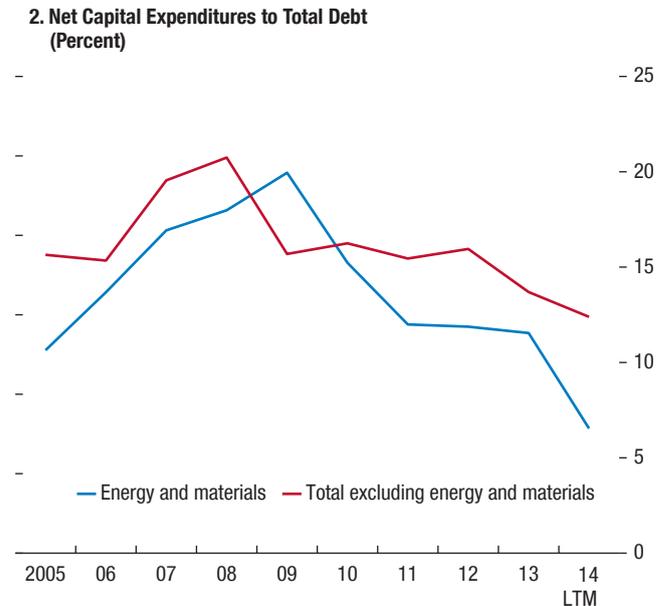
Sources: S&P Capital IQ; and IMF staff calculations.
Note: Net capital expenditures = capital expenditures – depreciation. Calculated on a balanced panel of 1,274 firms from 20 major emerging market economies. LTM = last 12 months.

could lead to direct cross-border spillovers, given gross issuance of about $130 billion in external bonds since 2010. An instance of such a spillover was a missed payment by the developer Kaisa in January 2015, which contributed to sharply curtailed issuance and wider spreads across Asia's high-yield bond market. Uncertainties related to the seniority of external creditors and their access to borrower collateral could rise sharply.

Falling output prices are eroding the profitability of sectors with overcapacity and worsening their debt-service capacity (Figure 1.22, panel 4). These sectors, which include building materials, chemicals, and mining, have also borrowed heavily since 2009. As with the property sector, falling output prices are welcome if they result in the exit of unprofitable firms and a return to financially sustainable growth. Such an adjustment, however, could mean potentially substantial losses for creditors. For banks, on-balance-sheet exposures to these sectors look manageable. But their off-balance-sheet exposures, which some may have used to evade macroprudential edicts against lending to these sectors, may be much higher. As banks recognize these contingent liabilities, the losses could quickly erode their seemingly ample capital buffers.

China's case is instructive for some sectors of other emerging market economies where excess capacity and overinvestment could create additional disinflationary pressures. Emerging market firms, which have been reducing their capital investment since 2011 (see the April 2015 *World Economic Outlook*, Box 4.1, for a broader exposition), have more recently been cutting back across all sectors on the investment plans (Figure 1.23, panel 1) that were funded by big debt increases. The share of net capital expenditures to total debt over the past two years has declined, and is more pronounced among commodity firms, which also account for nearly half of capital expenditures of nonfinancial firms (Figure 1.23, panel 2). As with China, these developments pose the risk of a disinflationary feedback loop.

Commodity price declines are exacerbating balance sheet strains in some emerging market economies

In most emerging market economies, lower commodity prices are boosting consumption, helping to offset lost output from general trade shocks and providing greater monetary policy space. However, they may also give rise to financial stability concerns. For others, the decline in commodity prices during the past nine months has led

Figure 1.24. Dependence of Emerging Market Sovereigns on Commodities, and Market Reaction

Emerging market economies that rely heavily on commodity exports...
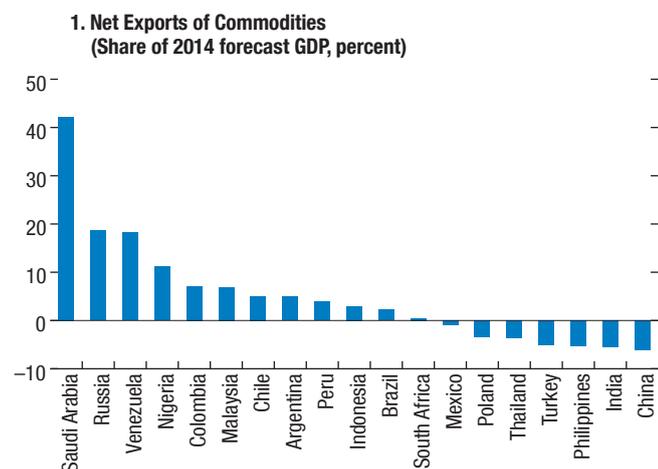
...generally had the greatest growth revisions.

1. Net Exports of Commodities
(Share of 2014 forecast GDP, percent)

2. 2015 Forecast Real GDP Growth Revision from October 2014
(Percentage points)

Net commodity exporter
Net commodity importer
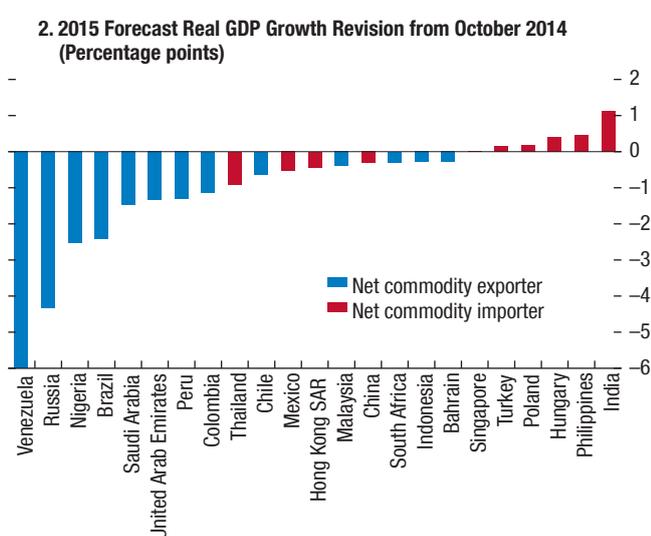
Sources: IMF, World Economic Outlook database; UN Comtrade; and IMF staff calculations.
Note: The UN Comtrade commodity net exports for 2013 comprise commodity codes 0 through 4, using Standard International Trade Classification Revision 3.

Sources: IMF, World Economic Outlook database; UN Comtrade.
Note: See Figure 1.24, panel 1 for categorization of commodity exports.

3. Change in the CEMBI Index Spread
(June 30, 2014, to March 18, 2015, by sector, basis points)

4. Change in the CEMBI Index Spread
(June 30, 2014, to March 18, 2015, by country, basis points)

796
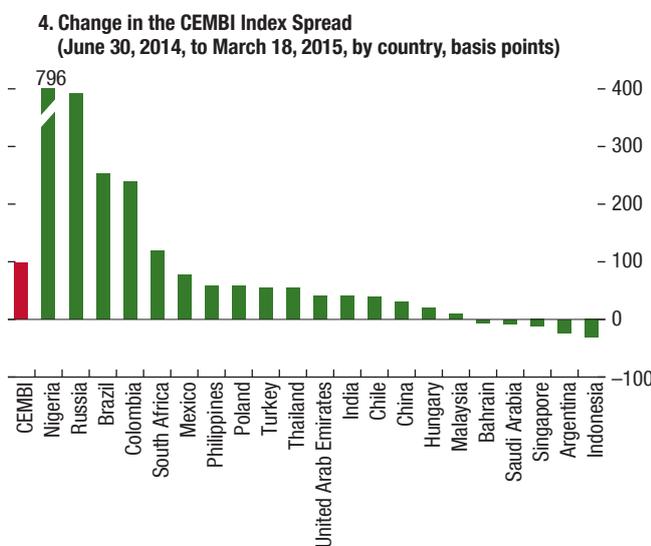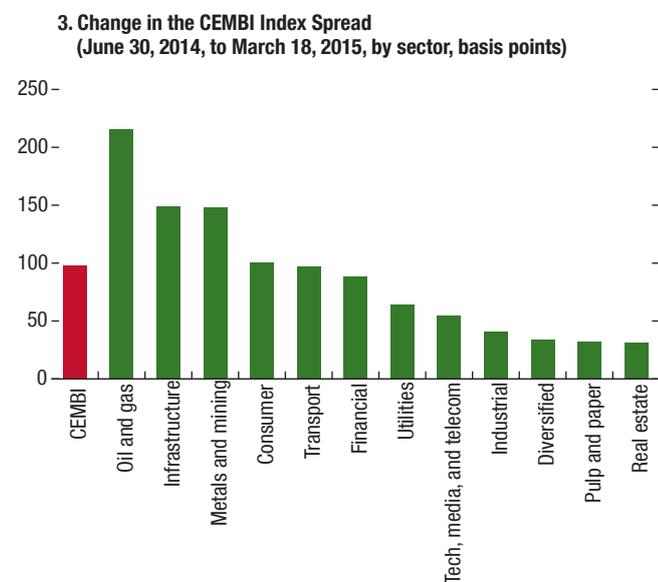
Source: JPMorgan Chase & Co.
Note: CEMBI = Corporate Emerging Markets Bond Index.

to sizable downward revisions of economic activity for some major commodity-exporting countries (Figure 1.24, panels 1 and 2). Commodity price shocks have become systemic for the oil and gas sector in Nigeria, Russia, and Venezuela, and markets have reflected that fact (Figure 1.24, panel 4). Lower revenue and higher public indebtedness in Nigeria and Venezuela, for example, have lim-

ited the ability of those countries to react to the growth downturn (see the April 2015 *Fiscal Monitor*).

Since 2007, energy firms have issued one-third of all hard-currency nonfinancial emerging market corporate bonds as they took advantage of accommodative financial conditions to borrow heavily in international bond and syndicated loan markets to expand their operations

Figure 1.25. Energy Corporate Sector Metrics

The balance sheet deterioration for the emerging market energy sector started even before the oil price decline...

1. Balance Sheet Metrics for the Energy Sector in Emerging Markets (Medians)
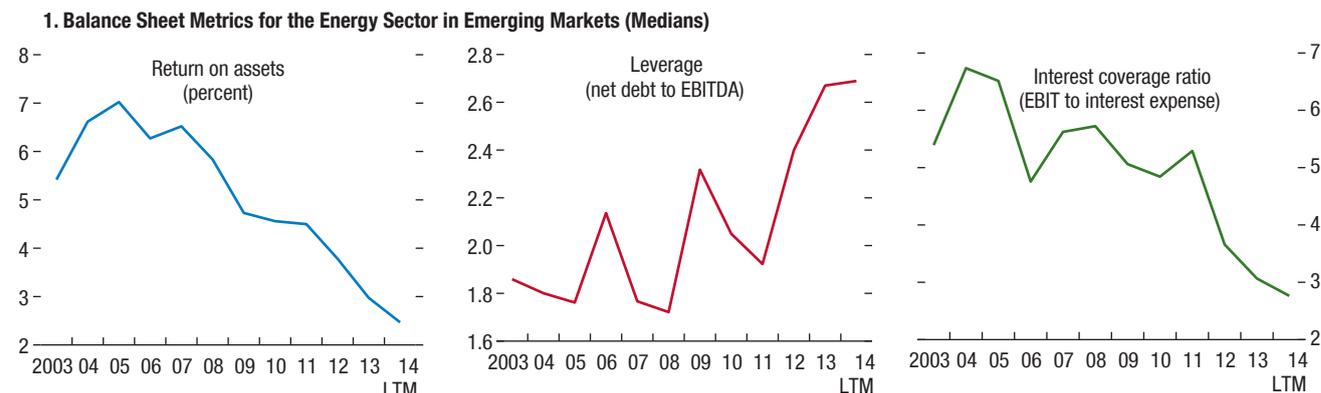
Source: S&P Capital IQ.

...and is notable in Argentina, Brazil, Nigeria, and South Africa, among others.

2. Energy Sector Balance Sheet Metrics (Medians)
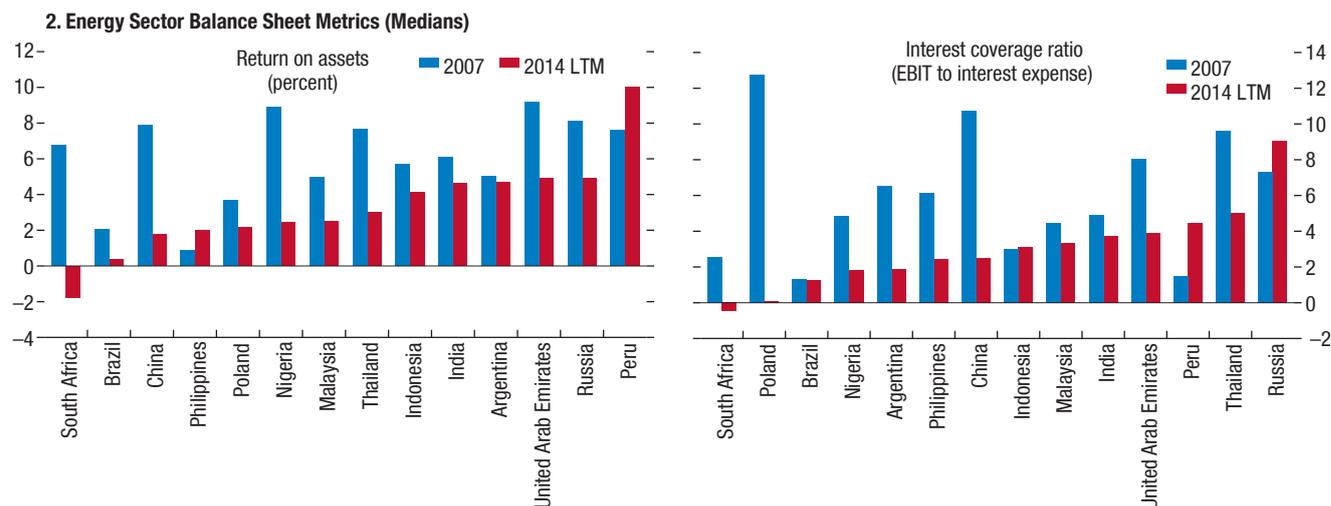
Sources: S&P Capital IQ; and IMF staff calculations.
Note: S&P Capital IQ classifies duty taxes related to exploration and production as operating expenses. EBIT = earnings before interest and taxes; EBITDA = earnings before interest, taxes, depreciation, and amortization; LTM = last 12 months.

and finance investment. Given expectations of lower energy prices, firms in the oil and gas and materials sectors are significantly cutting back their capital expenditure plans. Because these sectors account for, on average, half of investment in the major emerging market economies, this may affect long-term growth for other sectors as well (Figure 1.23, panel 2).[29]

On average, the deterioration of balance sheets for many oil and gas firms preceded the energy price decline of 2014. Profitability (for example, return on assets), leverage, and debt-servicing capacity are now at their worst levels since

2003 (Figure 1.25, panel 1). Price declines have cut into the profitability of energy firms, particularly in China, Nigeria, and South Africa (Figure 1.25, panel 2). Strains in the debt-repayment capacity of the oil and gas sector may become more evident in Argentina, Brazil, Nigeria, and South Africa, given their low interest-coverage ratios in 2014 (on a last-12-month basis; Figure 1.25, panel 2).[30]

Dollar appreciation could test firms and countries that have accumulated dollar debt

From October 2014 through February 2015 the U.S. dollar appreciated by 14 percent in nominal terms and

[29]For emerging market energy firms with available data, capital expenditures in fiscal year 2015 will decline by 31 percent from the previous year, and earnings before interest, taxes, depreciation, and amortization will decline by 20 percent.

[30]In Brazil, Petrobras's corporate governance concerns have resulted in credit rating downgrades and pushed its borrowing costs to their highest level in more than 10 years.

Figure 1.26. Large Increase in Emerging Market Debt

Indebtedness increased strongly across most major emerging markets.

1. Change in Private Sector and Government Indebtedness between 2007 and 2014
(As a share of GDP; percentage points)
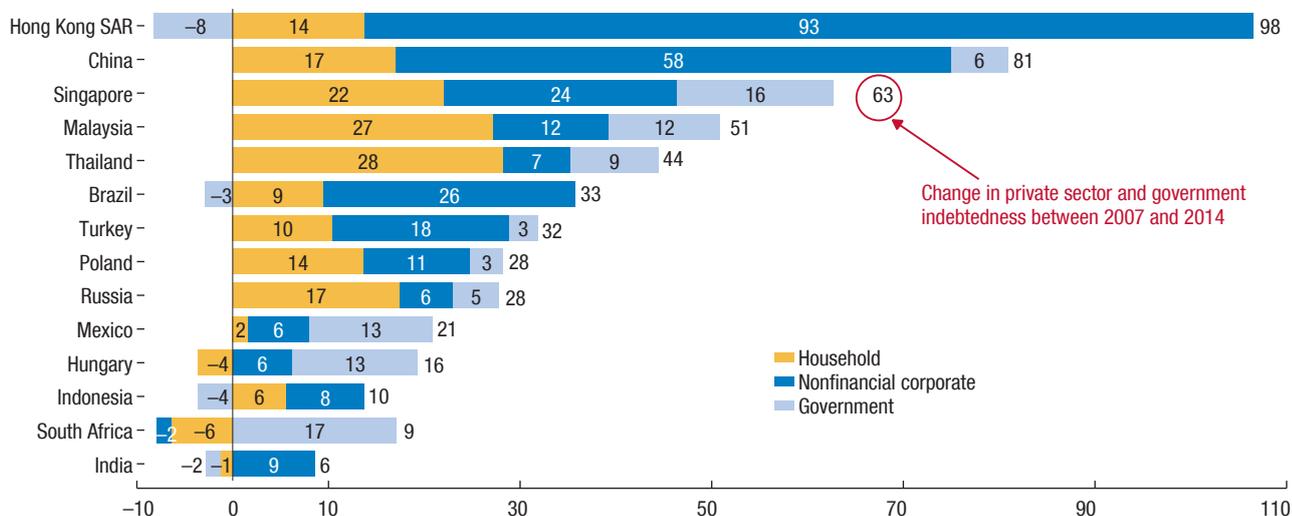
Sources: Bank for International Settlements; Morgan Stanley; national authorities; IMF, World Economic Outlook database; and IMF staff calculations.
Note: Data for Malaysia are from Bank Negara Malaysia, and the change in debt is between 2008 and 2014.

The private sector in many economies increased its foreign currency debt since the crisis or kept it high.

2. Foreign Currency Debt of Nonfinancial Firms and Households
(Percent of GDP)
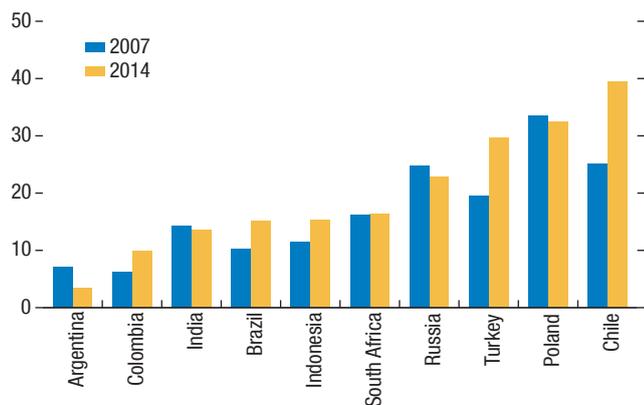
Sources: Bank for International Settlements; IMF, Financial Soundness Indicators; and IMF staff calculations.
Note: Foreign currency debt comprises domestic loans, international loans, and international bonds.

Most emerging market economies increased their foreign currency debt and exposure to foreign investors despite issuing relatively less in foreign currencies.

3. Government Debt Breakdown in Foreign Currency and Nonresident Holdings of Local Currency
(Percent of total)
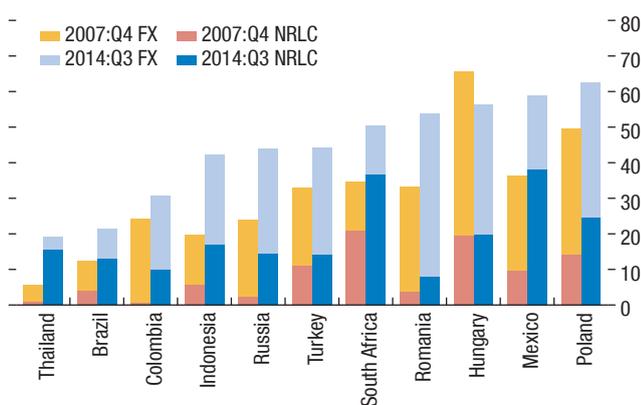
Sources: Bank for International Settlements; Haver Analytics; national authorities; and IMF staff calculations.
Note: FX is the share of foreign currency government debt; NRLC is the share of nonresident holdings of local currency government debt. The date for the left-hand bar for Colombia is January 2010, for Romania is December 2010, for South Africa is January 2011, and Russia is December 2011.

by 11 percent in real effective terms. This dramatic movement in the exchange rate over a period of five months has major implications for emerging market economies that have high debt levels denominated in foreign currencies. From 2007 to 2014, debt grew

faster than GDP in all major emerging market economies and in the international financial centers of Hong Kong SAR and Singapore, which lend to many emerging market economies in Asia. Most of the growth in debt was in the nonfinancial private sector (firms and

Figure 1.27. Firms in Countries with Large Currency Selloffs Also Had High Equity Volatility
(Percent)
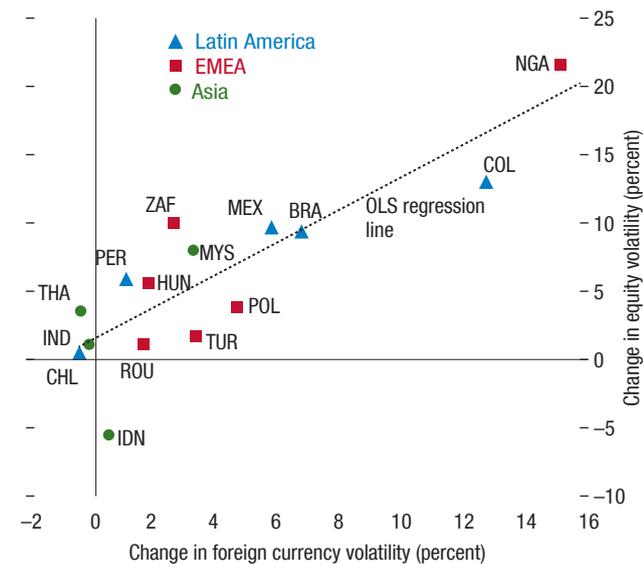
Sources: Bloomberg, L.P; and IMF staff calculations.
Note: Changes calculated over June 30, 2014–March 9, 2015. Volatilities are three-month realized. Currencies are quoted against the U.S. dollar, except in Hungary, Poland, and Romania, where they are quoted against the euro. Volatility in Russia (not shown) increased 44 points for the ruble and 39 points for equities. BRA = Brazil; CHL = Chile; COL = Colombia; EMEA = Europe, Middle East, and Africa; HUN = Hungary; IDN = Indonesia; IND = India; MEX = Mexico; MYS = Malaysia; NGA = Nigeria; OLS = ordinary least squares; PER = Peru; POL = Poland; ROU = Romania; THA = Thailand; TUR = Turkey; ZAF = South Africa.

households; Figure 1.26, panel 1), and a significant portion is in foreign currencies, especially in Chile, Poland, and Turkey (Figure 1.26, panel 2), although in Chile foreign currency mismatches of corporate balance sheets appear limited, and households do not have debt in foreign currencies.[31]

Rapid depreciation of the domestic currency can lead foreign investors to abruptly reduce their holdings of local currency debt and thus create a debt-rollover challenge to the public sector. Since 2007 the share of foreign currency and nonresident holdings of local currency general government debt in total general government debt has risen in a number of countries, such as Indonesia, Mexico, Poland, Romania, and South Africa, or remains elevated, such as in Hungary (Figure 1.26, panel 3). This development is critical where the ability of the local investor base to absorb new debt may be insufficient, such as in Hungary, Indonesia,

Mexico, and Poland.[32] Even though foreign currency exposure may not have increased for many emerging market economies, the increased role of foreign investors in local bond markets creates an implicit debt-rollover risk, which can be loosely described as "original sin 2.0."

The dramatic moves in commodity prices and the exchange rates of many emerging market economies over the past six months have already had a significant impact on market valuations for emerging market corporations (Figure 1.24, panel 3). For some central and eastern European countries, such as Poland, the high share of foreign-currency-denominated or -linked debt built up during the precrisis period also makes them vulnerable to depreciation against other currencies, such as the Swiss franc. Since the end of June 2014, financial markets have reassessed equity valuations for firms in Brazil, Colombia, Malaysia, Mexico, Nigeria, Peru, Russia, and South Africa with the increase in the volatility of their currencies (Figure 1.27). For emerging markets more generally, higher volatility and loss of market confidence can cause a sharp reduction in secondary market liquidity of emerging market assets and fast depreciation of local currencies, similar to what has been observed in Russia since the introduction of economic and financial sanctions (Box 1.2).

Banks have large exposures to the corporate sector in countries with significant corporate debt at risk

A significant share of debt in Argentina, Brazil, China, India, Nigeria, and Turkey is owed by firms with relatively constrained repayment capacity in terms of interest-coverage ratios[33] (Figure 1.28, panel 1), and in Turkey a significant share of this debt is in foreign currencies (Figure 1.26, panel 2). The exposure of banks to the nonfinancial corporate sector is particularly high in some emerging market economies. In 11 of the 21 emerging market banking systems analyzed here, more than half of the bank loan books consist of loans to firms, rendering them more exposed to corporate weakness, particularly in Nigeria, Peru, Turkey, and Ukraine (Figure 1.28, panel 2). Although it is difficult to match the precise exposure of banks to firms, the higher the overlap of these two metrics, the more

---

[31]The existence of foreign currency hedges, financial (via financial derivatives) or natural (via offshore revenues), are significant offsetting factors to foreign currency risks of emerging market firms. Nevertheless, disclosures and data availability for such hedges are difficult to obtain or estimate.

[32]See the October 2012 *Global Financial Stability Report*, Chapter 1, for an analysis of the absorptive capacity of banks and asset managers in emerging market economies.

[33]Defined as the ratio of earnings before interest, taxes, depreciation, and amortization to interest expenses.

Figure 1.28. Financial Stability of Emerging Market Banks

Nigeria, India, Turkey, and Brazil among others have a large share of corporate debt-at-risk.

1. Corporate Debt-at-Risk
   (Percent)
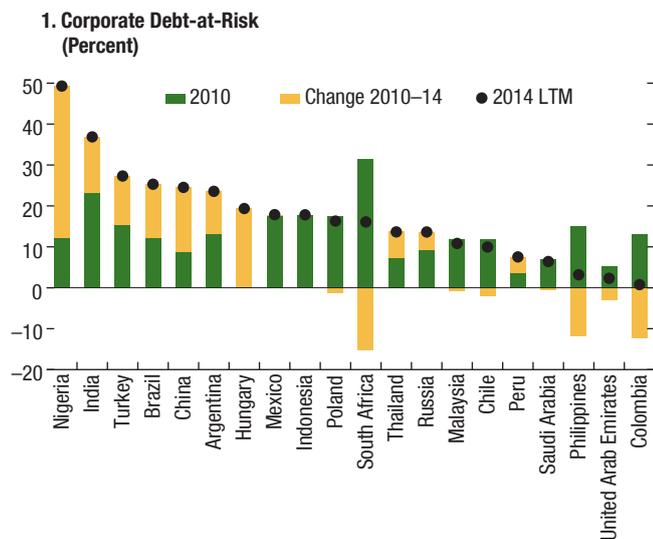
Banks in Nigeria, Ukraine, Turkey, and Peru are highly exposed to nonfinancial firms.

2. Bank Loans to Nonfinancial Corporations
   (Share of total loans; percent)
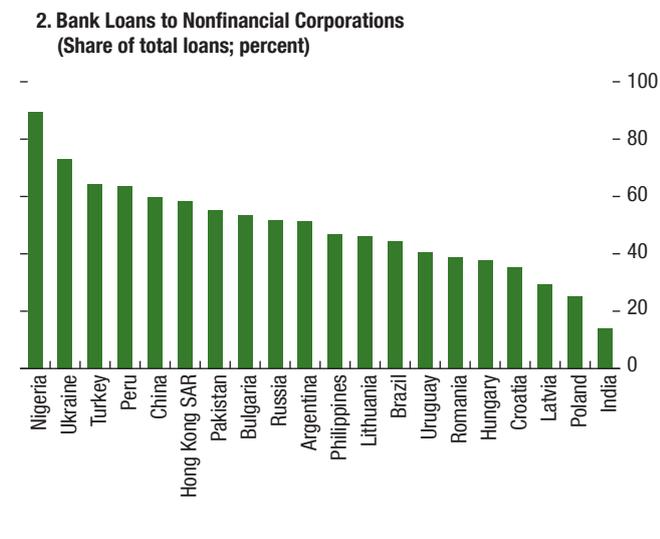
Sources: S&P Capital IQ; and IMF staff calculations.
Note: Debt-at-risk is the share of corporate debt held by the "weak firms" or those with interest coverage ratios (EBITDA divided by interest expense) less than two. A sample of more than 10,000 firms was used. EBITDA = earnings before interest, taxes, depreciation, and amortization; LTM = last 12 months.

Sources: IMF, Financial Soundness Indicators; and IMF staff calculations.

Banking buffers vary considerably among emerging market economies, and loan-to-deposit ratios have increased in places.

3. Loss-Absorbing Buffers
   (Share of risk-weighted assets; percent)

4. Banking System Loan-to-Customer-Deposit Ratio
   (Percent)
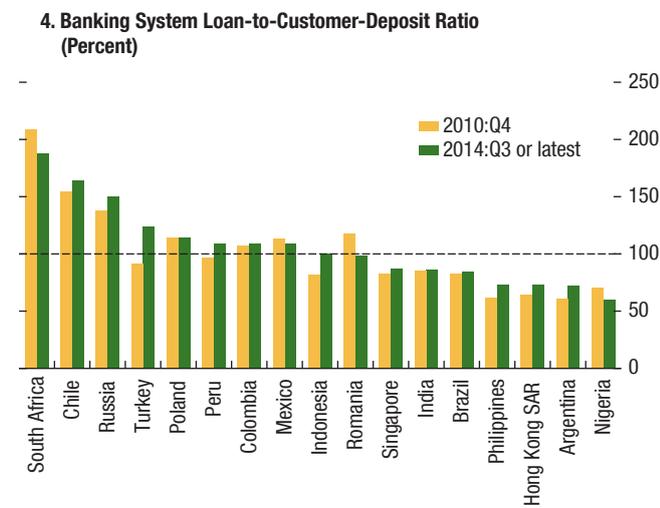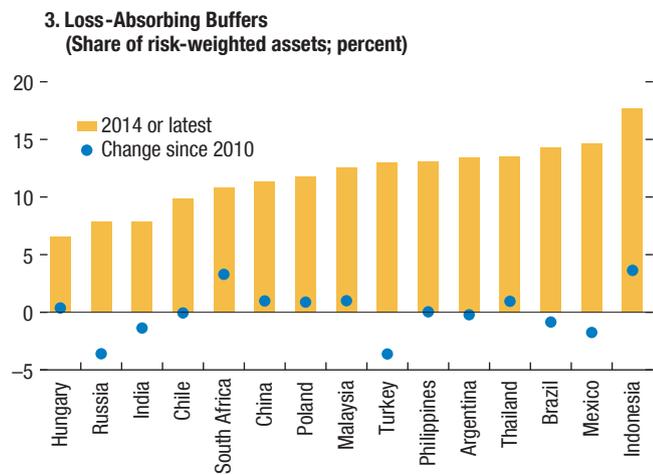
Sources: IMF, Financial Soundness Indicators; and IMF staff calculations.
Note: Loss-absorbing buffers = (Tier 1 capital + loan loss reserves – NPL)/(risk weighted assets). Data are for 2014 or latest available (2013 for China, Poland, and Thailand). NPL = nonperforming loan.

Source: IMF, Financial Soundness Indicators.
Note: Does not include interbank loans. Dashed line corresponds to 100 percent level.

significant the risks of bank asset deterioration from weaknesses in the corporate sector.

The broader impact of a sudden deterioration in corporate health depends on the capacity of banks to absorb losses and continue providing liquidity, given

that domestic banks still play the primary financing role in emerging market economies. An assessment of different measures of bank health is provided in Table 1.5. Bank balance sheets appear healthy in most emerging market economies, but some vulnerabilities are still

Table 1.5. Summary of Sovereign, Corporate, and Banking Indicators

		Macroeconomy				Commodity Exposure				Corporate Sector			
		CPI (Percent year-over-year, 2015 forecast)	Deviation of CPI from Central Bank's Inflation Target/Middle of Band (Percentage points)	Policy Rate (Percent)	2015 Growth Forecast (Percent)	Commodity Exports/Total Exports (Percent)[1]	Oil Exports/Total Exports (Percent)[1]	Commodity-Related Share of Corporate Sector (Percent)[2]	Oil-Related Share of Corporate Sector (Percent)[2]	Share of Debt at Risk (Percent)[3]	Share of Debt at Risk after Shock (Percent)[3]	Private Nonfinancial Sector FX Debt/GDP (Percent)	Nonfinancial Corporate Total Debt/GDP (Percent)
Latin America	Brazil	8.0	3.5	12.75	–1.0	52	7	25	20	25.3	37.0	15.1	46.9
	Chile	2.9	–0.1	3.00	2.7	47	1	26	6	10.0	22.4	39.4	—
	Colombia	3.6	0.6	4.50	3.4	69	47	45	33	0.8	2.5	9.9	—
	Mexico	3.1	0.1	3.00	3.0	20	12	39	30	17.9	19.4	—	20.9
Asia	China	1.2	–2.3	2.50	6.8	4	1	29	17	24.5	31.2	—	149.9
	India	5.8	–0.2	7.50	7.5	25	14	23	13	36.9	49.9	13.6	47.5
	Indonesia	4.6	0.6	7.50	5.2	54	7	36	18	17.8	45.7	15.3	21.7
	Malaysia	2.7	—	3.25	4.8	32	12	33	28	10.8	24.2	—	96.9
	Philippines	2.4	–0.6	4.00	6.7	15	2	9	5	3.2	31.5	—	—
	Singapore	0.8	—	—	3.0	—	—	—	—	—	—	—	80.7
	Thailand	2.1	–0.4	1.75	3.7	20	5	47	31	13.7	17.5	—	53.7
Europe, Middle East, Africa	Bahrain	1.5	—	0.50	2.7	82	68	37	—	2.1	2.1	—	—
	Hungary	1.7	–1.3	1.95	2.7	13	2	—	—	—	—	—	85.2
	Nigeria	12.0	—	13.00	4.8	91	81	60	35	49.3	51.9	—	—
	Poland	0.4	–2.1	1.50	3.5	16	2	32	18	16.3	23.9	32.5	44.2
	Russia	12.0	7.5	14.00	–3.8	68	48	53	46	13.6	16.0	22.9	49.2
	Saudi Arabia	2.0	—	2.00	3.0	83	81	50	5	6.4	6.4	—	13.0
	South Africa	5.0	0.5	5.75	2.0	34	3	28	6	16.1	20.2	16.4	32.6
	Turkey	7.0	2.0	7.50	3.1	13	3	12	7	27.3	31.0	29.6	50.8
	United Arab Emirates	2.2	—	1.00	3.2	32	29	11	8	2.3	4.0	—	—

(continued)

Table 1.5. Summary of Sovereign, Corporate, and Banking Indicators (continued)

		External Vulnerabilities						Banking Sector		
		Current Account (Percent of GDP, 2015 forecast)	Reserves/ Short-Term External Financing Requirements[4]	Nonresident Holdings of Domestic Government Debt (Percent of all domestic government debt)	Change in Currency since June 30 (Percent)[5]	Weight in EMBIG (Percent)[5]	Sovereign Credit Default Swap Spreads (Basis points)[5]	Nonperforming Loans (Percent)[6]	Loan-to-Deposit Ratio (Percent)[6]	Loss-Absorbing Buffers (Percent)[6]
Latin America	Brazil	−3.7	1.9	20.1	−32.5	6.7	250	2.9	84.3	14.3
	Chile	−1.2	1.2	—	−12.7	2.6	89	2.2	163.7	10.0
	Colombia	−5.8	1.1	14.6	−32.0	3.2	151	2.8	109.1	—
	Mexico	−2.2	1.2	38.5	−17.8	12.9	115	2.9	108.9	14.7
Asia	China	3.2	6.2	—	−1.0	5.0	84	1.1	56.5	11.3
	India	−1.3	2.0	—	−3.2	0.4	—	4.0	86.1	7.9
	Indonesia	−3.0	1.2	38.1	−8.9	7.8	145	2.1	100.2	16.6
	Malaysia	2.1	1.0	47.3	−12.8	1.3	138	1.8	82.0	12.5
	Philippines	5.5	7.8	—	−1.0	4.6	85	2.4	73.4	13.1
	Singapore	20.7	—	—	−10.0	0.0	—	0.9	—	—
	Thailand	4.4	2.3	18.6	−0.4	0.0	98	2.2	109.4	13.5
Europe, Middle East, Africa	Bahrain	−2.1	7.9	—	0.0	0.0	278	4.6	46.0	—
	Hungary	4.8	2.1	34.1	−22.0	2.8	115	16.6	—	—
	Nigeria	0.7	—	—	−20.5	0.2	—	3.2	59.9	—
	Poland	−1.8	0.7	40.0	−22.6	2.1	59	4.9	114.1	11.8
	Russia	5.4	6.7	24.3	−57.6	8.1	454	6.5	149.9	7.8
	Saudi Arabia	−1.0	18.6	—	0.0	0.0	73	1.3	78.1	16.8
	South Africa	−4.6	0.9	36.0	−12.4	2.5	203	3.4	187.7	10.8
	Turkey	−4.2	0.6	21.8	−21.4	7.4	218	2.7	124.0	13.0
	United Arab Emirates	5.3	—	—	0.0	0.0	—	7.3	97.0	—

Sources: Bank for International Settlements; Bloomberg, L.P.; JPMorgan Chase & Co; S&P Capital IQ; UN Comtrade; IMF, World Economic Outlook database; IMF, Financial Soundness Indicators; and IMF staff calculations.

Note: CPI = consumer price index; EBITDA = earnings before interest, taxes, depreciation, and amortization; EMBIG = Emerging Markets Bond Index Global; FX = foreign currency; NPL = nonperforming loan.

[1] 2013 COMTRADE data. Commodity exports using codes 0–4 from Standard International Trade Classification, Revision 3. Oil exports using code 33.

[2] According to available firms from S&P Capital IQ, weighted by assets.

[3] Percentage of firms with interest coverage (EBITDA/interest expense) ratio below 2. The shock is composed of a 25 percent increase in borrowing costs, 20 percent appreciation of the U.S. dollar, and 25 percent reduction in earnings of energy firms.

[4] Short-term external financing requirement is defined as short-term debt maturities plus current account deficit.

[5] Market data is as of March 6.

[6] As of 2014:Q3 or latest available data. Loss-absorbing buffers is (Tier 1 capital + loan loss reserves − NPL)/(risk-weighted assets), 2014 data, except for China, Poland, and Thailand (2013).

Box 1.2. Russia's Financial Risks and Potential Spillovers

Russia's economic outlook has deteriorated significantly under the combined shocks of sanctions and the sharp drop in the price of oil—interest rates are higher, the ruble has depreciated, and the government has lost its investment-grade credit rating. These developments threaten a further deterioration in asset quality and possible financial spillovers.

Foreign portfolio outflows amounted to $21 billion in the first nine months of 2014 ($13 billion of which was in equities), taking the stock of total foreign portfolio investment down to $225 billion. In the same period, Russians increased their portfolio investments abroad by $10 billion, to $63 billion.

External debt is not insignificant (at $599 billion as of December 2014). But the short-term repayment burden—$74 billion is due April–December 2015 (Figure 1.2.1), of which 61 percent is due to the corporate sector and 36 percent to banks— represents only one fifth of foreign exchange reserves ($352 billion as of the end of March). And the public and private sectors hold significant assets abroad (including $61 billion in portfolio assets, $184 billion in

The authors of this box are Allison Holland and Luigi Ruggerone.

Figure 1.2.2. Russian Banking System Key Financial Soundness Indicators
(Percent)
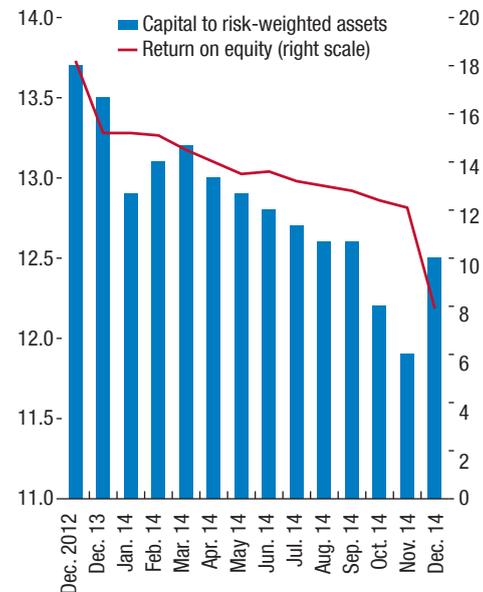
Source: Central Bank of Russia.

Figure 1.2.1. Russian External Debt Amortization Schedule
(Billions of U.S. dollars)
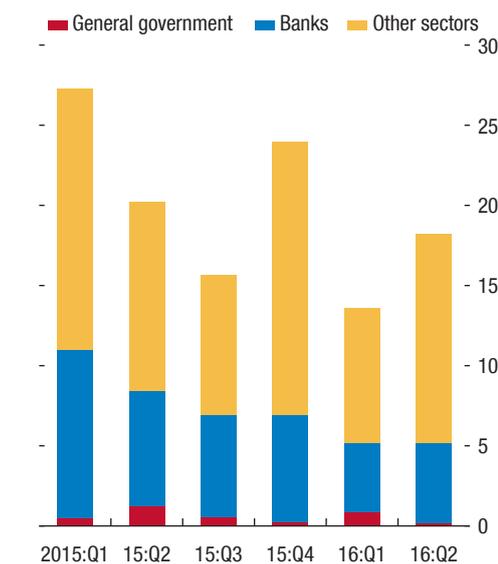
Source: Central Bank of Russia.

currency and deposits, and $32 billion in short-term loans at the end of December) that can be liquidated as needed. Nevertheless, as a consequence of the escalation of geopolitical tensions, lower oil prices, and sanctions, Russia's sovereign and corporate spreads have risen sharply, reflecting the market's perception of increased credit risk.

From a financial stability perspective, the Russian banking sector deserves close attention. Solvency risks in the sector appear contained overall, but some pressure is evident: nonperforming loans increased steadily through 2014 (to 6.7 percent as of the end of December) and profitability declined (Figure 1.2.2). Liquidity risk also appears relatively contained to date—overall deposits grew through 2014, with central bank funding representing 12 percent of liabilities as of the end of 2014; however, this may prove more challenging in the future. With a loan-to-deposit ratio of 150 percent, the sector is heavily dependent on wholesale market financing, and rolling over in external markets the foreign financing that comes due in 2015 ($37 billion) will not be possible for the seven sanctioned banks that account for about 75 percent

Box 1.2. *(continued)*

of Russian bank assetsAlthough the Russian banking sector weathered the crisis of 2009 (when conditions were arguably tougher), and official sector support can be expected to continue, a significant deterioration in asset quality or earnings or a liquidity shock at a large bank could signal a more systemic problem.

Direct financial linkages between Russia and the rest of the world are fairly limited, but the indirect connections with neighboring countries raise more serious global financial stability concerns. Foreign bank exposures to Russia have been reduced. But the stability of the European banking system could become significantly stressed should geopolitical concerns boost investors' risk aversion, which would lead to a stronger dollar and higher rates. This could cause Russia's intensified difficulties to spill over to central and eastern European countries, to which some large European banking systems are highly exposed (Figure 1.2.3).

Figure 1.2.3. Foreign Bank Exposures
(Billions of U.S. dollars)
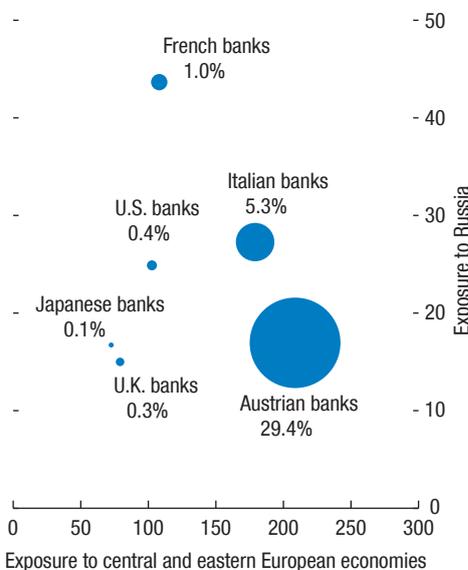
Sources: Bank for International Settlements (BIS); Bank of Japan; European Central Bank; and IMF staff estimates.
Note: Size of bubbles is exposure (BIS Table 9D) to central and eastern European economies as a percentage of total assets.

present. Loss-absorbing buffers appear particularly low in Chile, Hungary, India, and Russia (between 5 and 10 percent of risk-weighted assets; Figure 1.28, panel 3), and deterioration in loan quality could threaten capital levels. Furthermore, in India, Russia, and Turkey loss-absorbing buffers have deteriorated quite substantially in recent years. System-wide Tier 1 ratios for most emerging market economies are above 10 percent. However, the countries with the lowest ratios are China, India, and Russia, which account for about 70 percent of the aggregate banking system assets in this sample of banks. Buffers are still fairly low in some commodity-sensitive economies (such as Russia), while some banking systems are also sensitive to dollar funding and tighter liquidity conditions. This sensitivity could in turn put pressure on banks' funding channels, with many countries exhibiting high levels of loan-to-deposit ratios, including Chile, Russia, South Africa, and Turkey (Figure 1.28, panel 4). Finally, although regulatory caps mean that banks' direct currency exposures are generally limited, vulnerabilities

could yet arise via increasing nonperforming loans in places where firms have a high proportion of foreign currency debt.

Policies to mitigate risks

Emerging markets generally should aim to cushion the impact of global headwinds and disinflationary forces where possible, for example, by allowing exchange rate adjustment if it does not jeopardize smooth market functioning, or if the currency is already significantly undervalued, by boosting reserves, or by applying policies to increase macroeconomic policy space and buffers. Furthermore, countries ought to safeguard the resilience of the financial system through enhanced surveillance of vulnerable sectors.

In China, the overall priority must be to allow an orderly correction of excesses. This will require policies to play a dual and finely balanced role. Policies should contribute to a financial rebalancing, curtailing the riskiest parts of shadow banking. Policies should also

facilitate corporate deleveraging and the transparent recognition of costs arising from the exit of nonviable firms. Authorities should discourage the financing of nonviable borrowers, which will require tolerating more defaults, including in public bond markets. Orderly deleveraging requires comprehensive policies that allow a gradual slowdown in credit growth and, where necessary, provides mechanisms for orderly debt restructuring. Given China's outsized level of gross corporate debt and its importance to the global economy, managing this process smoothly will be critical in order to minimize the macroeconomic headwinds it could create.

Across emerging markets more generally, the large portion of debt denominated in foreign currencies as well as in specific sectors, such as energy firms, means that micro- and macroprudential measures have an important role to play in limiting the risks from shocks, and authorities need to enhance supervision of these sectors. The relevant macroprudential tools include higher risk weights (capital requirements) for corporate foreign currency exposures as well as caps on the share of such exposures on banks' balance sheets. In the likely case of leakage, consideration should also be given to changes in the tax code that remove fiscal incentives in favor of debt or that penalize foreign currency debt (see also IMF 2014b). To avoid these measures from becoming procyclical, they should be introduced cautiously and with sufficient phase-in periods. At the microprudential level, regulators need to conduct bank stress tests related to foreign currency

risks and regularly monitor corporate foreign currency exposures, including derivatives positions. The hedges employed by corporations to limit their exposure risks may be compromised when most needed, so regulators should assess them conservatively. These macroprudential and microprudential measures can be usefully complemented by flexible exchange rates. Flexible exchange rates can aid the adjustment to shocks and facilitate an independent monetary response to credit booms. They can also discourage banks and corporations from building up large foreign exchange exposures in the first place. Renewed efforts by authorities globally to collect and provide better information on foreign currency corporate indebtedness and offsetting factors (such as hedges) is also desirable.

To ensure properly functioning markets, authorities need to adopt and enforce policies that protect against lapses of liquidity in local bond markets. This calls for country authorities to potentially use cash balances when needed or to lower the supply of long-term debt to the market to help curtail bond spread increases. Policymakers can also adopt crisis management tools that allow the smooth functioning of markets, by using bilateral and multilateral swap line agreements to help reduce excess volatility in currency markets and provide foreign currency funding in times of stress. Multilateral resources, such as IMF facilities, could also provide additional buffers. Overall, keeping emerging market economies resilient calls for authorities to maintain a strong focus on domestic vulnerabilities, as noted in previous *Global Financial Stability Report* issues.

Annex 1.1. Progress on the Financial Regulatory Reform Agenda

The main elements of the Financial Regulatory Reform Agenda—capital, leverage, and liquidity—have been substantially agreed to. This accomplishment achieves a key postcrisis goal of strengthening the regulatory framework for banks.[34] Progress on the implementation of the agenda, however, is uneven: several areas require significant movement forward. Further, the stakeholders need to devote more resources to monitoring implementation.

The last important element of the liquidity framework for banks—the net stable funding ratio (NSFR)—was finalized in late 2014. It requires banks to maintain a stable funding profile in relation to their on- and off-balance sheet activities to address a vulnerability that fueled the systemic stress in the global financial crisis. The NSFR complements the liquidity coverage ratio (LCR), which targets short-term liquidity risks and came into force on January 1, 2015. The Basel Committee for Banking Supervision (BCBS) reports significant progress in meeting both of these standards well ahead of implementation dates.

The BCBS is now able to direct its attention to outstanding regulatory concerns, such as restoring the credibility of risk-weighted assets. Aligned with the Group of 20 (G20) objectives, the recently published proposals on the standardized approach to credit risk would reduce reliance on external credit ratings. Once finalized, amendments to the calibration of the risk weights should help enhance risk sensitivity and comparability with the internal ratings-based (models-based) approach to credit risk. Importantly, the BCBS wishes to ensure the standardized approach is suitable for a wider range of jurisdictions and banks, not just the main financial centers and internationally active institutions.

The BCBS has finalized revisions to the securitization framework that enhance risk sensitivity and reduce the mechanistic reliance of capital requirements on external ratings. Work is also progressing on criteria for identifying simple, transparent, and comparable securitizations, which should help support a sustainable securitization market.

The reform agenda has taken steps to address the too-big-to-fail problem. First, once finalized, international agreement on total loss-absorbing capacity (TLAC) should support orderly resolution of global systemically important banks (G-SIBs) without recourse to public funds, by setting minimum standards on the amounts and characteristics of capital and "bail-inable" debt that banks must issue. Second, 18 G-SIBs recently signed the new International Swaps and Derivatives Association Resolution Stay Protocol that suspends early termination and cross-default rights in over-the-counter (OTC) derivatives contracts during resolution. Nonetheless, resolution reforms remain a work in progress. Further action is needed in many jurisdictions to (1) make large, complex firms more resolvable and agree to "living wills"; (2) align legal frameworks with international best practice in resolution; (3) reduce legal and practical impediments to effective cross-border resolution; and (4) develop policies for the recovery and resolution of key nonbank intermediaries such as central counterparties.

Although the nonbank financial sector has seen some progress from the reform agenda, movement forward continues to lag in other areas. The International Association of Insurance Supervisors has finalized the Basic Capital Requirement for global systemically important insurers, and the insurance capital and higher loss-absorption capacity requirements are under development. The Financial Stability Board (FSB) released a second public consultation draft on methodologies to identify nonbank and noninsurer global systemically important financial institutions in March 2015. The FSB is continuing to finalize minimum haircut requirements on securities lending and repurchase agreements after the end of the consultation period in December 2014.

The reform agenda has seen some progress on the application of new OTC derivatives rules across borders, partly by deferring to home country regulatory regimes. In October 2014, the European Commission deemed that central counterparty (CCP) regimes in four jurisdictions are equivalent to European Union requirements. In December, the U.S. Commodity Futures Trading Commission extended the deadlines for requiring certain foreign CCPs to register in the United States until late 2015. However, agreement on important decisions, in particular between the United States and the European Union, remains elusive and perpetuates regulatory uncertainty for industry players.

Annex prepared by Katharine Seal, Michaela Erbenova, Alvaro Piris, Nobuyasu Sugimoto, and Eija Holttinen.

[34]This was the conclusion of the Financial Stability Board (FSB), as reported to the Leaders of the Group of 20 (G20) at the Brisbane Summit.

Annex 1.2. External Portfolio Rebalancing under Quantitative Easing in the Euro Area and Japan

This annex considers portfolio rebalancing for the euro area and Japan for three scenarios. This exercise is partial and does not incorporate exchange rate effects.

Euro area

Under the "baseline," euro area nonbank investors could allocate nearly €1.2 trillion abroad by the end of 2015 (Table 1.2.1). This figure could rise or fall, depending on the attractiveness of euro-denominated assets. A negative shock in the absence of additional policy action to strengthen bank balance sheets ("downside") could be expected to increase outflows to nearly €1.3 trillion (an additional 10 percent), whereas additional policy measures ("QE-Plus") could be expected to lower outflows to about €1.1 trillion (a symmetric decline of 10 percent).

Here, it is assumed that, at a minimum, the nonbank investor portion of the €2.4 trillion in negative yielding European government bonds (EGBs) will be rebalanced into alternative assets (Figure 1.2.1). Based on the Euro-

Annex Table 1.2.1. Potential Portfolio Outflows by Euro Area Investors, 2015
(Billions of euros)

	Baseline	QE-Plus	Downside
Total	1,177	1,059	1,294
held by			
Foreign	819	737	901
Pension and			
Insurance	233	210	256
Firms	125	112	137
Destination			
United States	421	379	463
Other Advanced			
Economies	482	434	530
Emerging Markets	131	118	144
Other	142	128	157

Sources: Bloomberg, L.P.; European Central Bank; IMF, Consolidated Portfolio Investment Survey (CPIS); and IMF staff estimates.
Note: The downside scenario assumes an additional 10 percent in portfolio outflows, which is consistent with a return to the euro's share of international reserves holdings (based on IMF Composition of Foreign Exchange Reserves data) at the onset of Economic and Monetary Union from the peak reached in 2009 (namely from 27 to 17 percent). For simplicity, a symmetric 10 percent is assumed for the QE-Plus scenario. As in Figure 1.10, foreign-currency-denominated flows are determined by European insurer asset allocations as of 2013, while destinations are based on data for 2013 international portfolio flows (CPIS). Emerging markets comprise Argentina, Brazil, Chile, China, Colombia, Hong Kong SAR, Hungary, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, and Turkey. Other advanced economies comprise Australia, Canada, Denmark, Japan, New Zealand, Norway, Sweden, Switzerland, and the United Kingdom. QE = quantitative easing.

The authors of this annex are Ali Al-Eyd and Serkan Arslanalp.

pean Central Bank's (ECB's) government bond holding statistics, nonbank investors hold about €1.8 trillion (70 percent) of these negative yielding bonds, while banks—and national central banks (NCBs)—hold the remaining €600 billion. From an asset-liability management point of view, there is little reason to expect institutional investors to maintain a negative carry on these assets. Similarly, it is assumed that the other domestic nonbank and foreign investors will also forego holding negative yielding assets. However, banks are assumed to either sell their EGBs to the ECB, or hold on to them for regulatory reasons.

The international allocation of assets by institutional investors is based on current domestic and foreign currency investment allocations, implying that under the "baseline" about one-third (€630 billion) will be rebalanced into euro-denominated assets (namely high-yield corporate bonds) and the rest (€1.2 trillion) will be rebalanced into foreign assets. Based on data on international investment positions, about €420 billion of this could end up in U.S. dollar assets, €480 billion in other advanced economies, and €130 billion in emerging market economies.

Japan

Calculations indicate that Japanese financial institutions could shed ¥165 trillion of Japanese government bonds (JGBs) by the end of 2017, given the pace of the central bank's purchases under the second round of quantitative and qualitative easing (QQE2) and additional debt issuance by the government. In particular, Japanese insurance companies and pension funds could shed ¥55 trillion of government bonds, while banks could sell another ¥110 trillion by the end of 2017, which would bring their sovereign exposure closer to international levels (Table 1.2.2).

This "baseline" scenario considers three types of investors—domestic banks, insurance companies, and pension funds—which own nearly 80 percent of JGBs in private hands, and makes the following assumptions:

- Domestic banks are assumed to reduce their JGB holdings to 5 percent of assets by 2017, in line with bank sovereign exposures in other Group of Seven (G7) economies (excluding Italy). Japan Post Bank reduces its domestic bond holdings to 35 percent of assets, in line with the Government Pension Investment Fund's (GPIFs) new allocation to domestic bonds.
- Insurance companies broadly follow the GPIF as a benchmark and reduce their exposure to government bonds to 35 percent of total assets, a drop of ¥40 trillion.

Annex Figure 1.2.1. Euro Area Negative-Yielding European Government Bonds and Baseline Portfolio Rebalancing

Expectations of quantitative easing drove some core yields negative.

Rebalancing under the baseline scenario.
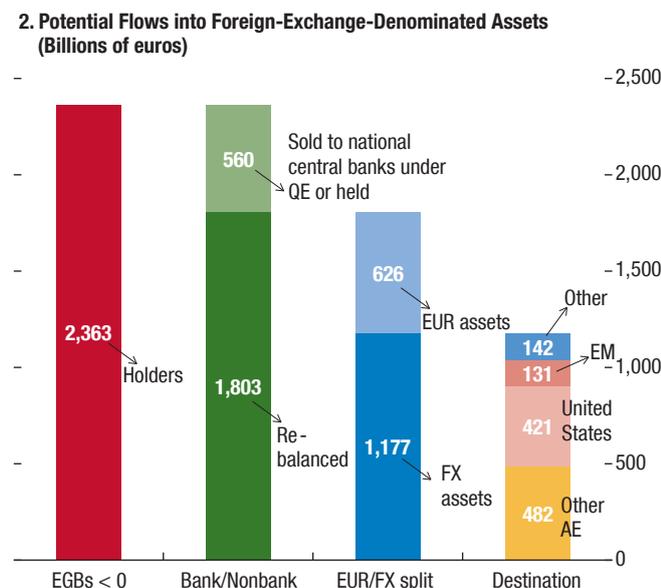
1. Sovereign Yields: Euro Debt–Weighted Yield Curve (Percent)

2. Potential Flows into Foreign-Exchange-Denominated Assets (Billions of euros)

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

Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: AE = advanced economies; EGB = European government bond; EM = emerging markets; EUR = euro area; FX = foreign exchange; QE = quantitative easing. See Figure 1.10 panel 2 for country groupings.

- Pension funds are assumed to follow the GPIF's lead, reducing their domestic bond holdings to 35 percent of assets through a reduction of JGB holdings.
- The outstanding stock of JGBs rises in line with the latest *World Economic Outlook* fiscal projection and the BOJ buys ¥80 trillion of JGBs every year, as announced under QQE2.

As a result of this portfolio rebalancing, insurance companies and pension funds could invest as much as ¥42 trillion ($350 billion), or 8 percent of GDP, in foreign assets (Table 1.2.3). This scenario is in line with the pace of their portfolio rebalancing abroad over the last year and the GPIF's new target allocation announced in late 2014. If the insurance companies and pension funds maintain present international allocation ratios,

Annex Table 1.2.2. Japan: A Potential Portfolio Rebalancing Scenario under QQE2, 2015–17
(Trillions of yen)

	End-2014	End-2017	Change
Bank of Japan's JGB Holdings	207	447	240
Other Financial Institutions' JGB Holdings	505	340	−165
Pension Funds (public and private)	92	78	−14
Insurance Companies	199	159	−40
Domestic Banks (major and regional)	105	50	−55
Japan Post Bank	110	53	−57
Memo Items:			
Outstanding Stock of JGBs	828	903	75

Sources: Bank of Japan (BOJ); Japan Post Bank; Ministry of Finance; and IMF staff projections.
Note: Pension fund holdings of domestic bonds decline to 35 percent of assets by a reduction in JGB holdings in line with the GPIF's new target allocation. Similarly, insurance company holdings of JGBs and Japan Post Bank holdings of domestic bonds decline to 35 percent of total assets. Domestic bank holdings of JGBs decline to 5 percent of total assets (benchmark: other advanced economies). The BOJ buys 80 trillion yen of JGBs on a net basis every year, as announced under QQE2. Outstanding stock of JGBs rises in line with *World Economic Outlook* fiscal projections. GPIF = Government Pensions Investment Fund; JGB = Japanese government bond; QQE = quantitative and qualitative easing.

Annex Table 1.2.3. Potential Portfolio Outflows by Japanese Institutional Investors, 2015–17
(Billions of U.S. dollars)

	Baseline	QE-plus (complete policies)	Downside
Insurance Companies	100	275	0
Private Pensions	25	58	0
Public Pensions	225	225	225
Total	**350**	**559**	**225**

Source: IMF staff projections.
Note: All figures are expressed at end-2014 exchange rates. Under the baseline scenario, insurance companies and pension funds continue their portfolio rebalancing abroad at the same pace as since 2012:Q3. Under the complete policies/QE-plus scenario, insurance and private pension funds accelerate their portfolio rebalancing abroad at twice the pace as baseline. Under the downside scenario, they stop their portfolio rebalancing abroad. QE = quantitative easing.

80 percent of the outflow would go into bonds of other advanced economies, 14 percent into emerging market bonds, and 6 percent into global equities.

This baseline scenario assumes a significant but partial implementation of the other two arrows of Abenomics (fiscal and structural reforms). If announced policies are fully implemented and work to their fullest extent across the three reform arrows (the "QE-plus" scenario, also referred to as the "complete policies" scenario), portfolio outflows could be as much as $550 billion, as insurance and private pension funds accelerate their portfolio rebalancing abroad (Table 1.2.3). Alternatively, if the other two reform arrows are not effectively deployed and efforts at pulling the economy out of deflation are not successful ("downside" scenario), portfolio outflow could be less than anticipated, as private financial institutions continue to demand JGBs as a hedge against deflation. This would imply a partial return to the status quo before Abenomics when home bias of Japanese institutional investors was strong and portfolio outflows were limited. In this case, portfolio outflows could be limited to $225 billion by end-2017.

References

Bank of England. 2012. "The Role of Designated Market Makers in the New Trading Landscape." *Quarterly Bulletin* Q4: 343–53.

Barisitz, Stephan. 2013. "Nonperforming Loans in Western Europe—A Selective Comparison of Countries and National Definitions." *Focus on European Economic Integration* (1): 28–47.

Baum, Anja, Cristina Checherita, and Philipp Rother. 2013. "Debt and Growth: New Evidence from the Euro Area." *Journal of International Money and Finance* 32: 809–21.

Bergthaler, Wolfgang, Kenneth Kang, Yan Liu, and Dermot Monaghan. 2015. "Tackling Small and Medium Sized Enterprise Problem Loans in Europe." Staff Discussion Note 15/04, International Monetary Fund, Washington.

Bornhorst, Fabian, and Marta Ruiz Arranz. 2013. "Indebtedness and Deleveraging in the Euro Area." Country Report 13/232, International Monetary Fund, Washington.

Bouveret, Antoine, Peter Breuer, Yingyuan Chen, David A. Jones, and Tsuyoshi Sasaki. Forthcoming. "Fragilities in U.S. Treasury Markets and Lessons from the Flash Rally of October 15, 2014." IMF Working Paper, International Monetary Fund, Washington.

Cecchetti, Stephen G., Madhusudan S. Mohanty, and Fabrizio Zampolli. 2011. "The Real Effects of Debt." Working Paper 352, Bank for International Settlements, Basel.

Chen, Sally, Minsuk Kim, Marijn Otte, Kevin Wiseman, and Aleksandra Zdzienicka. 2015. "Private Sector Deleveraging and Growth Following Busts." Working Paper 15/35, International Monetary Fund, Washington.

Chicago Mercantile Exchange. (2010). "Algorithmic Trading and Market Dynamics." Chicago Mercantile Exchange Group. July 15.

Dattels, Peter, Rebecca McCaughrin, Ken Miyajima, and Jaume Puig. (2010). "Can You Map Global Financial Stability?" IMF Working Paper No. 10/145 (Washington: International Monetary Fund).

Draghi, M. 2015. *"Speech at The ECB and its Watchers XVI Conference."* Frankfurt, March 11.

EIOPA, 2014a. "EIOPA Insurance stress test 2014." EIOPA-BOS-14-203, November 28.

EIOPA, 2014b. "Low interest rate environment stock taking exercise 2014." EIOPA-BoS-14/103, 28 November 2014.

Elekdag, Selim, Faezeh Raei, Jérôme, Vandenbussche, and Vanessa Le Leslé. 2014. "Selected Issues: Germany." Country Report 14/217, International Monetary Fund, Washington.

European Banking Authority (EBA). 2015. "Overview of the Potential Implications of Regulatory Measures for Banks' Business Models." London.

European Central Bank (ECB). 2012. "Corporate Indebtedness in the Euro Area." *Monthly Bulletin* (February): 87–103.

———. 2015. "Box 1: The Governing Council's expanded asset purchase programe." *Economic Bulletin,* January 2015.

European Insurance and Occupational Pensions Authority (EIOPA). 2013. "Financial Stability Report," Second Half-Year Report, Autumn.

Hüttl, Pia, and Guntram B. Wolff. 2014. "What is Behind the Reduction of Private Sector Debt? Comparing Spain and the UK." Bruegel (blog).

International Monetary Fund (IMF). 2014a. Euro Area Article IV Consultation14/198, Washington.

———. 2014b. "Staff Guidance Note on Macroprudential Policy." Washington.

Jassaud, Nadège, and Kang, Kenneth. 2015. "A Strategy for Developing a Market for Nonperforming Loans in Italy." Working Paper 15/24, International Monetary Fund, Washington.

Kim, D. H., and J. H. Wright. 2005. "An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates," Finance and Economics Discussion Series (FEDS): 2005–33 (Washington: Federal Reserve Board).

Kumar, M., and J. Woo. 2010. "Public Debt and Growth." Working Paper 10/174, International Monetary Fund, Washington.

Pericoli, Marcello, and Sbracia Massimo. 2004. "A Primer on Financial Contagion." *Journal of Economic Surveys* 17 (4): 571–608.

Reinhart, Carmen M., and Kenneth S. Rogoff. 2010. "Growth in a Time of Debt." *American Economic Review* 100 (2): 573–78.

Satio, Masashi and Yoshihiko Hogen. 2014. "Portfolio Rebalancing Following the Bank of Japan's Government Bond Purchases: Empirical Analysis Using Data on Bank Loans and Investment Flows." BOJ Reports & Research Papers, June.

Tabb, L. (2012). "Written Testimony to the United States Senate Committee on Banking, Housing, and Urban Affairs," CEO, TABB Group." September 20.

INTERNATIONAL BANKING AFTER THE CRISIS: INCREASINGLY LOCAL AND SAFER?

SUMMARY

Two developments stand out among the changes in international banking since the global financial crisis. First, direct cross-border lending as a share of total banking assets has declined, mostly because of the retrenchment of European banks. Second, the share of local lending by foreign bank affiliates has remained steady. Global banks in particular have refocused their activities on some key markets, leaving space for other banks to expand. As a result, intraregional financial linkages have deepened, especially in Asia.

Although the cutback in cross-border lending was triggered by the crisis, regulatory changes and weaknesses in bank balance sheets have contributed significantly to the subsequent retrenchment. Better-capitalized banks were more likely to maintain cross-border lending. Macroeconomic factors have also played a role.

The relative shift on the part of foreign banks away from cross-border lending and toward more local lending through affiliates has a positive effect on the financial stability of host countries. Cross-border lending compounds adverse domestic and global shocks. In contrast, foreign-owned subsidiaries, particularly those with better-capitalized parent banks, tend to behave less procyclically than domestic banks around domestic crises.

In principle, international banking has benefits that are not examined in this chapter. For example, global banks contribute to the allocation of global savings across countries, with positive effects on investment and growth. The reduction in cross-border lending may diminish some of those benefits.

Policymakers should therefore strive to maximize the benefits of international banking while mitigating risks. The findings of this chapter lend support to recent financial reforms that strengthen the resilience of global banks. They also emphasize the need for more international cooperation to deal with regional or global shocks.

Introduction

International banking has changed since the global financial crisis. Two developments stand out. International banks, especially European ones, have reduced their cross-border lending, that is, their direct lending to non-affiliated entities in other countries. At the same time, loans extended locally by banks' affiliates abroad have remained steady. Other changes include a retrenchment of international banks from certain market segments, the emergence of new actors to fill the resulting gaps, and some regionalization where global banks are replaced by ones with a more regional focus.

The drivers of these changes have been both internal and external to the banking sector. The sharp and prolonged process of deleveraging of banks and households since 2008 has had a strong effect on credit supply and demand. Large U.S. and European banks have been cleaning up their balance sheets and selling legacy assets while trying to reduce their reliance on less stable funding sources, such as short-term wholesale funding. At the same time, banks have been pressed by supervisors to shore up capital, while abstaining from reducing domestic credit supply. Different economic conditions across countries and recent financial reforms, such as those aiming at restricting certain types of operations by banks, as well as new capital and liquidity standards, have also affected banks' global operations and their organizational structure.

The reduction in cross-border banking flows can in principle have opposite effects on financial stability. The retrenchment in cross-border lending may reduce risk sharing and diversification for banking groups (Allen and others 2011), because investing or lending abroad allows banks to reduce their exposure to domestic shocks (Schoenmaker and Wagner 2011). From the perspective of recipient countries, cross-border lending may also lower the volatility of domestic credit because foreign banks, which are less exposed to domestic shocks, are more able to withstand local stress. Then again, cross-border flows are also likely to contribute to the transmission of foreign shocks and may thus increase volatility (Bruno and Shin, forthcoming; IMF 2014c). For example, deleveraging by international banks can reduce funding sources for banks in host countries. These banks in turn may be forced to contract lending even in the absence of domestic credit problems. Moreover, cross-border lending is often seen as less stable than local lending through local subsidiaries and branches (Schnabl 2012), partly because host

countries can restrict the ability of parent banks to withdraw liquidity from their subsidiaries.[1] The overall financial stability effect of the observed patterns of changes in global banking is therefore unclear without further examination.

This chapter provides a comprehensive picture of recent changes in international banking, analyzes what is driving those changes, and investigates the potential consequences for financial stability. The results should not be interpreted as providing a full cost-benefit analysis of the changing patterns of banking globalization. In particular, the role of international banks in the global allocation of savings and in contributing to financial deepening is not explored.[2]

The analysis finds that, jointly with bank balance sheet weaknesses, regulatory changes can explain a substantial portion of the decline in the ratio of cross-border claims to GDP between the precrisis and postcrisis periods. The results are based on data collected in a survey conducted specifically for this chapter. Macroeconomic factors, including monetary policy factors, have also played a role.

The financial stability implications of the relative shift away from cross-border lending and toward more local lending by branches and subsidiaries may be positive from the perspective of host countries. A comparison reveals that cross-border banking flows have historically been much more volatile and sensitive than portfolio flows to global financial conditions. Consequently, a reduction in their relative importance is likely to reduce the global transmission of volatility and contagion. The analysis also finds that cross-border lending is associated with a strong transmission of global shocks to domestic banking systems, and does not help dampen local shocks. By contrast, confirming existing findings in the literature, the chapter finds that local lending by foreign subsidiaries is more resilient in the face of domestic shocks.

The strengthening of regional linkages, particularly in Asia, implies a heightened exposure to shocks emanating from within the region. It also means that shocks originating outside the region can propagate faster within the region once they hit a country's

---

[1]The shift toward local funding may also enhance the effectiveness of monetary policy by tightening the link between domestic interest rates and credit supply (Forbes 2014).

[2]For example, foreign bank presence is also often associated with greater efficiency and competition in host countries' banking sectors (Claessens and Laeven 2004; Cull and Martínez Pería 2010). Enhanced competition in turn may also affect financial stability; these issues are not explored here.

banks. This prospect may call for a strengthening of regional safety nets to address idiosyncratic and regional shocks.

Financial reforms that contribute to strengthening the soundness of parent banks can help limit the transmission of negative foreign shocks by affiliates of foreign banks. Increased cooperation among national regulators and supervisors—not only in matters of cross-border resolution, but also on the implementation of Basel standards and on accounting standards—is key to reconciling banking globalization with financial stability.

What Has Changed?

From Cross-Border Banking to Multinational Banking

Cross-border bank lending has declined since the global financial crisis, while international banks have shifted their international business models toward more local operations. Cross-border claims as a share of total banking assets of host countries have not recovered to their precrisis level (Figure 2.1, panel 1).[3] Local loans extended by affiliates of foreign banks did fall slightly in 2007 and 2008 but have since stabilized. Their share in total foreign claims (the sum of cross-border claims plus loans extended through affiliates abroad) has thus grown from less than 43 percent to about 49 percent. Most of those loans are in local currency; their share rose mildly after the crisis, most likely because of foreign currency funding pressures (McGuire and von Peter 2009), and has not returned to its precrisis level even after the pressures abated (Figure 2.1, panel 2).

The shift from cross-border banking to multinational banking with more local and likely locally funded operations is more pronounced in some banking systems than in others. McCauley, McGuire, and von Peter (2012) show that global French and Spanish banks in particular have increased the share of their

local operations whereas internationally operating Japanese banks continue to conduct mostly cross-border operations. Differences in business models can be related to differences in funding models. Multinational banks tend to rely less on wholesale funding and were thus less affected by disruptions in the wholesale funding market during the crisis.

One question is whether the precrisis level of cross-border claims reflected an anomaly—that is, the outcome of a temporary, unsustainable boom. Although this question extends beyond the scope of the chapter, it is worth noting that international claims (which include cross-border claims and local claims of foreign bank affiliates in foreign currency—see Figure 2.2) grew steadily between 2002 and 2007, with the growth rate picking up only somewhat in 2007 (Figure 2.1, panel 1). This at least indicates that the observed levels in 2007–08 were part of a longer-term trend (which may well have been unsustainable).

The reduction in cross-border lending and lending through affiliates is mainly due to euro area banks; banks from other areas have only partially offset that reduction (Figure 2.1, panel 3). Foreign claims of European banks dropped sharply in the wake of the global crisis and have continued to decline since then. The drop in claims from euro area banks has been general across all regions of the world. Claims vis-à-vis non-euro-area countries have dropped more than intra-euro-area claims. U.S. and U.K. banks also retrenched in 2008, but their foreign claims have partially recovered. Foreign claims from other areas, particularly from Japan, have grown quickly.

Foreign claims on emerging market and developing countries dropped in all regions in 2008 and have exhibited different recovery patterns. Claims on the Asia and Pacific region have nearly doubled since their 2008 trough (Figure 2.1, panel 4). Those on Latin America and the Caribbean have also exceeded their precrisis peak, although growth has slowed since 2011. Meanwhile, outstanding claims on emerging and developing Europe are still hovering slightly below their precrisis levels.

Overall, international banks have somewhat reduced the number of branches and subsidiaries they hold abroad. Based on a sample of 64 countries, including both advanced and emerging market economies, the total number of affiliates of foreign banks shrank by about 5 percent between 2008 and 2013. The drop essentially comes from a reduction in the number of subsidiaries, especially in the European Union, while the total number of branches has risen marginally

---

[3]Strictly speaking, "banking claims" include not only loans but also deposits with other banks and holdings of securities and participations. Following the Bank for International Settlements' terminology, "foreign banking claims" are defined as the sum of "cross-border claims" (for example, a direct loan of a bank in a given country to a firm in another country) and "local claims" of affiliates of foreign banks in local or foreign currency (for example, a loan from a branch or subsidiary of a foreign bank in a given country to a firm in that same country). "International claims" include cross-border claims and only the part of local claims denominated in foreign currency. See Figure 2.2. This chapter considers claims reported on a consolidated basis; that is, intragroup positions are netted out.

Figure 2.1. Developments in Foreign Banking Claims

1. Cross-Border and Local Claims Relative to Total Banking Assets of Recipient Countries (Percent)

2. Share of Local Currency Claims in Total Local Claims (Percent)

3. Foreign Claims by Home Country of Banks (Trillions of U.S. dollars)

4. Foreign Claims on Emerging Market and Developing Economies (Trillions of U.S. dollars)
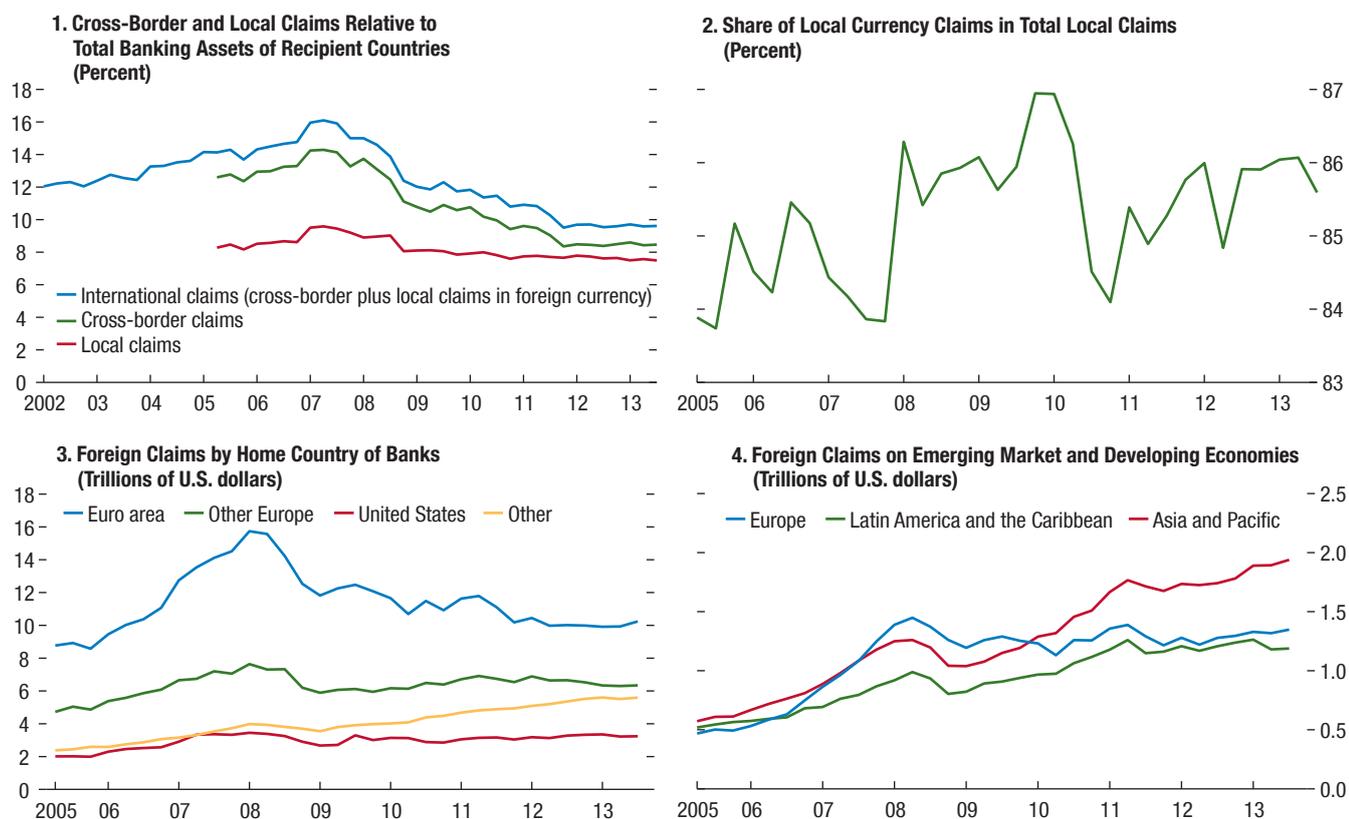
Sources: Bank for International Settlements (BIS), Consolidated Banking Statistics; IMF, International Financial Statistics database; and IMF staff calculations.
Note: Claims include deposits and balances placed with other banks, loans and advances to banks and nonbanks, and holdings of securities and participations. Foreign claims are the sum of cross-border claims and local claims of affiliates of foreign banks. International claims include cross-border claims and local claims in foreign currency. In panel 1, the ratios are calculated by dividing claims of all BIS reporting countries by total bank assets for all host countries with available data for each period. In panel 2, the share of local claims in local currency is estimated by dividing local claims in local currency on an immediate risk basis by the total local claims on an ultimate risk basis, after correcting for the difference in foreign claims in the two bases. Panels 1, 3, and 4 are based on ultimate risk basis data. The data in panels 1, 2, and 3 are adjusted for statistical breaks following Cerutti (2013). The observation period ends in 2013:Q3. In panel 3, "Other" consists of Australia, Canada, Chile, India, Japan, Singapore, Taiwan Province of China, and Turkey.

Figure 2.2. Types of Claims in Bank for International Settlements Consolidated Statistics
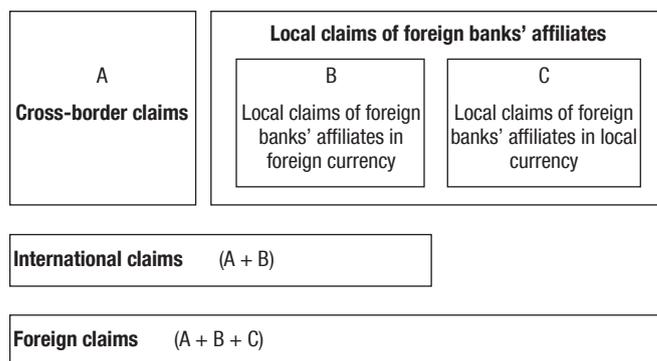
Source: Cerutti, Claessens, and McGuire 2012.
Note: Cross-border claims and total local claims of foreign banks' affiliates are reported on an ultimate risk basis (that is, allocated to the country in which the final risk lies) whereas international claims are compiled on an immediate risk basis (allocated to the country of residence of the immediate counterparty). Cross-border claims do not include intragroup positions. See Annex 2.1.

Figure 2.3. Number of Branches and Subsidiaries of Foreign Banks in 2008 and 2013, by Region
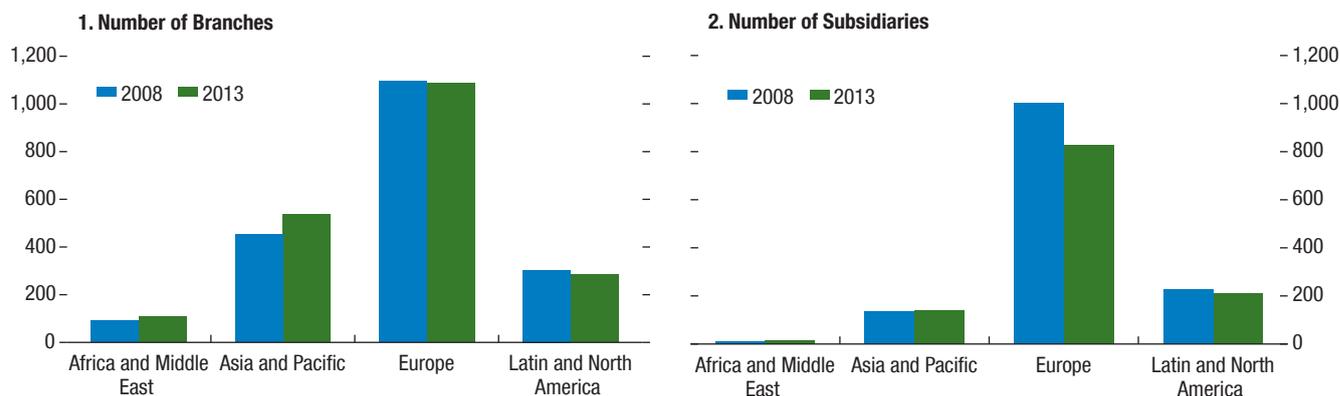
Sources: National authorities; and IMF staff estimates.
Note: Africa and Middle East = Bahrain, Botswana, Israel, Jordan, Kuwait, Nigeria, Oman, Qatar, Saudi Arabia, South Africa, United Arab Emirates; Asia and Pacific = Australia, China, Hong Kong SAR, India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand; Europe = Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom; Latin and North America = Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Mexico, Paraguay, Peru, and the United States. See Fiechter and others 2011.

(Figure 2.3). There is no evidence of increased subsidiarization at the expense of branches.[4] Since 2008, only 7 of the 64 sample countries experienced an increase in the number of foreign subsidiaries and a simultaneous decline in the number of foreign branches.

The decline in the number of foreign affiliates partially reflects the refocusing of global banks' international operations on core markets and businesses. Having strengthened their balance sheets and reduced risk exposures to meet risk-based requirements, global banks are reallocating capital to core businesses and markets, shrinking capital markets activities, rebalancing their business models away from capital-intensive activities to more fee-based businesses, and refocusing their geographical presence on fast-growing markets (Claessens and van Horen 2014) or on markets in which they have a competitive edge (see Chapter 1 of the October 2014 *Global Financial Stability Report*).

[4]Operating in the form of a subsidiary versus a branch has legal implications. Subsidiaries are entities legally independent from the parent bank and have to fulfill regulatory requirements, including capital and liquidity ratios, on a stand-alone basis in the host country. In addition to consolidated supervision by the home supervisor, subsidiaries are regulated and supervised by the authorities in the host country. In contrast, branches are an integral part of the parent company and are typically subject to more limited supervision by host supervisors (Fiechter and others 2011; IMF 2013b). Host country authorities generally prefer the subsidiary model, and some countries are implementing measures that require foreign banks to operate as subsidiaries under certain conditions.

A Trend toward Regionalization?

The reduction in the exposures of euro area banks to some regions has left a gap that local banks have, at least partially, filled. In Asia in particular, the retrenchment of euro area banks has been accompanied by increased regionalization. According to data from the Bank for International Settlements (BIS), foreign banking claims of euro area banks in the emerging and developing Asia and Pacific region have declined since 2008 and have not recovered to their precrisis level, despite the region's high growth (Figure 2.4, panel 1). This decline has been more than offset by the expansion of banks from Asian countries, particularly Japan. The increase in claims of other European countries, which likely reflect those of British banks with a very large Asian presence, such as HSBC and Standard Chartered, was remarkable in 2009 and 2010, but growth has since slowed. Claims of Chinese banks are not reported to the BIS, but anecdotal evidence suggests a significant increase.

An analysis of Asian banks' geographical allocation of assets shows an increased concentration in the region. The share of regional assets more than doubled between the precrisis and postcrisis periods, rising from about 10 percent to close to 20 percent of total assets, whereas the share of domestic assets declined from 84 percent to 73 percent (Figure 2.4, panel 2). These changes reflect in particular the recent

Figure 2.4. Banking Regionalization in Asia
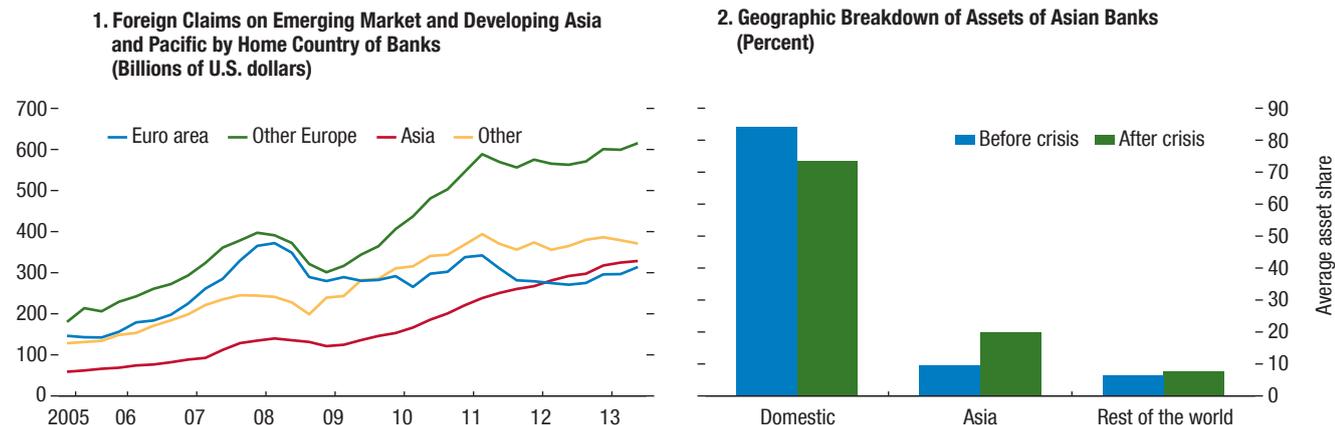
1. Foreign Claims on Emerging Market and Developing Asia and Pacific by Home Country of Banks
(Billions of U.S. dollars)

Legend: Euro area — Other Europe — Asia — Other

2. Geographic Breakdown of Assets of Asian Banks
(Percent)

Legend: Before crisis — After crisis

Categories: Domestic, Asia, Rest of the world
(Average asset share axis, 0 to 90)

Sources: Bank for International Settlements, Consolidated Banking Statistics; and IMF staff calculations.
Note: Foreign claims are the sum of cross-border claims and local claims of affiliates of foreign banks. "Asia" consists of Australia, India, and Japan. "Other" consists of Canada, Chile, Turkey, and the United States. The panel is based on ultimate risk basis data. China does not report its banking claims to the Bank for International Settlements.

Sources: Datastream/Worldscope; and IMF staff calculations.
Note: Average geographic breakdown of Asian banks' assets as a percentage of their total assets before and after the global financial crisis (from 2002 to 2007 and from 2008 to 2013, respectively).

internationalization and regionalization of Chinese banks (see Box 2.1 for a comparison of the internationalization strategies of Chinese and Japanese banks).

Other regions of the world do not show a comparable degree of regionalization. In Latin America, the retrenchment of European banks was short-lived and has been accompanied by an increase in lending by U.S., Canadian, and Latin American banks. Colombian banks, for instance, have aggressively expanded in Central America.[5] In emerging Europe, the share of European banks in total foreign claims declined slightly, reflecting both the deleveraging that took place in the region in the aftermath of the crisis and the effect of the Vienna Initiative in preventing a sudden and massive reduction in cross-border financing (Figure 2.5, panel 2). In Africa, the rapid regional expansion of pan-African banks in recent years has contributed to increasing cross-country linkages across that continent (Box 2.2).

Correlation networks based on banks' stock returns illustrate patterns in financial interconnections across different markets.[6] Figure 2.6 shows the networks in 1998–2007 and 2010–14 using data from both advanced and emerging market and developing economies. Each colored square represents a bilateral correlation between two banks' stock returns after removing the effect of strong common factors (for instance, a shock to the whole banking industry). Significant correlations tend to be clustered by countries and regions, which underscores the importance of local factors such as common balance sheet or market exposures, common accounting practices, or technological linkages. More than 90 percent of the significant correlations in both periods are between banks within the same region. Although most banks are not directly connected to one another, the combination of strong linkages within countries and regions and the presence of a few cross-regional links (via so-called hub banks) may allow for rapid transmission of shocks across regions.

[5]Colombia does not report international banking statistics to the BIS; the regional expansion of Colombian banks is therefore not reflected in Figure 2.5, panel 1.

[6]The correlation networks used in this section are derived from spatial-econometric techniques described in Saldías and Craig (forthcoming) and Bailey, Holly, and Pesaran (forthcoming), applied to banks' daily stock returns. These networks are obtained by applying first spatial dependence methods to detect and filter the effects of strong common factors and then a thresholding procedure to select the significant bilateral correlations.

Intraregional linkages increased in the postcrisis period in Europe, Middle East, and Africa (EMEA) countries and especially in Asia. Cross-regional linkages, represented by colored squares outside the diagonal blocks in Figure 2.6, were more frequent during the precrisis period (1998–2007). EMEA banks in particular exhibited many linkages with banks in Asia and the Americas, which contributed to the propagation of the crisis across regions. The regionalization of banking linkages since 2010 partially reflects increased correlations within countries, illustrated by a larger concentration of colored squares within each diagonal block, especially in Asia, but also actual growth in the share of regional cross-country interconnections after the crisis.

Changes in Corporate Borrowing

The decline in cross-border lending by banks has been accompanied by a surge in international nonfinancial corporate bond issuances (Figure 2.7, panel 1). This surge has been driven to a large extent by the rapid increase in bond issuances from emerging markets (see Chapter 1 of the October 2014 *Global Financial Stability Report*). Faced with bank credit constraints, firms, especially large ones, may have turned to capital markets to obtain financing. The low level of interest rates has also encouraged risk taking by private investors and fueled the demand for higher-risk debt securities. One question is to what extent the reduction in cross-border banking and the expansion in direct capital market borrowing by nonfinancial firms may have affected their borrowing costs.

All else equal, a less globalized banking system may imply greater heterogeneity of bank funding costs for firms across countries. The decline in cross-border lending may limit arbitrage opportunities for firms and reduce competitive pressures for domestic banks when capital markets are shallow. It also makes lending interest rates more dependent on the condition of the domestic banking sector. The cross-country divergence of bank lending rates was one of the features of the euro area crisis and the main sign of the fragmentation of euro area financial markets (see Box 2.4 and Chapter 1 of the October 2013 *Global Financial Stability Report*). Higher dispersion of corporate borrowing costs at the global level would potentially have adverse consequences for private investment in some countries because firms with profitable investment opportunities may struggle to obtain funding

Figure 2.5. Trends in Latin America and Europe
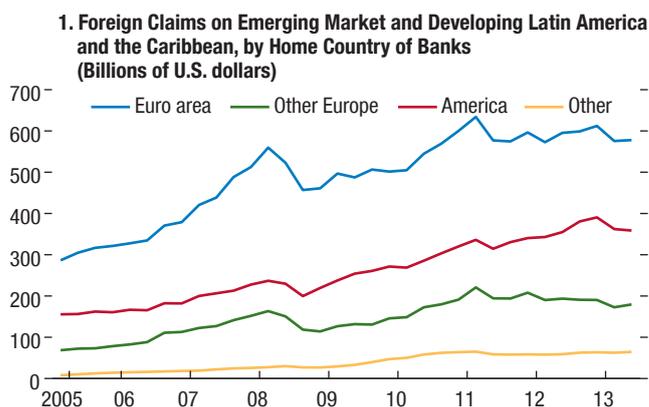
1. Foreign Claims on Emerging Market and Developing Latin America and the Caribbean, by Home Country of Banks
(Billions of U.S. dollars)

Sources: Bank for International Settlements, Consolidated Banking Statistics; and IMF staff calculations.
Note: Based on ultimate risk basis data. "America" consists of Canada, Chile, and the United States. "Other" consists of Australia, India, Japan, and Turkey.
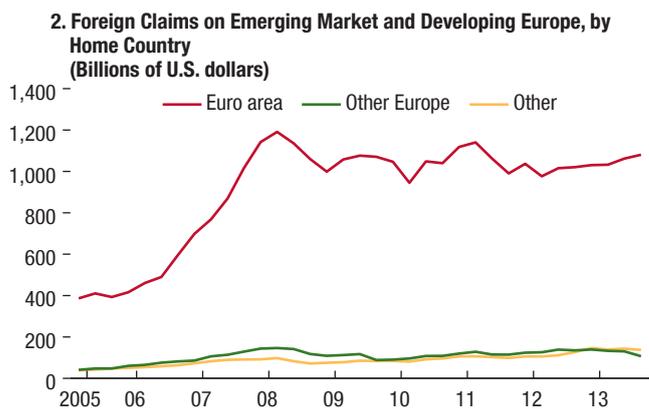
2. Foreign Claims on Emerging Market and Developing Europe, by Home Country
(Billions of U.S. dollars)

Sources: Bank for International Settlements, Consolidated Banking Statistics; and IMF staff calculations.
Note: Based on ultimate risk basis data. "Other" consists of Australia, Canada, Chile, India, Japan, Turkey, and the United States.
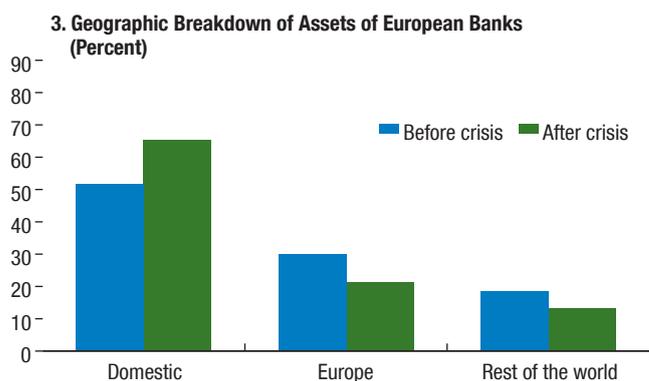
3. Geographic Breakdown of Assets of European Banks
(Percent)

Sources: Datastream/Worldscope; and IMF staff calculations.
Note: Average geographic breakdown of European banks' assets as a percentage of their total assets before and after the global financial crisis (from 2002 to 2007 and from 2008 to 2013, respectively).

Figure 2.6. Precrisis and Postcrisis Geographic Correlation Networks from Banks' Stock Returns
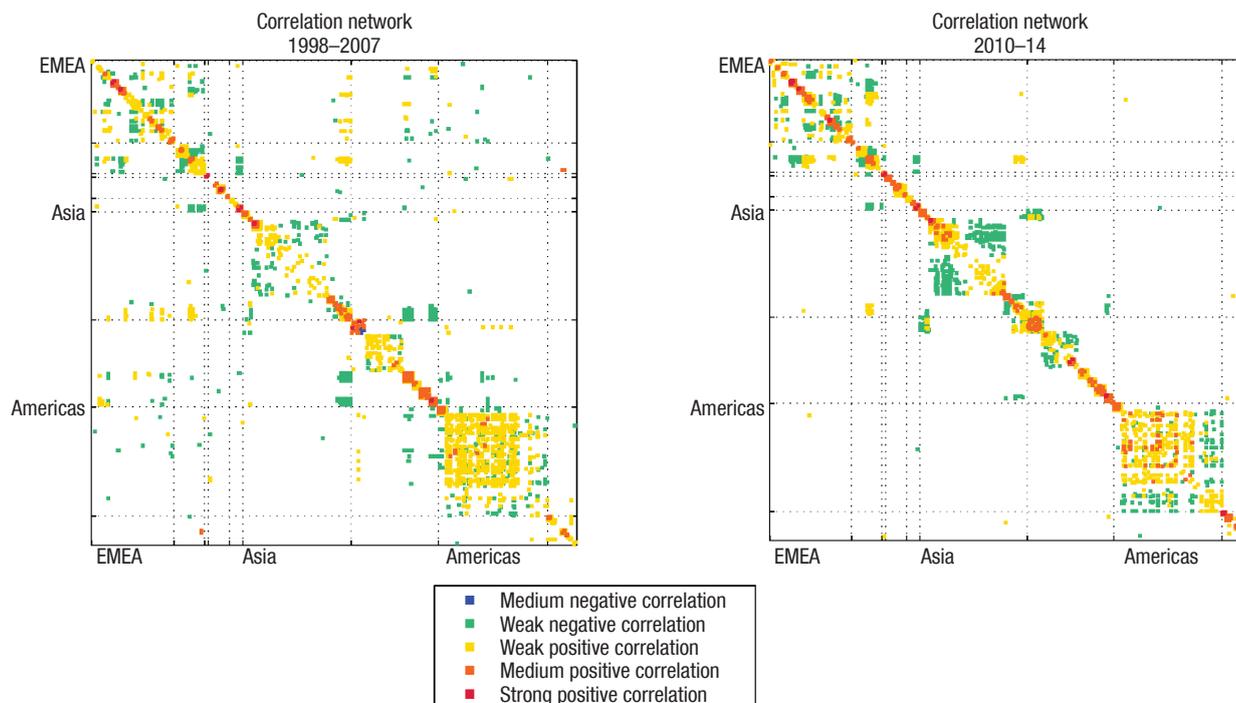
Sources: Bloomberg, L.P.; and IMF staff estimates.
Note: The networks are constructed from daily stock returns of 506 banks located in 62 countries. Each colored square represent a bilateral correlation between two banks after removing the effect of strong common factors. The matrix is symmetric, which allows for identifying clusters by square areas. The banks are grouped into nine sub-regions and three regions (Europe, Middle East, and Africa; Asia; and Americas), then sorted by country (alphabetically) and size (market capitalization) within each region. The nine sub-regions are advanced European economies, emerging and developing Europe, Commonwealth of Independent States, advanced Asian economies, emerging and developing Asia, advanced American economies, Latin America and the Caribbean, Middle East, North Africa, Afghanistan, and Pakistan, and sub-Saharan Africa. The sub-regions follow the country classification in the *World Economic Outlook*. EMEA = Europe, Middle East, and Africa.

or face higher borrowing costs as a result of lower banking competition. Panel 2 in Figure 2.7 illustrates the changes in the dispersion of manufacturing firms' borrowing costs since 1990, after accounting for firm and country characteristics.[7]

There is no clear evidence of increased dispersion of corporate borrowing costs following the global financial crisis. Corporate borrowing costs have converged across countries since 1990, in line with the rise of financial globalization. The recent changes in international banking patterns described in this chapter do not seem to have reversed this trend. Although the cross-country dispersion of corporate funding costs seemingly rose slightly after 2008 and again after the

debt crisis in Europe in 2011, it has recently declined.[8] However, in euro area countries, the dispersion of corporate borrowing costs did rise after 2008 compared with the precrisis period.

Summary

Cross-border lending is the dimension of global banking that has shrunk most sharply since the global financial crisis. Local claims of affiliates of foreign banks have remained more resilient despite an overall reduction in the number of foreign subsidiaries and branches. Euro area banks retrenched the most. Where they were replaced by other, more regionally focused

---

[7]This dispersion is interpreted as a sign of financial frictions that distort the allocation of resources among firms (Gilchrist, Sim, and Zakrajšek 2013).

[8]Because the borrowing cost measure is backward looking (it represents the average interest cost on outstanding debt and not the cost on newly obtained loans), the estimation does not capture the most recent changes in borrowing costs.

Figure 2.7. Changes in Corporate Borrowing

1. Net Issues of International Debt Securities by Nonfinancial Corporations
(Billions of U.S. dollars)
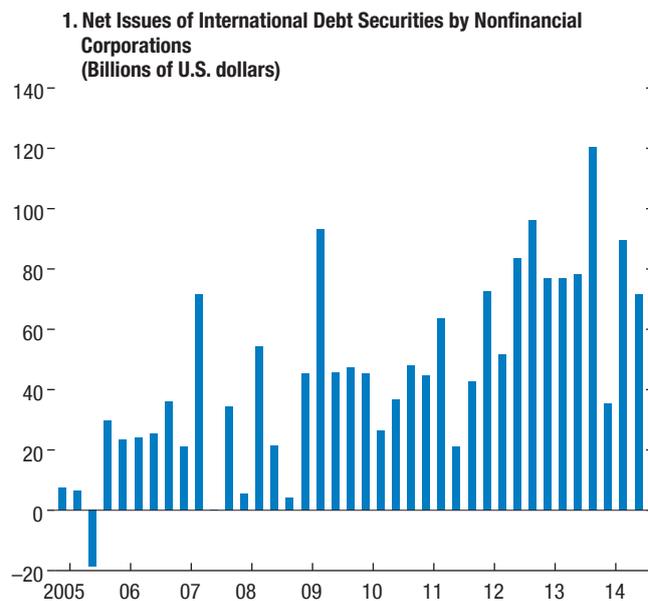
Sources: Bank for International Settlements, Debt Securities Statistics; and IMF staff estimates.

2. Cross-Country Dispersion of Corporate Borrowing Costs
(Percent)
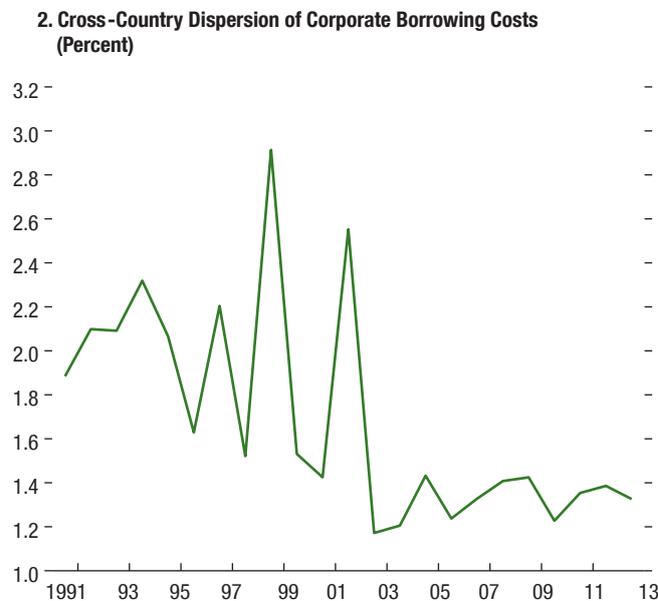
Sources: Datastream/Worldscope; IMF staff estimates.
Note: The figure plots the standard deviation of median manufacturing firms' borrowing costs across countries, after accounting for firm and macroeconomic characteristics, including country risk. The two spikes in the figure correspond to the years following the Asian crisis in 1998, and the Argentine crisis in 2001. Corporate borrowing costs are computed from listed firms' balance sheet and income statement data as the ratio of firms' interest expenses to total debt.

banks, international banking linkages have become more regional. Yet these developments do not seem to have led to a larger dispersion of corporate borrowing costs.

The Drivers of the Changes in International Banking

Changes in Regulations on Banks' International Operations

This section examines the drivers of the previously described changes in international banking. The analysis builds on the results of a confidential survey about the regulations applicable to banks' international operations in both home and host countries (see Annex Table 2.1.1 for a list of the survey questions). Answers were collected from bank supervisors in 40 countries that are among the top recipients of international banking claims according to BIS data.[9]

The survey results show that many countries tightened regulations on banks' international operations or strengthened their supervision between 2006 and 2014, while a more limited number loosened them (Figure 2.8). The supervisory authorities in many countries are now more likely than before to limit banks' activities—for instance, by imposing ring-fencing measures in a discretionary way. Many resolution authorities obtained more powers over local branches of foreign banks. Some countries amended banking secrecy laws to enhance information sharing about banks' operations and balance sheets with foreign supervisors. In contrast, a few countries have loosened regulations regarding foreign banking presence (for example, conditions for a foreign bank's acquisition of a domestic bank) and activity (for example, cross-border lending and borrowing).

The proportion of countries that tightened their regulations on banks' international operations is higher in advanced economies than in emerging market economies (Figure 2.9). There is, however, little evidence that countries that experienced

[9]Survey respondents were Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Croatia, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Hungary, Indonesia, Ireland, Italy, Japan, Luxembourg, Malaysia, Mexico, the Netherlands, Norway, the Philippines, Portugal, Romania, Russia, Saudi Arabia, Singapore, the Slovak Republic, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, the United Kingdom, and the United States.

Box 2.1. The International Expansion of Chinese and Japanese Banks

This box compares the international expansion strategies of Chinese and Japanese banks and discusses some implications for financial stability.

Banks headquartered in China and Japan expanded rapidly after the global financial crisis. Strong balance sheets, growth opportunities outside the domestic economy, and the retrenchment of euro area and U.S. banks from Asia have been common factors behind their international expansions. However, their growth also differs in several important ways, including scales, business lines, and funding patterns.

The scale of international expansion

Japanese banks and, to a more limited extent, Chinese banks, have increased their assets and loans overseas as a share of total assets and loans, respectively (Figure 2.1.1). From 2009 to 2013, the average ratio of overseas loans to total loans for the three largest Japanese banks rose from 15 percent to about 26 percent.[1] The same numbers for the four largest Chinese banks were 6.1 percent and 9.2 percent.

This box was prepared by Kai Yan.

[1] The data set includes the four largest banks in China (Industrial and Commercial Bank of China, China Construction Bank, Bank of China, and Agricultural Bank of China), and the three largest banks in Japan (Mitsubishi, Mizuho, and Sumitomo). Mizuho does not report assets and liabilities based on geographic segments. The average for Japanese banks in Figure 2.1.1, panel 1, and Figure 2.1.3, panel 2, is thus computed using data for the two remaining banks.

Although Chinese banks expanded rapidly after the financial crisis, their global business is still limited in scale and much smaller than that of Japanese banks, which were among the world's biggest creditors before the Japanese banking crisis of the late 1990s. The internationalization of Chinese banks remains primarily driven by a follow-your-customer strategy. In contrast, limited domestic growth prospects and new business opportunities abroad for Japanese banks, particularly following the retrenchment of European banks, added incentives for them to expand abroad (Lam 2013). The degree of internationalization also varies greatly among the four largest Chinese banks. The proportion of both international assets and international loans has exceeded 20 percent for the Bank of China, but is still less than 5 percent for the Agricultural Bank of China.

Business models and expansion strategies

Both Chinese and Japanese banks generate major portions of their revenues abroad from net interest income (Figure 2.1.2). For Chinese banks, corporate loans amount to more than 80 percent of the total loan portfolio, with most of them coming from Chinese customers' foreign subsidiaries. For Japanese banks, which showed resilience during the global financial crisis and which benefit from strong capital buffers, longer-term project finance and syndicated lending have also played a major role in their overseas expansion.

Figure 2.1.1. The Internationalization of Chinese and Japanese Banks
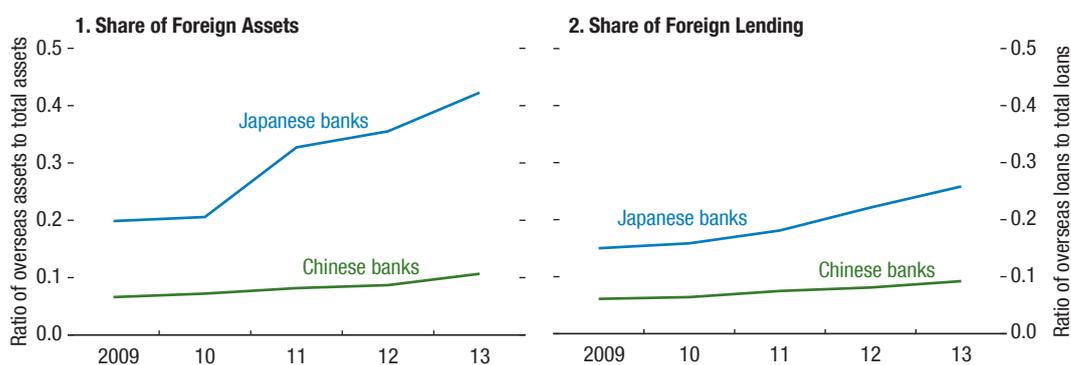
Sources: Banks' annual reports; and IMF staff estimates.

Box 2.1 *(continued)*

Figure 2.1.2. Ratio of Foreign Interest Income to Foreign Revenue for Chinese and Japanese Banks
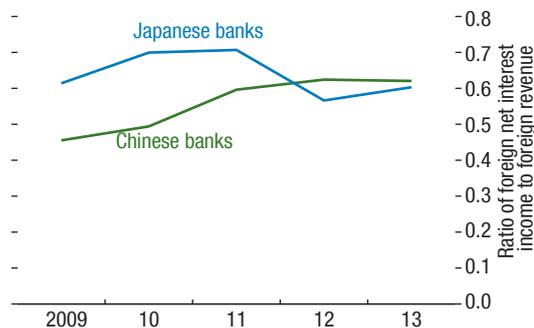
Sources: Banks' annual reports; and IMF staff estimates.

Japanese banks have also expanded assertively in non-lending activities. Overseas business strategies differ across banks, however. Mizuho Bank, which experienced 240 percent growth in foreign non-interest income in the past three years, emphasizes its syndicated loan business as one of the main sources of fee income. The revenue generated by Mitsubishi's three business lines (foreign exchange, corporate and investment banking, and fees and commissions), grew by 33 percent during the past three years.

Similarly, expansion strategies differ for the leading banks in the two countries. Chinese banks tend to expand their global presence through organic growth by opening foreign offices and branches. The increase in their business coverage mainly occurred in their subsidiaries in Hong Kong SAR.[2] In contrast, Japanese banks have completed major mergers and acquisitions to expand globally. The three Japanese megabanks combined spent more than 1 trillion yen acquiring foreign companies between 2012 and 2014. The acquisition targets range from banks to asset management companies.

[2]For example, of the 623 overseas affiliates of the Bank of China, almost all of those outside of mainland China and Hong Kong SAR are overseas branches and offices. Besides the traditional deposit, loan, and payment business conducted by those branches, all the other banking business abroad is conducted by Bank of China International, which is in Hong Kong SAR.

Funding pattern vulnerabilities

The risks of foreign expansion for banks can come from both the asset and liability sides. Such risks can stem from the concentration of exposure to certain countries and certain industries, or from dependence on unstable funding sources. This section focuses on funding vulnerabilities.

For Japanese banks, the overseas loan-to-deposit ratio is about 1.3, with little variation across banks (Figure 2.1.3). Chinese banks' average overseas loan-to-deposit ratio increased from about 1.5 to more than 2 during the past five years. The rise was primarily driven by the growth of the ratio for the Agricultural Bank of China, the least globalized of the four largest Chinese banks. At the opposite end, Bank of China, which is the most international of the four, has a loan-to-deposit ratio of less than 1. The inverse correlation between Chinese banks' foreign loan-to-deposit ratios and the degree of international activity suggests that the least globalized banks embarked on aggressive strategies to expand overseas.

Another indicator of vulnerability is the ratio of total overseas liabilities to overseas deposits, which measures banks' dependence on funding sources other than local deposits for their operations abroad. The overseas total liabilities-to-deposits ratio for Chinese banks has been rising steadily since 2009, indicating a growing reliance on nontraditional funding. By contrast, the same ratio has been declining for Japanese banks.

Both Chinese and Japanese banks have loan-to-deposit ratios consistently larger than 1. This shows that despite the increase in deposits collected abroad, banks still fall short of funding for their total external loans and have to rely on external wholesale funding to fill the gap. This growing reliance on wholesale funding could raise potential vulnerabilities from currency and liability mismatches.

Future prospects

Growth opportunities still abound for both Chinese and Japanese banks, as their domestic clients increase their outward expansion. Japanese banks can build on their already well-established market shares in project finance and syndicated loans to take advantage of a rise in infrastructure investment in Asia, whereas Chinese banks will benefit from the further liberalization of financial markets

Box 2.1 *(continued)*

Figure 2.1.3. Funding Vulnerabilities for Chinese and Japanese Banks

Sources: Banks' annual reports; and IMF staff estimates.
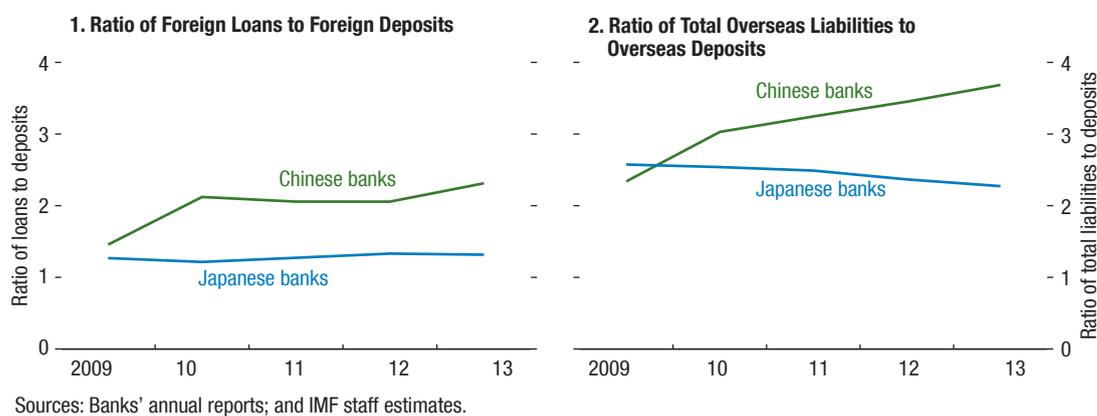
in China combined with the internationalization of the renminbi.

Both groups of banks face challenges, however. Constraints to their global expansion include cross-country differences in regulatory and supervisory frameworks, the difficulty of raising local deposits, and the need to rely on external funding. In addition, Chinese banks' relatively simple business model and heavy reliance on domestic customers may also weigh on their ability to expand.

higher banking stress, such as some countries in the euro area, consistently tightened more than other countries.

Changes in regulations targeting banks' international operations, as well as more general regulatory changes (such as those on bank capital requirements), can affect foreign banking claims in at least three ways. First and most simply, tighter regulations may reduce foreign bank lending just because bank activities in general are curtailed. Second, regulatory arbitrage may induce a countervailing effect: banks in countries that tighten banking regulations may increase their claims on countries that are less regulated (Houston, Lin, and Ma 2012; Ongena, Popov, and Udell 2013; Bremus and Fratzscher 2014).[10] Third, regulatory changes may bring about a substitution effect between various types

of lending because their effects may differ across types of exposures.

Econometric Evidence

According to the econometric analysis, regulatory changes can explain a sizable fraction of the decline in cross-border claims on recipient countries. The analysis relates changes in cross-border lending and in lending by foreign affiliates to changes in regulations on international banking operations in both home and host countries. It uses the results of the above-mentioned survey, as well as changes in capital regulations and official supervisory power (Barth, Caprio, and Levine 2013), an indicator of the health of the banking sector in home countries, and other macroeconomic variables, including GDP growth and changes in exchange rates and real policy interest rates. The growth rate of international claims before 2007 is used to control for the precrisis boom (see

[10]The literature finds some evidence of regulatory arbitrage across countries, and Chapter 2 of the October 2014 *Global Financial Stability Report* shows the presence of regulatory arbitrage between banks and the nonbank financial sector.

Figure 2.8. Share of Countries that Changed Regulations on International Banking Operations between 2006 and 2014
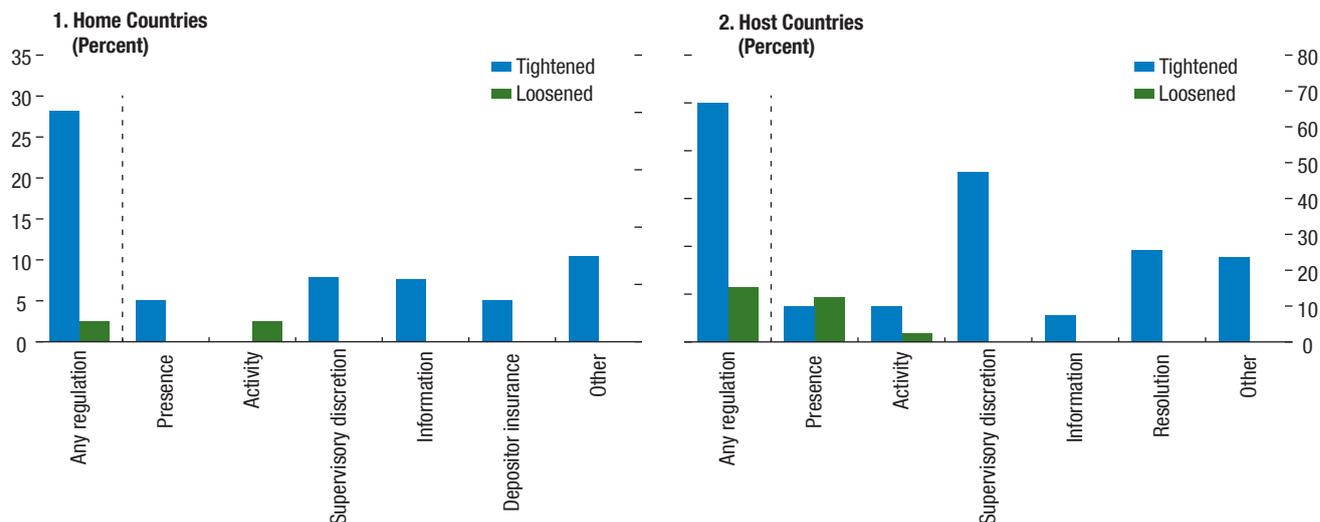
Source: IMF staff calculations.
Note: Shares are calculated from the results of a survey about regulations on banks' international operations. The "any regulation" bar represents the share of countries that changed any regulation related to banks' international operations during 2006–14. The other bars correspond to the shares of countries that have changed any corresponding type of regulation.

Annex 2.1 for details). The results show that roughly half of the drop in cross-border claims (as a percentage of GDP) since the precrisis period (2005–07) can be attributed to regulatory changes. Figure 2.10 examines the sensitivity of the various types of claims to each explanatory variable and the contributions of the various factors to the observed changes in the claims-to-GDP ratio.

Tighter regulations on banks' international operations or capital regulations in home countries are associated with a reduction in lending from those countries (Figure 2.10, panel 1). This effect is intuitive, given that both impose limitations on banks' operations abroad and imply indirect restrictions through, for example, higher risk weights on foreign assets.[11] There is some indication that home countries with more powerful supervisors tend to experience stronger growth in foreign claims, possibly as a result of regulatory arbitrage.[12] The effect of

regulatory changes on local claims is not statistically significant.

The effect of regulatory changes in host countries depends on the type of regulation (Figure 2.10, panel 2). Countries that tightened their regulations on banks' international operations received lower volumes of cross-border loans. Changes in capital requirements do not seem to affect total foreign, cross-border, or local claims. However, tighter capital regulations are positively associated with changes in foreign claims on the public sector, which may be explained by a portfolio shift to safer assets to satisfy more stringent capital requirements (see Annex 2.1).

Higher precrisis bank-capital-to-total-assets ratios in the home country (a proxy for the health of the home country banking system) are associated with higher postcrisis growth in foreign claims (Figure 2.10, panel 3).[13] The initial sharp drop in claims (up to 2009) may to a large extent be due to this factor, along with possible expectations of a tightening of regulatory standards. In particular, precrisis capitalization levels of European banks were on average substantially lower than in other countries. This result suggests

---

[11]Figuet, Humblot, and Lahet (2015) estimate that the Basel III regulatory reforms could lead to a drop of 20 percent in cross-border claim inflows to emerging markets.

[12]Whereas the literature emphasizes the role of regulatory arbitrage, by which banks facing stronger supervisory power at home may increase foreign claims on countries with less supervisory power, the use of consolidated supervision by home supervisors weakens this argument.

[13]This result is consistent with previous studies on syndicated lending that also find that banks with strong balance sheets were better able to maintain lending during the crisis (Kapan and Minoiu 2013).

Figure 2.9. Share of Countries that Tightened Regulations on International Banking Operations between 2006 and 2014, by Region
(Percent)
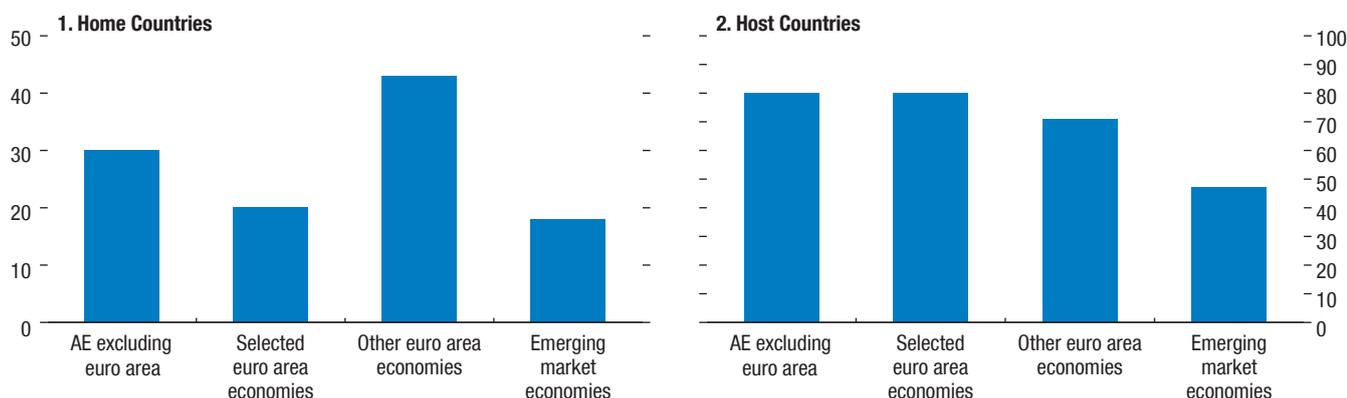
Source: IMF staff calculations.
Note: AE = advanced economies. Selected euro area economies are those with high borrowing spreads during the 2010–11 sovereign debt crisis and comprise Greece, Ireland, Italy, Portugal, and Spain. Other euro area economies comprise Austria, Belgium, Finland, France, Germany, Luxembourg, and the Netherlands. Countries that tightened regulations are defined as countries with a positive index of changes in regulations on banks' international operations (see Annex 2.1).

that although tighter capital requirements in home countries may initially curtail international banking operations, they can contribute to stabilizing banking flows later on once banks have built capital buffers. Countries with higher precrisis growth rates of foreign claims experienced a larger subsequent contraction in these claims, as foreign banks deleveraged to strengthen their balance sheets. Greater physical distance between home and host countries is associated with lower growth, particularly for local claims.

The overall effect of regulatory changes on foreign banking claims is comparable to that of nonregulatory factors (Figure 2.10, panel 4). Among regulatory changes, those directly targeted at the international operations of banks have a larger effect than more general banking regulatory or supervisory changes. All these results still need to be considered with caution. It is possible that the correlation between regulations and foreign claims does not reflect a causal relationship, but may rather be driven by other factors. For instance, the vulnerabilities revealed during the crisis may have caused both bank deleveraging and regulatory reforms in the postcrisis period. This concern is alleviated by adding many control variables, including banks' precrisis capital-to-assets ratios and the precrisis growth rate of international claims, to the regression. Moreover, extensive robustness checks (among others, with instrumental vari-

ables) provide additional evidence of the role played by regulatory changes (see Annex 2.1). In particular, the contribution of regulatory changes remains significant even when euro area countries are excluded from the sample or when the euro area is treated as a single country.

Accommodative monetary policies in the wake of the crisis may have slowed the decline in international banking activities while also supporting a shift to portfolio investment. After the global financial crisis, short-term interest rates effectively hit the zero lower bound in many economies, and central banks engaged in unconventional monetary policies aimed at stimulating their economies. Those policies helped reduce uncertainty and market volatility, lowered banks' funding costs, and bolstered their balance sheets, with a potentially positive effect on foreign banking claims. The results indeed suggest that international banking activities would likely have contracted more without such accommodative policies, confirming previous findings in the literature (Bremus and Fratzscher 2014; IMF 2014c).[14]

[14]Empirically examining the effect of unconventional monetary policies on capital flows is challenging, in part because long-term interest rates are endogenous to capital flows (Bernanke 2005). Estimates computed after incorporating long-term interest rates in the regression model broadly confirm the robustness of the results on the effect of regulatory changes while pointing to a significant effect of monetary easing (see Annex 2.1).

Figure 2.10. Effects of Regulations and Other Factors on International Banking Linkages
(Percent)

1. Response to Home Country Regulatory Changes

2. Response to Host Country Regulatory Changes

- Total foreign claims
- Cross-border claims
- Local claims

3. Response to Nonregulatory Variables

- Total foreign claims
- Cross-border claims
- Local claims

4. Contributions of Regulatory Changes to Growth in Claims-to-GDP Ratio

- Regulations on international operations of banks
- General banking regulations such as capital requirements
- Other
- ▲ Claims to GDP growth

Source: IMF staff estimates.
Note: Panels 1, 2, and 3 show the effects of a one standard deviation increase in each variable on the growth rate of different types of claims. These are calculated by multiplying the estimated coefficient of the regression and the cross-sectional standard deviation of the corresponding independent variable. Nonshaded bars correspond to coefficients that are not significant at the 10 percent level. Panel 4 decomposes factors contributing to the growth of the claims-to-GDP ratio from 2005–07 to 2011–13 averaged across the observations of the regression. The factor contribution is calculated by multiplying the estimated coefficient by the average of the independent variable. Country samples vary depending on the type of claims. "Regulations on international operations of banks" is the sum of the contributions of international operations regulatory changes in home and host countries. "General banking regulations such as capital requirements" is the sum of the contributions of the other regulation variables. See Annex 2.1 for details.

Effects on Financial Stability

Cross-Border Lending and the Volatility of Capital Flows

Cross-border banking flows dropped more sharply and more durably than other capital flows in reaction to the global financial crisis. Both cross-border banking flows and portfolio flows declined strongly in 2008, but portfolio flows recovered much more quickly and have remained positive on average since early 2009. By contrast, cross-border banking flows have been slightly negative since 2009 (Figure 2.11,

panel 1). Yet there is no clear evidence of substitution between the various types of flows at the country level.

All else equal, the reduction in cross-border banking flows can be expected to reduce the sensitivities of total capital inflows to global financial shocks. A comparison of the sensitivity of different types of flows to the Chicago Board Options Exchange Market Volatility Index (VIX) shows that cross-border banking claims are more sensitive to global conditions than are local claims, whose sensitivity to global shocks is close to that of portfolio flows (Figure 2.11, panel 2). This

Box 2.2. The Expansion of Pan-African Banks: Opportunities and Challenges

This box describes the recent expansion of pan-African bank groups (cross-border banks headquartered in Africa), the benefits these groups offer, and the financial stability risks they entail.

The face of African finance is changing rapidly with the strong expansion of pan-African banks across the continent in recent years. Reflecting a number of converging push and pull factors and aided by improved political and macroeconomic stability and robust economic growth, the number of operations of the seven largest groups has more than doubled since the mid-2000s (Figure 2.2.1). Specific factors contributing to this expansion include increasing trade linkages between African countries, which have induced banks

to follow their clients, and the declining role of more traditional players such as European banks.

The growth of pan-African banks offers a number of opportunities and benefits. Anecdotal evidence suggests that the expansion of these banks has improved competition and given rise to economies of scale, especially in host countries with small local markets. Pan-African banks are driving innovation, offering opportunities to enhance financial inclusion, and in some cases contributing to lowering borrowing costs. For example, in the East African Community, Kenyan banks have introduced innovative business models such as agency banking into neighboring countries. Similarly, Moroccan banks' focus on small and medium enterprise development is being exported to francophone West Africa, while Nigerian banks

This box was prepared by Alexandra Peter.

Figure 2.2.1. Major Pan-African Banks: Cross-Border Expansion, 2002–14
(Number of subsidiaries in sub-Saharan Africa; percent)
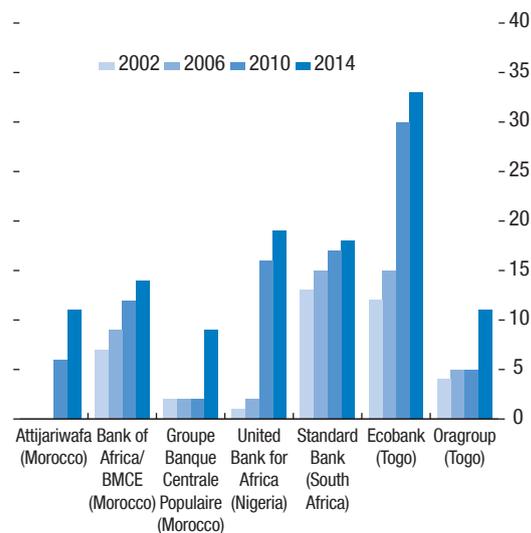
Source: Bank websites and annual reports.

Figure 2.2.2. Major Pan-African Banks: Systemic Importance by Country, 2013
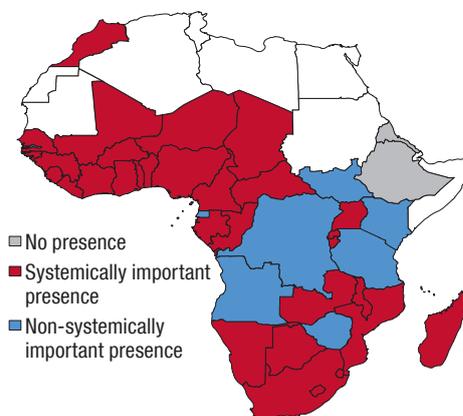
Sources: Banks' annual reports; Bankscope; IMF Monetary and Financial Statistics; and IMF staff calculations.
Note: The countries highlighted in red are those where any of the seven largest pan-African banks has a systemically important presence defined as a deposit share of more than 10 percent of the banking system's deposits. This includes the home countries of the pan-African banks.

Box 2.2 *(continued)*

are expanding their branch networks across their host countries, including in rural areas. African banks have also become lead arrangers for syndicated loans, filling the gap left by European banks (IMF 2014a). From a home country perspective, the geographical expansion of pan-African banks increases diversification and provides further growth and profit opportunities for banks.

However, as these groups have developed in reach and complexity, significant supervision gaps, governance issues, and questions about cross-border resolution have emerged that could pose risks to national and regional financial stability if unaddressed. With their rapid

expansion, the largest pan-African banks have become systemically important in many of their host countries, raising concerns about spillover risks (Figure 2.2.2). Most groups conduct their foreign operations through subsidiaries, which rely on local deposits for funding, somewhat mitigating potential contagion. However, with limited information about intragroup exposures and interconnections within pan-African banks and cross-border cooperation between supervisors just emerging, undetected risks could be mounting. In addition, pan-African groups have become more complex, encompassing nonbank activities that could give rise to additional contagion channels (IMF, forthcoming b).

result confirms previous evidence that net bank flows have consistently been the most volatile type of capital flow (see Chapter 4 of the April 2011 *World Economic Outlook*). It suggests that the observed changes in international banking may yield a reduction in contagion, but potentially may also reduce flows that help countries dampen external and domestic shocks.[15] These issues are examined next.

International Banking Linkages, Adverse Shocks, and Credit

The analysis now turns to the role that foreign banks can play in mitigating or amplifying the effect of adverse local and foreign shocks.[16] This question is tackled from both a macroeconomic (country-level) and microeconomic (bank-level) perspective. The analysis focuses on the effect of international banking linkages on the *changes* in domestic credit growth

in response to shocks. Bank credit is one of the main channels of transmission of financial shocks to the real economy and plays a crucial role in the ability of economic agents to withstand negative shocks.

International banking linkages for each country are measured in three ways. The first measure is the ratio of cross-border claims to the total assets of the banking sector in recipient countries. This measure excludes local lending by foreign branches and subsidiaries in both foreign and domestic currencies (and, given the consolidated nature of the data, also excludes intragroup lending). The second measure uses international claims (the sum of cross-border claims and local claims in foreign currency) relative to banking sector assets in recipient countries. Because local claims in foreign currency are more likely to be funded by external borrowing, this measure may better capture the overall dependence of a country on foreign bank lending. The third measure uses the ratio of foreign subsidiaries' and branches' local claims in local currency to total banking assets.

Measuring linkages through cross-border and international claims

Host countries with higher cross-border or international claims tend to be more exposed to global shocks.[17] In times of global stress, credit growth drops more in these countries (Figure 2.12, panel 1). This finding can be related to the literature pointing to the financial stability risks associated with bank

---

[15]Recent changes, such as the growing issuances of nonfinancial corporate bonds or changes in the mix of global portfolio investors (see Chapter 2 of the April 2014 *Global Financial Stability Report*) might, however, affect the sensitivity of portfolio flows to future shocks.

[16]Many studies have looked at the role of international banking linkages in the transmission of shocks to host countries (for example, Cetorelli and Goldberg 2011), while ignoring the role those linkages may play in smoothing the effect of domestic shocks. The analysis in this chapter considers both effects, thereby providing a more comprehensive assessment of the stabilizing role of foreign banks. For other effects of banking globalization, in particular the role of foreign bank participation in financial development in developing countries, see Goldberg (2009) and Detragiache, Tressel, and Gupta (2008).

[17]Global stress (shocks) is measured by the VIX.

Figure 2.11. Changes in Capital Flows

1. Cross-Border Banking Flows and Portfolio Inflows (Billions of U.S. dollars)

2. Sensitivity of Cross-Border Flows to Global Shocks (Percent)
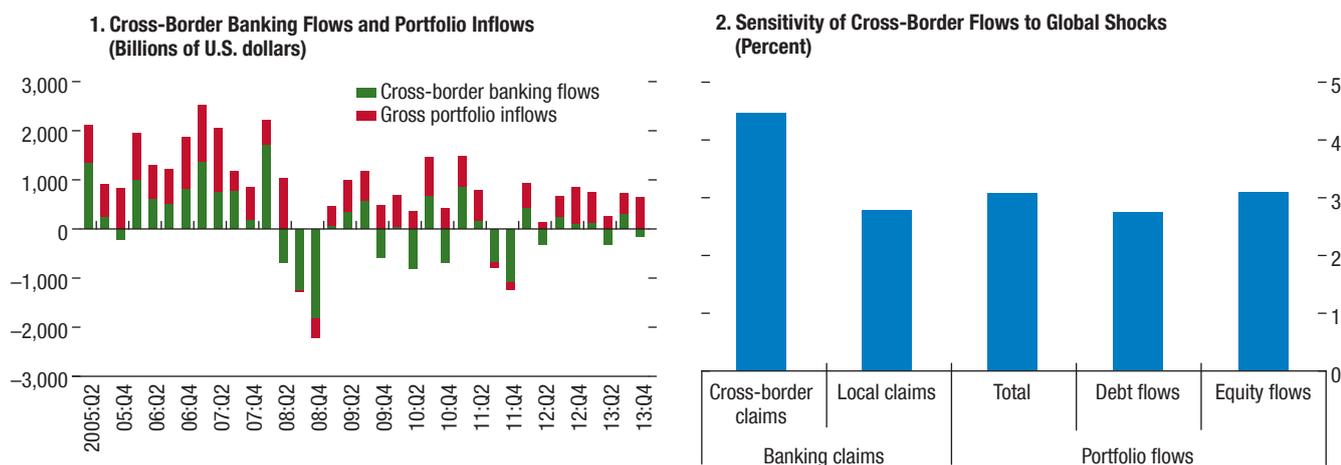
Sources: Bank for International Settlements (BIS); IMF, International Financial Statistics; and IMF staff calculations.
Note: Cross-border banking flows are computed as changes in cross-border banking claims from the BIS Consolidated Banking Statistics on an ultimate risk basis. These data are not compiled on a residency basis and therefore are not fully consistent with the flows reported in the balance of payments. For panel 2, all flows are normalized by the average of their absolute values over the sample period. The bars in panel 2 represent the changes in flows following a one-unit increase in the VIX (Chicago Board Options Exchange Market Volatility Index).

wholesale funding (see Berkmen and others 2012). In fact, a substantial portion of precrisis cross-border lending by major banks was financed by tapping wholesale markets. Cross-border lending itself may also reflect cross-border wholesale funding between non-affiliated banks.[18]

Similarly, host countries do not enjoy a diversification benefit when they are hit by domestic shocks. All else equal, cross-border lending by international banks may be expected to be more resilient around domestic shocks. For example, the balance sheets of global banks will be less affected by economic stress in any given host country. This should enable these banks to curtail lending less than their local peers do. However, the opposite seems true. In the face of higher domestic banking stress, countries with more international banking linkages in the form of cross-border or international claims tend to see a larger, not smaller, contraction in lending.[19] This suggests that

cross-border lending does not dampen the impact of domestic shocks.

By contrast, countries that are home to banks with large foreign assets experience some stabilizing benefits. Domestic credit is less affected during times of global stress in countries that are home to banks with large international operations (Figure 2.12, panel 2). This outcome may be related to the fact that banks in these countries have more leeway to adjust their operations worldwide and support the domestic entities—a form of home bias in which international banks are more inclined to maintain credit at home during times of global stress, potentially at the expense of their foreign operations (Giannetti and Laeven 2012). No such result is observed, however, for domestic shocks. One possible reason is that international banks, in the face of troubles at home, would rather maintain or expand their more profitable overseas operations than support domestic credit. The underlying assumption is that a global shock affects global banks' activities in a similar way both at home and abroad, while a domestic shock hurts the profitability of domestic operations relative to foreign ones.

[18]Other than during stress periods, cross-border and international claims are associated with higher domestic credit growth in host countries. This may reflect the role that cross-border lending can play as a complement to domestic lending in relaxing credit constraints, and in contributing to financial deepening in countries with small domestic banking sectors. It may, however, also suggest a contribution of cross-border lending to unsustainable local credit booms (see next section).

[19]Domestic stress (shocks) is measured by the average expected default frequency of the domestic banking sector (weighted by the

size of the domestic banks). The average expected default frequency of all listed domestic firms, which represents a broader measure of domestic stress, is used as a robustness check; the main results remain unchanged.

Figure 2.12. Effect of International Banking Linkages on Domestic Credit Growth
(Percent)

1. Host Country

2. Home Country

3. Host Country
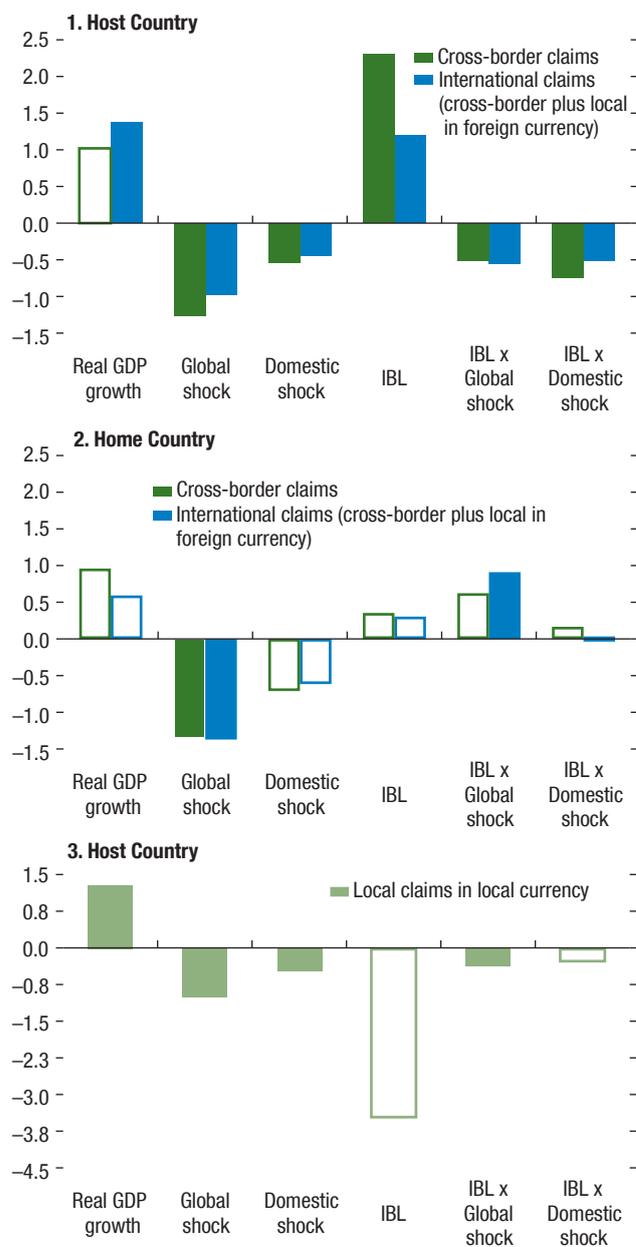
Note: IBL = international banking linkages. The bars show the effects of a one standard deviation increase in each variable on domestic credit growth. These are calculated by multiplying the estimated coefficient of the regression and the standard deviation of the corresponding independent variable. Nonshaded bars correspond to coefficients that are not significant at the 10 percent level. The estimation period spans 2002–13, depending on data availability.

These results do not depend on the severity of domestic or foreign shocks. The analysis finds little evidence that the stabilizing role of global banks may be either impeded or enhanced during extreme shocks or crises.

Measuring linkages through local currency lending by foreign banks

Linkages in the form of higher local currency lending by foreign subsidiaries or branches do not amplify domestic shocks (Figure 2.12, panel 3). Cross-border and international claims do not capture the local activities of foreign branches and subsidiaries well. One reason is that local claims are mostly denominated in local currency and are therefore more likely to be funded by local deposits. Another reason is that on a consolidated basis, cross-border claims cannot account for intragroup funding flows, although these are known to play a stabilizing role during periods of heightened risk (Reinhardt and Riddiough 2014; De Haas and van Lelyveld 2010). Intragroup funding can help support local lending by foreign banks' affiliates. In fact, countries with a high share of local lending in local currency by foreign banks do not experience stronger credit contractions when they are hit by domestic shocks.

A more in-depth look at subsidiaries' lending

An examination of the behavior of individual banks suggests that lending by foreign-owned subsidiaries is in fact more stable during domestic crises. The micro-level analysis uses balance sheet data for a large number of domestic and foreign-owned banks (see Annex 2.2 for details). The regression model compares the growth rate of loans by foreign-owned subsidiaries in a given country with that of domestic banks in periods of stress.[20] The growth rate of lending by foreign-owned subsidiaries is higher than that of lending by domestic banks during domestic banking crises, but lower during global crises (Figure 2.13). These results emphasize the beneficial role played by local lending of foreign-owned subsidiaries during domestic crises. This finding is consistent with the literature reporting that lending by subsidiaries is more stable than direct cross-border lending (Peek and Rosengren 2000; De Haas and van

[20]Branches of foreign banks are excluded from the analysis because of the lack of balance sheet data. Using regulatory data, Hoggarth, Hooley, and Korniyenko (2013) provide an interesting analysis of the behavior of foreign bank branches in the United Kingdom.

Figure 2.13. Lending Growth by Domestic and Foreign-Owned Banks during Crises
(Percent)
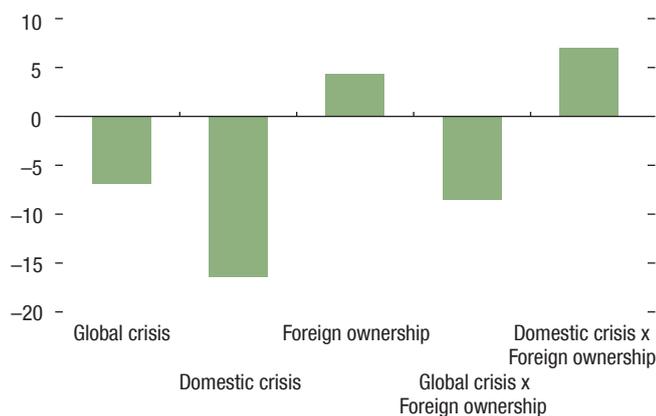
Source: IMF staff estimations.
Note: The bars represent the values of the estimated coefficients of the independent variables in a regression of lending growth at the bank level comparing lending by domestic and foreign-owned banks (see Annex 2.2). The estimation period spans 1998–2013, depending on data availability.

Lelyveld 2006; McCauley, McGuire, and von Peter 2012; Schnabl 2012).

Foreign subsidiaries with better-capitalized parent banks and parent banks with more stable funding sources tend to react less procyclically. Higher capitalization of the parent bank is associated with higher lending growth by its subsidiaries during stress periods (Figure 2.14, panel 1; and Annex Table 2.2.3). High dependence of parent banks on nondeposit funding sources is destabilizing during both domestic and global crises (Figure 2.14, panel 2). The results highlight the role played by parents' dependence on nondeposit funding sources in increasing contagion, an intuitive and well-known result in the literature (Cetorelli and Goldberg 2012; Porter and Serra 2011).[21]

A high reliance of subsidiaries on domestic deposits for their funding is also found to help stabilize lending during both domestic and global stress. This result holds for all banks, whether domestically or foreign

[21]A comparison of the credit growth of foreign banks with that of domestic banks in Central, Eastern, and Southeastern Europe showed that the tightening in parent banks' funding conditions explained most of the difference in the credit slowdown in 2008–11 (IMF 2013a).

owned (Figure 2.14, panel 3) and further underscores the importance of banks' liability structures for financial stability (see Chapter 3 of the October 2013 *Global Financial Stability Report*).

International Banking Linkages and the Incidence of Crises

If certain forms of international banking linkages can aggravate the effect of domestic shocks, do they also increase the *incidence* of crises more generally? The previous section found that cross-border banking linkages tend to facilitate the transmission of global shocks and aggravate the effect of domestic ones on host countries but are also associated with higher domestic credit growth on average. Given that rapid credit growth is considered a powerful indicator of systemic risk buildup, this section directly investigates the effect of international banking linkages on the probability of a banking crisis (see Annex 2.3 for more details).

On average, a higher degree of international banking linkages does not seem to be significantly correlated with the probability of domestic banking crises (Table 2.1). This result is not surprising, since the existing literature does not provide a definitive answer. Although Demirgüç-Kunt, Levine, and Min (1998) find that foreign bank presence tends to lower the probability that a country will experience a banking crisis, more recent work by Minoiu and others (forthcoming) suggests a positive relationship between a country's banking interconnectedness and the probability of a banking crisis.

Policy Implications

As evidenced by the regulatory survey results, the challenges of the recent financial crisis prompted a number of countries to take crisis-resolution measures and impose new requirements on banks. The response was global, with the Group of 20 playing a major role in setting up the agenda for financial reforms (Viñals and others 2010). National regulatory reforms followed, although they were not always well coordinated across countries. Structural banking reforms aiming to reduce interconnectedness between intermediaries may have intentionally introduced some degree of fragmentation to the market, including across borders (FSB 2014). Measures frequently

Figure 2.14. Effect of Parent and Subsidiary Characteristics on Subsidiary Lending Growth
(Percent)
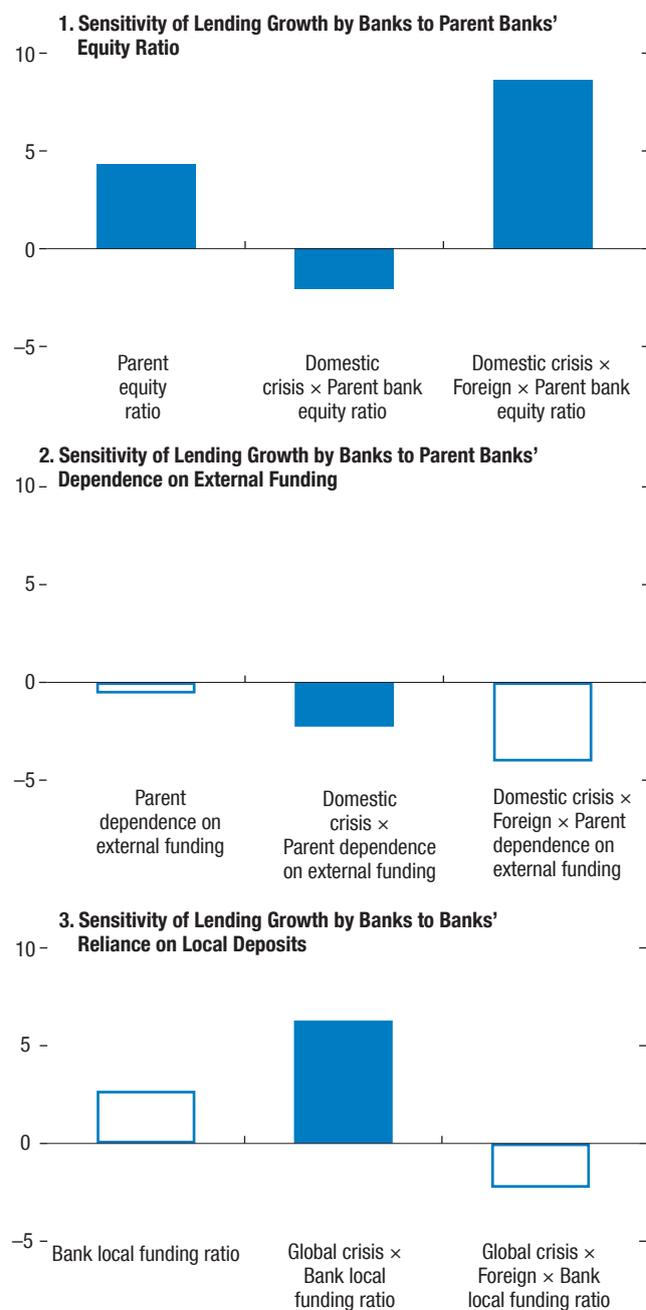
1. Sensitivity of Lending Growth by Banks to Parent Banks' Equity Ratio

2. Sensitivity of Lending Growth by Banks to Parent Banks' Dependence on External Funding

3. Sensitivity of Lending Growth by Banks to Banks' Reliance on Local Deposits

Source: IMF staff estimations.
Note: The bars represent the values of the estimated coefficients of the independent variables multiplied by the standard deviation of the parent or subsidiary characteristic of interest in a regression of lending growth at the bank level, comparing lending by domestic and foreign-owned banks (see Annex 2.2). Nonshaded bars correspond to coefficients that are not statistically significant at the 10 percent level. The marginal effect of each parent and subsidiary characteristic on lending growth by foreign subsidiaries during crises corresponds to the sum of the coefficients on the interaction terms Crisis x Characteristic and Crisis x Foreign x Characteristic. The estimation period spans 1998–2013.

used include the separation of specific activities into different legal entities, restrictions on business models, heightened regulatory requirements on a subconsolidated basis, and requirements to operate as subsidiaries instead of branches. These regulatory changes clearly had an effect on the patterns of international banking.

With regard to financial stability, the findings of the empirical analysis in this chapter lend support to a "multinational" banking model rather than a cross-border one (see Table 2.2). In contrast to international banks, which are mainly engaged in cross-border transactions out of their home countries, multinational banks operate locally through subsidiaries or branches (McCauley, McGuire, and von Peter 2012). All else equal, the shift to more local as opposed to cross-border operations results in a decline in the sensitivity of capital flows to global shocks and yields a reduction in contagion. Foreign banks operating locally rather than through cross-border transactions tend to contract credit much less following domestic shocks in host countries. More local claims may also translate into higher effectiveness of macroprudential policies given that local measures are less likely to be circumvented (Viñals and Nier 2014; IMF 2014d).

Governments can enhance the resilience to financial shocks. A higher reliance of *affiliates* on local funding sources increases their resilience to global shocks. At the *parent* level, higher capitalization levels and more stable funding sources positively contribute to financial stability in host countries. The results therefore support recent financial reforms aimed at strengthening banks' capital and liquidity buffers, especially the buffers of global systemically important banks. The results also call for the close monitoring of cross-border and foreign currency lending, given that both tend to compound domestic and global shocks.[22]

However, limiting cross-border lending across the board may jeopardize other benefits and create new risks, most of them not examined here. The analysis finds a positive effect of cross-border lending on domestic credit growth in *host countries* in normal times. Moreover, *home countries* benefit from having cross-border banking claims during times of global stress. However, the chapter does not consider

[22]Lower dependence of banks on external funding, along with stronger supervision, was shown to also reduce the fiscal costs of banking crises (IMF, forthcoming a).

Table 2.1. Effects of International Banking Linkages on the Incidence of Crises

	International Banking Linkages Measured with		
	Cross-Border Claims	International Claims	Local Claims
Real GDP Growth (year-over-year change, lagged)	−0.03	−0.05*	−0.05*
Credit Growth (lagged)	0.08***	0.06***	0.06***
Foreign-Exchange-Reserves-to-GDP Ratio (lagged)	−2.59	−1.96	−1.81
Foreign-Debt-to-GDP Ratio (lagged)	0.39**	0.48***	0.43***
Current-Account-Balance-to-GDP Ratio (lagged)	−0.14***	−0.16***	−0.15***
International Banking Linkages (lagged)	0.16	0.19	−0.14
Observations	1,324	1,840	1,792
Number of Countries	46	46	45
Chi-squared	41.8	47.5	46.5

Source: IMF staff estimates.

Note: IBL = international banking linkages. Banking crises are defined as in Laeven and Valencia (2013). The estimates are derived from a random effects panel probit model. The estimation period spans 2002–13, depending on data availability. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

the positive role cross-border flows can play in the allocation of global savings across countries, and the resulting benefits for investment and growth. Some of these benefits would likely be lost if divergences in the implementation of reforms agreed to at the global level and the ensuing regulatory fragmentation were to lead to a further retrenchment of global banks.[23] In addition, the changes in the provision of cross-border credit could raise new financial stability risks. As international issuances of corporate bonds continue to increase and bank direct cross-border lending declines, the locus of risks is shifting away from banks to nonbanks. Such a shift may complicate surveillance of the global financial system (see Chapter 3 of this *Global Financial Stability Report* and Chapter 2 of the October 2014 *Global Financial Stability Report*).

One policy challenge would therefore be to make the global financial system safer for cross-border lending. Doing so requires a more harmonized institutional and regulatory framework, with more cooperation and coordination among national regulators and supervisors. The analysis highlights the destabilizing effects of cross-border lending during shock episodes; therefore, the efforts should first focus on reducing the risks in times of crisis. In that regard, mutually compatible resolution frameworks could provide a global safety net, preventing the ad hoc imposition of ring-fencing measures.

[23]Furthermore, the chapter does not consider the particular case of banking unions, within which the distinction between cross-border and local claims is less relevant because of full regulatory and supervisory integration and the existence of common safety nets.

In particular, stronger intraregional banking linkages call for enhanced regional cooperation. Regionalization may increase vulnerability to regional crises. Dealing with such crises requires agreement on the resolution of regional banks and the availability of adequate fiscal backstops at the regional level. Box 2.3 provides a description of the progress made in this regard with the European banking union.

International forums have an important role to play in the advancement of regulatory standards and in ensuring their consistent application across countries (see Box 2.4 for a discussion of areas that warrant attention by financial regulators). Progress along these dimensions would reduce the scope for regulatory arbitrage between countries as well as between regulated banks and the shadow banking system.

Conclusion

The reduction in cross-border lending and the move toward more local and locally funded operations, partly fostered by regulatory reforms, should positively affect financial stability in host countries. The analysis in this chapter provides evidence that cross-border banking tends to aggravate adverse domestic and global shocks in host countries. In contrast, local lending by foreign banks is less sensitive to global shocks than are cross-border lending and portfolio inflows in general. Moreover, lending by foreign-owned subsidiaries, especially when their parents are well capitalized and less dependent on nondeposit funding sources, can help stabilize credit growth in the face of adverse domestic

Table 2.2. Main Findings of the Analysis of the Effects of International Banking Linkages on Domestic Credit Growth

Measure of International Banking Linkages	Effect on Domestic Credit Growth by Banks during Periods of	
	Adverse Domestic Shocks	Adverse Global Shocks
Cross-Border Claims	Amplifies the effect of the shock	Amplifies the effect of the shock
Local Lending through Branches and Subsidiaries	Dampens the effect of the shock	Amplifies the effect of the shock
Parent and Subsidiary Characteristics	Effect on Lending Growth by Foreign Subsidiaries during Periods of	
	Domestic Crises	Global Crises
Higher Parent Capitalization and Lower Parent Dependence on Nondeposit Funding	Dampens the effect of the crisis	Dampens the effect of the crisis
Higher Reliance of Subsidiaries on Local Deposits	Dampens the effect of the crisis	Dampens the effect of the crisis

Source: IMF staff.

shocks. Countries that are home to banks with large foreign assets still enjoy some risk diversification benefits from their international exposures.

However, the chapter does not look into the other benefits usually associated with cross-border banking flows. Although the decline in cross-border lending may reduce the international transmission of shocks, it may dampen benefits in other domains, such as financial deepening, the efficient allocation of global savings, and the diversification of financing sources.

Overall, the findings lend support to recent regulatory reforms strengthening the resilience of global banks while calling for further progress on the consistent implementation of regulatory standards and cross-border resolution. Given the trade-offs, an important policy challenge is to make the global financial system safer for cross-border lending. Only with sufficient international cooperation on the regulation and supervision of global banks can the full benefits of banking globalization be realized with no increased risk to financial stability.

Box 2.3. Banking Union in Europe

This box describes the banking union in Europe as a policy response to financial fragmentation in the euro area.

The global financial crisis and its aftermath led to fragmentation of euro area financial markets along national borders, peaking in the summer of 2012. Bank borrowing and lending costs became highly correlated with sovereign yields and both diverged markedly across countries (Figure 2.3.1; Goyal and others 2013). Local banks relied on their sovereigns as backstops in times of stress, linking the financial health of the sovereign and the banking sector: when banking sector conditions deteriorated, the sovereign's fiscal space to backstop shrank, and vice versa. Moreover, in a currency union, individual member states cannot use interest or exchange rates to support banks in response to local macroeconomic conditions.

To short-circuit bank-sovereign linkages and safeguard the functioning of the currency union and single market, policymakers formulated a plan for a banking union in the euro area, in which nationally distinct banking supervision and resolution frameworks would

be replaced by a shared and common framework.[1] The banking union goes a step further than European Union–wide initiatives to harmonize banking practice across countries, by establishing centralized mechanisms for these functions.[2]

Like many European institutions, the euro area mechanisms are layered on top of existing national institutions. Under the Single Supervisory Mechanism, which began operation in November 2014, the European Central Bank (ECB) is the overarching supervisory authority, directly supervising 120 significant banks—which together make up almost 85 percent of total euro area bank assets—and overseeing the supervision of the other 3,500 or so less significant banks in the euro area by their respective national competent authorities. Moreover, the ECB can take over the direct supervision of any less significant bank if it deems it necessary to ensure the integrity of euro area supervision or if the bank becomes systemically important.

Similarly, under the Single Resolution Mechanism, the newly established, stand-alone Single Resolution Board oversees the resolution of banks by national resolution authorities and directly handles the resolution of large and cross-border banks. Following European Union–wide practice, resolution may involve a bail-in of up to 8 percent of bank liabilities. Importantly, as of January 2016, the board will also have access to a common, industry-funded backstop called the Single Resolution Fund to facilitate resolution if needed. The eventual size of the industry backstop is planned to be €55 billion by 2024 (about 1 percent of covered deposits in the euro area). Together, these tools should help minimize recourse to taxpayer-financed bailouts. Moreover, as of December 2014, the European

Figure 2.3.1. Sovereign Bond and Corporate Lending Rates in the Euro Area
(Percent; GDP weighted)
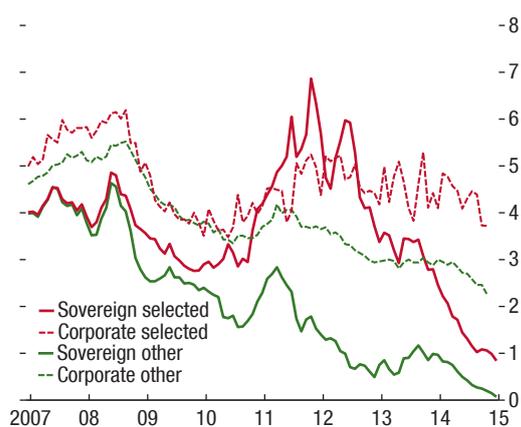
Sources: Bloomberg, L.P.; and Haver Analytics.
Note: Sovereign rates are the yields on five-year bonds. Corporate lending rates are for bank loans longer than five years. The rates for Belgium and Portugal reflect all maturities. "Selected countries" are those which experienced high borrowing spreads during the 2010–11 debt sovereign crisis and comprise Ireland, Italy, Portugal, and Spain. "Other countries" are Belgium, France, Germany, and the Netherlands.

This box was prepared by John Bluedorn.

[1] Plans for banking union began in earnest shortly after the European Central Bank's August 2012 announcement of the Outright Monetary Transactions instrument that contained and alleviated the turmoil in euro area financial markets.

[2] The key European Union initiatives include the Single Rulebook, to establish a common bank capital definition and implement Basel III prudential requirements (adopted in June 2013; phased in by 2019); the Bank Recovery and Resolution Directive, establishing common practices for bank resolution at the national level, which minimizes taxpayer support for banks, partly through the "bail-in" of bank creditors in resolution (adopted April 2014; in full force January 2016); and the Deposit Guarantee Scheme Directive, harmonizing rules for national deposit guarantee schemes and ensuring their upfront funding and uniform functioning (adopted April 2014; phased in by 2025).

Box 2.3 *(continued)*

Stability Mechanism may directly recapitalize banks under restructuring, acting as a kind of common fiscal backstop to the banking union. However, the hurdles for its use are very high (for example, bail-in must be exhausted), and the funding available is capped at €60 billion, which could be rapidly depleted in a systemic crisis.

By centralizing and sharing bank supervision and resolution, the banking union will eliminate the distinction between home and host supervisors for

euro area banks; enforce a high, common supervisory standard; enable the cross-border flow of bank liquidity; and ensure common and consistent treatment of investors and depositors in cases of bank distress. This centralization should help foster the single market and reduce fragmentation. However, a number of the practicalities and modalities still need to be worked out for the new institutions. Moreover, without an effective common fiscal backstop, the risk that bank-sovereign linkages could reemerge in a systemic crisis remains.

Box 2.4. Global Banks: Regulatory and Supervisory Areas in Need of Attention

This box highlights areas that warrant further attention from policymakers to make regulation and supervision of globally active banks more effective.

Cooperation and coordination

A pragmatic approach is needed to tackle the challenges global banking poses to national policymakers. Mutually shared objectives as well as a stronger cooperation and coordination process among regulators and supervisors are paramount.

- *Build trust through strengthened cooperation and coordination:* The international response to the financial crisis has markedly improved the regulatory framework. However, more attention could be devoted to strengthening supervision (Viñals and others 2010). Building and maintaining trust among supervisors is essential for effective cooperation among more integrated countries, especially during times of crisis. Confidence-building measures include the signing of memoranda of understanding (MoUs) or active participation in regional networks.[1,2] In general, policymakers should strive to remove any legal

impediments to cross-border cooperation among supervisory authorities, thus enabling them to share information effectively.[3]

- *Establish a dedicated framework for reforms with a cross-border reach:* The unilateral adoption of measures without international agreement can encourage other countries to take similar unilateral measures, leading to a spiral of regulatory fragmentation. Financial stability might be compromised if national approaches, introduced in the absence of an international standard, confront global banks with competing or contradictory requirements. In the long term, countries should consider moving toward an international system for mutual consultation of reform proposals with considerable cross-border reach. While retaining national autonomy for safeguarding financial stability, such a process could ensure broader application of substituted compliance with foreign regulatory regimes and internalize the effects of extraterritorial measures.[4]

Consistency

The details of the implementation and application of reforms deserve more attention. Inconsistent implementation of international standards across countries may

---

This box was prepared by Johannes Ehrentraud.

[1]MoUs establish a set of details for cooperation and information exchange with other supervisory authorities. Although such agreements failed to facilitate cooperation during the global financial crisis, their format could be revamped to include specific timelines and escalation procedures (IMF 2014a). For systemically important institutions, the Financial Stability Board (FSB) recommends setting up crisis management groups and institution-specific cross-border cooperation arrangements (FSB 2014).

[2]Examples include the Group of Banking Supervisors from Central and Eastern Europe or the Association of Supervisors of Banks of the Americas.

[3]In some countries, banking secrecy laws prevent authorities from sharing information with others if their counterparty's legal system provides the option of sharing the data with tax authorities.

[4]Substituted compliance describes the circumstances in which authorities permit legal subjects to use compliance with regulations in another jurisdiction as a substitute for compliance with local regulations. Deferring to the regulatory regimes of other countries often involves the determination of equivalence of the other countries' regulatory regimes.

Box 2.4 *(continued)*

cause global banks to book their transactions in jurisdictions with light-touch regulation or more preferential accounting rules.

- *Basel framework:* In 2012, the Basel Committee on Banking Supervision established a Regulatory Consistency Assessment Program to facilitate consistency in the adoption and implementation of Basel standards.[5] Current challenges to ensuring a level playing field include different phase-in requirements and transitional adjustments in banks' regulatory capital calculations, and excessive variability in the calculation of risk-weighted assets in banks using an internal-ratings-based approach. In Europe, the Capital Requirements Regulation and Capital Requirements Directive include a large number of options allowing for national discretion in the application of certain regulatory rules (Lautenschläger 2014). Further efforts are thus required to ensure that national discretion does not undermine the consistency of agreed-upon reforms.[6]

- *Accounting:* Although commissioned by the Group of 20 countries in 2009, convergence efforts by the International Accounting Standards Board and the U.S. Financial Accounting Standards Board have not yet produced a single set of global standards. For banks, one key area of divergence is the standards for credit loss provisioning. Diverging accounting approaches are costly for compliance and hamper comparability in loan loss estimates. They also create an uneven playing field because banks in different parts of the world will

be required to hold different loan loss reserves for a given level of loan portfolio riskiness.

Resolution and organizational banking structures

Effective cross-border resolution regimes would allow for more flexibility in the choice of legal structures for banking groups.

- *Advancing cross-border bank resolution:* The Key Attributes, which are the international standard for resolution regimes for financial institutions, are to be implemented in Financial Stability Board member jurisdictions by end-2015. They provide resolution authorities with comprehensive resolution powers. However, a number of considerable challenges remain. In some cases, there may be significant asymmetry of power in interactions between home and smaller host countries where the operations are not material to the institution's overall health. Moreover, national interests may still trump incentives for cooperative cross-border strategies. More work is needed on proposals for total loss-absorbing capacity, greater harmonization of creditor hierarchies, and depositor preference between countries (IMF 2014a).[7]

- *Legal banking structures:* Given a cooperative international environment, banking groups that find it more useful to be organized either as branches or as subsidiaries can be consistent with financial stability outcomes.[8] In some situations, however, imposing subsidiarization might seem preferable from a financial stability perspective but has efficiency costs for banks that would otherwise prefer to organize themselves through a branch structure in light of their business model. Harmonizing cross-border resolution regimes and burden-sharing agreements, along with effective cooperation and information sharing in crisis times, may change authorities' current preference for certain structures with regard to financial stability.

---

[5]Main elements of the Regulatory Consistency Assessment Program are the implementation and monitoring of Basel standards and consistency assessments carried out on a jurisdictional and thematic basis.

[6]In 2010, the FSB established a framework for encouraging stronger adherence to international standards. The three main elements are (1) FSB members' commitment to implement standards and publish evidence of their adherence, (2) periodic peer reviews for FSB and non-FSB members, and (3) a toolbox with positive and negative measures, including identification of non-cooperative jurisdictions (FSB 2010a, 2010b). This framework could be strengthened.

[7]In November 2014, the FSB issued a consultation paper on a common international standard on total loss-absorbing capacity for global systemic banks.

[8]See Fiechter and others (2011) for an exhaustive discussion.

Annex 2.1. Regression Analysis of the Drivers of the Decline in Foreign Banking Claims[24]

This annex describes the data and the regression model used to examine the drivers of the decline in foreign claims and provides more detailed results. Annex Table 2.1.1 lists the questions used to construct the model's regulatory index. Annex Table 2.1.2 provides a summary of data definitions and sources, and Annex Table 2.1.3 gives the coefficient estimates.[25]

Data on Foreign Banking Claims and the Regulatory Index

The dependent variable is the growth rate of foreign banking claims from a home country to a host country. In addition to total foreign claims, subcategories by type of claim and counterparty sector are also used. The data come from the BIS Consolidated Banking Statistics on an ultimate risk basis.[26] Statistical breaks are adjusted following Cerutti (2013). Quarterly claims over the period 2005:Q2–2013:Q3 are annualized and averaged over the precrisis (2005–07) and postcrisis periods (2011–13). The growth rate is computed by dividing the change in claims between the two periods by the average level in the two periods.[27]

The main explanatory variables of interest are the indices of changes in regulations on banks' international operations in home and host countries, based on the results of a survey conducted for the purpose of this chapter. Survey questions are classified into six categories

each for home and host countries, as shown in Annex Table 2.1.1. Each country-category pair is assigned a value of 1, 0, or –1 when the number of answers reporting a tightening of regulations is greater than, equal to, or smaller than, respectively, the number of answers reporting a loosening. The final index is calculated as a simple average of the scores for the six categories.

Regression Model

The regression model takes the following form:

$$\Delta claims_{ij} = \alpha + \beta\ home_i + \gamma\ host_j$$
$$+ \delta\ bilateral_{ij} + \varepsilon_{ij},$$

in which $\Delta claims_{ij}$ denotes the growth rate of claims from home country i to host country j. The terms $home_i$ and $host_j$ are vectors of variables specific to home and host countries, respectively. Each of these vectors includes three indices of regulatory changes (one based on the survey results and two based on World Bank data on capital requirements and supervisory power; see Annex Table 2.1.3), the change in the exchange rate against the U.S. dollar,[28] the GDP growth rate, and the real policy interest rate. In addition, $home_i$ includes an indicator of banking sector health in the precrisis period. The term $bilateral_{ij}$ is a vector of bilateral variables, comprising the log of the physical distance between the home and host countries, a common language dummy, two variables capturing the importance of the claims from the home country in the host country and of the claims in a given host country from the home country perspective in the precrisis period, and the growth rate of bilateral international claims in the precrisis period.[29] The coefficients α, β, γ, and δ are parameters or vectors of parameters, and ε_{ij} is the residual.

The results reported in the text are broadly robust to the following specification changes: First, the indices on changes in capital requirements and supervisory power (computed from World Bank data) are excluded, which is an important robustness check given that the indices are not available for some BIS reporting countries, including Japan and the United Kingdom. Second, real long-term interest rates in home and host countries are used instead of real policy interest rates to control for unconventional monetary policy effects. Third, euro

---

[24]The author of this annex is Hibiki Ichiue.

[25]For more details, see Ichiue and Lambert (forthcoming).

[26]The BIS Consolidated Banking Statistics record the consolidated positions of reporting banks' worldwide offices, excluding interoffice positions. They comprise two subsets, compiled on different bases: an immediate risk basis and an ultimate risk basis. The immediate risk basis data allocate banking claims to the country of residence of the immediate counterparty; the ultimate risk basis data allocate claims to the country in which the final risk lies. The immediate risk basis data offer better coverage of time series and countries. In addition, they distinguish between international claims (sum of cross-border claims and local claims in foreign currency) and local claims in local currency, whereas the ultimate risk basis data provide a breakdown between cross-border claims and total local claims (sum of local claims in both foreign and local currencies). The immediate risk basis data, however, do not reflect risk transfers and have limitations in capturing banks' bilateral risk exposures. These issues are irrelevant when immediate risk basis data are aggregated by country of origin. The analysis described in this annex uses bilateral claims and thus relies on ultimate risk basis data.

[27]The literature often uses log differences to calculate growth rates. However, such a method naturally discards data when claims are zero at the start or end of the period and cannot capture home countries' entry into or exit from host countries, which may actually result from changes in regulations or other factors.

[28]The BIS Consolidated Banking Statistics are reported in U.S. dollars by converting claims in other currencies. Changes in claims from one period to another may then only reflect valuation effects following exchange rate fluctuations with the actual underlying position remaining unchanged (Cerutti 2013).

[29]Precrisis values of the variables of bank health and bilateral importance are used to mitigate endogeneity concerns.

area countries are either excluded from the sample or aggregated and treated as a single country. Fourth, the *International Country Risk Guide* country risk rating is added to the variables for host countries. Fifth, home countries' sovereign rating index or a banking crisis dummy is added to the regression. Finally, the indices for the changes in regulations in home countries are instrumented by the capital regulation index and supervisory power index from the World Bank in 2003 and 2006, to deal with possible endogeneity bias. The choice

of instruments is justified by the possibility of regulation contagion as discussed in Demirgüç-Kunt and Detragiache (2002) and Houston, Lin, and Ma (2012).

Annex Table 2.1.3 reports the detailed results for different types of banking claims. The model is also estimated using the difference between the growth rates of different types of claims as the dependent variable. Significant nonzero coefficients confirm that two different types of claims have different sensitivities to some of the explanatory variables. These results are not reported.

Annex Table 2.1.1. Survey on the Regulation of Banks' International Operations

Category	Questions
Home Country Regulations	
Presence	Are domestic banks prohibited from acquiring foreign banks?
	Do domestic banks need their domestic supervisor's approval to acquire a foreign bank?
	Are domestic banks prohibited from establishing branches overseas?
	Do domestic banks need their domestic supervisor's approval to establish a branch overseas?
	Are domestic banks prohibited from establishing subsidiaries overseas?
	Do domestic banks need their domestic supervisor's approval to establish a subsidiary overseas?
	Are the requirements to obtain permission to establish a branch stricter than those applicable to subsidiaries?
Activity	Are domestic banks prohibited from making cross-border loans?
	Are domestic banks prohibited from purchasing foreign securities?
	Are there restrictions on the type of activities (for example, corporate and retail lending, residential mortgage, trade finance, long-term infrastructure finance, investment banking) that domestic banks can conduct overseas that do not apply to domestic operations?
	Are there additional regulatory requirements for domestic banks operating outside their home country beyond what would be required for similar operations conducted domestically?
Depositor Insurance	Are foreign depositors covered by deposit insurance?
Information	Do banking secrecy laws in your country limit your ability to share information about banks' operations and balance sheets with foreign supervisors?
Supervisory Discretion	Can the supervisor limit the range of activities a consolidated group may conduct and/or the locations in which activities can be conducted (including the closing of foreign offices) in specific circumstances (as per Basel Core Principle 12.6)?
Other	Did the authorities introduce other structural measures (such as Volcker reform, Vickers proposals, and others) that could weigh on the decision of some banks to expand internationally?
Host Country Regulations	
Presence	Is foreign ownership of domestically incorporated banks prohibited?
	Do foreign banks need the host country supervisor's authorization to acquire a domestic bank?
	What is the maximum percentage of foreign ownership of a domestic bank legally allowed?
	Are foreign banks prohibited from operating in the form of branches?
	Are the requirements for establishing a branch stricter for foreign banks than for domestic banks?
	Are there additional and/or different regulatory requirements for foreign-owned banks versus domestic banks?
Activity	Are there restrictions on the type of activities (for example, corporate and retail lending, residential mortgage, trade finance, long-term infrastructure finance, investment banking) that foreign banks can conduct domestically and that do not apply to domestic banks?
	Are there restrictions on domestic currency cross-border borrowing by banks?
	Are there restrictions on foreign currency cross-border borrowing by banks?
	Are banks required to fund part or all of their domestic operations with local deposits?
	Are there restrictions on the share of funding a domestically incorporated bank can obtain from a foreign parent?
	Are there restrictions on lending by domestically incorporated banks to a foreign parent?
Supervisory Discretion	Can the supervisory authorities impose ring-fencing measures in a discretionary way?
Information	Do banking secrecy laws in your country limit your ability to share information about banks' operations and balance sheets with foreign supervisors?
Resolution	Does the resolution authority have resolution powers over local branches of foreign firms and the capacity to use its powers either to support a resolution carried out by a foreign home authority or, in exceptional cases, to take measures on its own initiative (as per Key Attribute 7.3)?
Other	Did the authorities introduce other structural measures (such as Volcker reform, Vickers proposals, and others) that could weigh on the decision of some banks to retrench from your country?

Source: IMF staff.

Annex Table 2.1.2. Definition of the Variables

Variable	Description	Source
Claims	The dependent variable is the growth rate of bilateral claims from the precrisis period (2005–07) to the postcrisis period (2011–13), which is calculated from the change in average claims between the pre- and postcrisis periods. The precrisis growth rate of bilateral international claims, computed between 2002–04 and 2005–07, is used as a control variable.	BIS
International Operations Regulatory Index	An index constructed from answers to survey questions about regulation changes for 2006–14. See the text of this annex for more detail.	IMF
Capital Regulatory Index	Difference between Barth, Caprio, and Levine (2013) indexes in 2006 and 2011.	Barth, Caprio, and Levine (2013)
Official Supervisory Power Index	Difference between Barth, Caprio, and Levine (2013) indexes in 2006 and 2011.	Barth, Caprio, and Levine (2013)
Exchange Rate	Change in the exchange rate against the U.S. dollar between 2005–07 and 2011–13.	IMF, IFS
GDP	Growth rate from 2005–07 to 2011–13.	IMF, WEO
Real Policy Interest Rate	Change in the policy rate (or an alternative interest rate if not available) minus the one-year-ahead expected inflation rate between 2005–07 and 2011–13.	Central banks, Consensus Forecasts
Bank-Capital-to-Total-Assets Ratio	Average of the ratio in 2005, 2006, and 2007.	World Bank
Distance	Log distance between two cities, mostly capitals, in home and host countries. The distance to Hong Kong SAR is proxied by the distance to Taiwan Province of China.	http://privatewww.essex.ac.uk/~ksg/data-5.html
Common Language Dummy	The variable is equal to 1 when the home and host countries use a common language and zero otherwise.	Rose (2004)
Importance of Host in the Claims from Home	Ratio of bilateral claims from a home country to a host country to total claims from the home country to all host countries, averaged over 2005, 2006, and 2007.	BIS
Importance of Home in the Claims on Host	Ratio of bilateral claims from a home country to a host country to total claims from all home countries to the host country, averaged over 2005, 2006, and 2007.	BIS

Source: IMF staff.

Note: BIS = Bank for International Settlements; IFS = *International Financial Statistics;* WEO = *World Economic Outlook.*

Annex Table 2.1.3. Results of Country-Level Regression for the Drivers of the Changes in Foreign Banking Claims

		By Instrument		By Sector		
	Foreign Claims	Cross Border	Local	Nonbank	Banks	Public
Regulatory Index (changes)						
International Operations (home)	−179.60***	−136.95*	131.74	−184.27**	20.88	249.65
International Operations (host)	−41.62**	−42.73**	9.26	28.17	−42.23*	6.91
Capital (home)	−7.09***	−2.02	3.96	−6.67***	0.43	4.14
Capital (host)	0.66	0.97	1.50	2.52	−2.01	7.47***
Supervisory Power (home)	3.88***	3.89***	1.73	2.23*	1.24	10.17***
Supervisory Power (host)	1.08	1.96	−3.51	2.10	0.93	−0.02
Exchange Rates (percent appreciation against US$)						
Home	2.89***	3.01***	−7.23***	0.01	4.21***	−10.26**
Host	0.07	0.20	1.28**	0.07	0.25	0.18
GDP (percent change)						
Home	0.39	0.44	7.07***	0.15	8.87***	1.82***
Host	0.88***	0.93***	1.22***	1.24***	0.12	0.65***
Real Policy Interest Rate (percentage point changes)						
Home	−1.54	0.68	55.21***	−7.60*	61.62**	7.77
Host	−5.00***	−6.27***	−2.58	−8.45***	−5.71**	−1.27
Bank-Capital-to-Total-Assets Ratio (percent in 2005–07)						
Home	10.50***	12.07***	18.52***	13.82***	12.51**	8.82***
Bilateral Geographic and Cultural Variables						
Distance (log, km)	−11.72***	−10.78**	−33.19***	−14.08***	1.76	−9.26*
Common Language Dummy	−3.50	−3.73	−3.66	−13.60	15.01	−1.40
Bilateral Share (percent in 2005–07)						
Host Country's Share of Claims from Home	0.77	0.82	−1.31	1.00	−2.65**	−1.11*
Home Country's Share of Claims on Host	0.86**	−0.10	0.63	0.17	1.40**	0.05
Bilateral Lagged Claims (percent changes from 2002–04 to 2005–07)						
International Claims	−0.18***	−0.17**	−0.36**	−0.19**	0.27**	−0.03
Number of Observations	518	433	328	424	352	417
R^2	0.27	0.27	0.22	0.28	0.26	0.19

Source: IMF staff estimates.

Note: km = kilometer; White's (1980) robust standard errors are used. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Annex 2.2. Analysis of the Role of International Banking Linkages in Mitigating or Amplifying Shocks[30]

This annex summarizes the analysis of the role played by global banks in mitigating or amplifying domestic and global shocks. The analysis uses panel data techniques on country-level and bank-level data to estimate the impact of international banking linkages on credit growth.

Country-level analysis

International banking linkages are measured in three ways, by (1) the ratio of cross-border claims to the total assets of the banking sector, (2) the ratio of international claims to total banking assets, and (3) the ratio of foreign subsidiaries' and branches' local claims in local currency to total banking assets. The second measure includes foreign currency domestic claims of foreign bank affiliates whereas the first one focuses exclusively on cross-border claims.[31] All of these variables are available from the BIS and adjusted for statistical breaks following Cerutti (2013). Other measures, such as the ratio of foreign claims to the nonfinancial sector to total domestic credit to the nonfinancial sector, are used for robustness checks.

Global (foreign) stress is measured by the VIX. Results are similar when an alternative measure is used (such as average credit default swap (CDS) prices of the global systemically important banks identified by the Financial Stability Board). Domestic stress is measured by the average expected default frequency (EDF) of the domestic banking sector (weighted by the size of the domestic banks). The EDF is used instead of CDS prices because the former has much better data coverage—CDS data are only available for the largest banks. Since the EDF can be contaminated by global stress, a measure of domestic stress purged of the effect of global stress (residual of a regression of the EDF on the VIX) is used as a robustness check. The average EDF for all listed firms, a broader measure of domestic shock, is also considered. The results are unchanged. Alternative specifications include a dummy for the

global financial crisis (2008–09) and a dummy for domestic banking crises (Laeven and Valencia 2013).

The econometric specification is as follows:

$$
\begin{aligned}
\Delta bankcredit_{i,t} = {} & \alpha_i + \beta_1 X_{i,t-1} + \beta_2\, domestic\ shock_{i,t} \\
& + \beta_3\, global\ shock_t + \beta_4\, IBL_{i,t-1} \\
& + \gamma_1\, IBL_{i,t-1} \times domestic\ shock_{i,t} \\
& + \gamma_2\, IBL_{i,t-1} \times global\ shock_{i,t} \\
& + \beta_5\, domestic\ crisis_{i,t} \\
& + \beta_6\, global\ crisis_t + \gamma_3\, IBL_{i,t-1} \\
& \times domestic\ shock_{i,t} \times domestic\ crisis_t \\
& + \gamma_4\, IBL_{i,t-1} \times foreign\ shock_{i,t} \\
& \times global\ crisis_t + \varepsilon_{i,t},
\end{aligned}
$$

in which $\Delta bankcredit_{i,t}$ is the quarterly growth in bank claims to the private sector available from the IMF *International Financial Statistics;* α_i and $X_{i,t-1}$ capture country-level effects with country fixed effects and the real GDP growth rate; *domestic shock*$_{i,t}$ and *global shock*$_t$ are measured by the EDF of the banking sector and the VIX, respectively; and $IBL_{i,t-1}$ is the measure of international banking linkages. The main coefficients of interest are the γ coefficients that capture the interaction between the level of international banking linkages and the sensitivity of credit to domestic and foreign shocks. The baseline model is supplemented by the inclusion of dummies for domestic and global crises (*domestic crisis*$_{i,t}$ and *global crisis*$_t$) and their interactions.

Annex Table 2.2.1 summarizes the results from the panel regressions. Driscoll-Kraay standard errors are used to account for the potential heteroskedasticity and autocorrelation of standard errors. The results are robust to adding one lag of the dependent variable on the right-hand side to account for the persistence of credit growth or the possibility of boom-bust cycles, and to including additional country-level control variables. They also hold for subsamples of advanced economies and emerging markets and when the European countries are excluded from the sample. Finally, the results are robust to the exclusion of Vienna Initiative countries.

The above analysis is from the perspective of countries that are host to foreign banks. Annex Table 2.2.2 summarizes the results of the panel regressions from the perspective of the home country of international banks. For this specification, international banking linkages are

---

[30]The authors of this annex are Pragyan Deb and Kai Yan.

[31]To be precise, the first measure is not exactly a subset of the second measure because cross-border claims are reported on an ultimate risk basis whereas international claims are compiled on an immediate risk basis. See Annex 2.1.

measured by the ratio of nondomestic claims of banks domiciled in the country to the total domestic banking sector assets of the country. International banking linkages are measured in two ways: (1) ratio of cross-border claims to domestic banking assets and (2) ratio of international claims (including both cross-border claims and local claims of affiliates in foreign currency) to domestic banking assets. Local claims in local currency are less relevant from a home country perspective and are therefore not considered in this analysis.

Bank-Level Analysis of the Stabilization Role of Foreign Banks

The analysis uses balance sheet data for a panel of banks during the period 1998–2013. The data set contains 25,568 domestic- or foreign-owned subsidiaries over 15 years, though the number of active banks for which balance sheet data are available is much smaller and varies from year to year.

The data set is constructed in two steps. First, subsidiary banks are matched with their parent banks using ownership data from 2007 to 2013 from Bankscope's ownership database, which is extended back to 1998 (Porter and Serra 2011). The data set includes commercial banks, savings banks, cooperative banks, and bank holding companies. Adjustments are made to correct for missing or incorrectly identified parents, when possible. Independent banks or banks with no parent are considered to be their own parent. Second, bank parents' and subsidiaries' financial statement data since 1998 are obtained from Bankscope. Balance sheet data are annual, as of year-end, and on a consolidated basis. Unconsolidated balance sheet data are used to control for subsidiaries' characteristics. Country-level data are the same as used in the macro-level analysis.

Observations that show an annual growth rate of loans of more than 100 percent are dropped. These observations are likely to correspond to newly estab-

lished subsidiaries operating for only a few months in their year of incorporation and represent fewer than 3 percent of the total number of observations.

The econometric specification is the following:

$$\Delta loan_{i,j,k,t} = \alpha\, X_{i,t-1} + \rho\, foreign_i + \beta\, bankcrisis_{k,t}$$
$$+ \theta\, bankcrisis_{k,t} \times foreign_i + \delta\, bankcrisis_{k,t}$$
$$\times X_{i,t-1} + \gamma\, bankcrisis_{k,t} \times X_{i,t-1} \times foreign_i$$
$$+ controls_{j,k,t} + \varepsilon_{i,j,k,t},$$

in which $foreign_i$ is a dummy variable equal to 1 if the bank is owned by a foreign bank. The variable $bankcrisis_{k,t}$ is now a dummy variable equal to 1 if the host country of the bank is having a banking crisis. In some specifications, $bankcrisis_{k,t}$ is replaced by a global financial crisis dummy, which equals 1 during the global financial crisis (2008–09). The term $X_{i,t-1}$ still denotes the bank-level characteristics of interest. We subtract the mean of $X_{i,t-1}$ from $X_{i,t-1}$ to facilitate the interpretation of the results. The two-way interaction terms can therefore be interpreted as the marginal impact of being in the treatment group (when the dummy is equal to 1) when the bank's characteristics are that of an average bank.

The coefficients ρ, θ, and γ are the focus of the analysis. A statistically significant ρ suggests that the lending behavior of foreign-owned subsidiaries differs on average from that of domestic banks. The coefficient θ measures the stabilization role played by foreign-owned subsidiaries during banking crises. The coefficient γ measures the way in which different characteristics of the parent bank or subsidiaries affect foreign subsidiaries' credit growth during crises. A negative and significant γ suggests that foreign-owned subsidiaries of a banking group with certain characteristics are less likely to support credit growth during financial crises.

The model is estimated with a standard fixed effects panel estimation method, with Driscoll-Kraay standard errors. Annex Table 2.2.3. reports the detailed results.

Annex Table 2.2.1. Credit Growth Panel Regressions from the Perspective of Host Countries of Foreign Banks

	International Banking Linkages Measured with					
	Cross-Border Claims		International Claims		Local Claims	
Real GDP Growth (year-over-year change, lagged)	0.26	0.31	0.35**	0.36**	0.34**	0.35**
Domestic Shock (average EDF)	−2.43*	−2.38	−2.29*	−1.19	−2.81**	−1.6
Global (foreign) Shock (VIX)	−12.99**	−17.19***	−11.19**	−13.35**	−12.00**	−14.03**
International Banking Linkages (lagged)	2.36***	2.10***	1.29**	1.25*	−1.47	−1.72
IBL × Domestic Shock	−4.43***	−4.97***	−3.37***	−3.44***	−0.77	−0.51
IBL × Global Shock	−2.26**	−0.15	−2.34***	−1.48	−0.76*	−1.14*
Domestic Crisis		−1.06		−2.27*		−2.35*
IBL × Domestic Shock × Domestic Crisis		12.22*		2.28		2.2
Global Crisis (2008–09)		1.98		1.78		1.77
IBL × Foreign Shock × Global Crisis		−1.96		−0.83		0.24
Number of Observations	1,486	1,486	2,174	2,174	2,135	2,135
Number of Countries	49	49	49	49	49	49
R^2	0.12	0.13	0.09	0.10	0.09	0.11

Source: IMF staff estimates.

Note: EDF = expected default frequency; IBL = international banking linkages; VIX = Chicago Board Options Exchange S&P 500 Volatility Index. The dependent variable is the quarterly growth in bank claims to the private sector. Country fixed effects are included, but not reported. Driscoll-Kraay standard errors are used to take into account potentially heteroscedastic and autocorrelated standard errors. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Annex Table 2.2.2. Credit Growth Panel Regressions from the Perspective of Home Countries of Foreign Banks

	International Banking Linkages Measured with	
	Cross-Border Claims	International Claims
Real GDP Growth (year-over-year change, lagged)	0.25	0.17
Domestic Shock (average EDF)	−2.64	−2.8
Global (foreign) Shock (VIX)	−13.99**	−15.69**
International Banking Linkages (lagged)	2.86	2.11
IBL × Domestic Shock	4.48	−0.05
IBL × Global Shock	19.49	25.39*
Number of Observations	749	1,250
Number of Countries	23	27
R^2	0.12	0.09

Source: IMF staff estimates.

Note: EDF = expected default frequency; IBL = international banking linkages; VIX = Chicago Board Options Exchange S&P 500 Implied Volatility index. The dependent variable is the quarterly growth in bank claims to the private sector. Country fixed effects are included, but not reported. Driscoll-Kraay standard errors are used to take into account potentially heteroscedastic and autocorrelated standard errors. *$p < 0.10$; **$p < 0.05$.

Annex Table 2.2.3. Bank-Level Evidence on Foreign Bank Stabilization Role during Crises

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Loan Growth			
Host Country GDP Growth	0.52**	0.41***	0.43***	0.58***	0.35***	0.34***	0.54***
Domestic (host country) Banking Crisis	−16.46***	−20.02***	−19.97***	−21.12***			
Global Crisis	−6.92**				−10.35***	−11.42***	−13.76***
Foreign Ownership Dummy	4.35***	−0.82	−2.36	0.14	6.69*	4.41	3.89**
Domestic Crisis × Foreign	7.05***	3.06	4.00**	2.23*			
Global Crisis × Foreign	−8.59***				−7.22***	−5.54**	−4.85***
Parent Equity Ratio		62.95***			66.45***		
Foreign × Parent Equity Ratio		−38.08			−73.72		
Domestic Crisis × Parent Equity Ratio		−30.21*					
Domestic Crisis × Foreign × Parent Equity Ratio		126.05*					
Global Crisis × Parent Equity Ratio					−38.80		
Global Crisis × Foreign × Parent Equity Ratio					143.25***		
Parent Dependence on Ext. Funding			−0.36			0.61	
Foreign × Parent Dependence on Ext. Funding			−2.02**			3.42***	
Domestic Crisis × Parent Dependence on Ext. Funding			−1.46**				
Domestic Crisis × Foreign × Parent Dependence on Ext. Funding			−2.61				
Global Crisis × Parent Dependence on Ext. Funding						−3.48***	
Global Crisis × Foreign × Parent Dependence on Ext. Funding						−3.07**	
Subsidiary Local Funding Ratio				21.77***			11.18
Foreign × Subsidiary Local Funding Ratio				−8.00**			−8.87
Domestic Crisis × Subsidiary Local Funding Ratio				16.29***			
Domestic Crisis × Foreign × Subsidiary Local Funding Ratio				−0.18			
Global Crisis × Subsidiary Local Funding Ratio							26.08***
Global Crisis × Foreign × Subsidiary Local Funding Ratio							−9.41
Constant	18.35***	15.84***	15.90***	16.28***	16.12***	16.50***	18.37***
Observations	13,167	7,557	7,437	11,022	7,557	7,437	11,022
Number of Banks	2,031	1,491	1,471	1,751	1,491	1,471	1,751
R^2	0.14	0.10	0.10	0.13	0.09	0.09	0.14

Source: IMF staff calculations.

Note: Ext. = external. The dependent variable is the annual growth rate of loans by banks. $*p < 0.10$; $**p < 0.05$; $***p < 0.01$.

Annex 2.3. Analysis of the Effect of International Banking Linkages on the Probability of a Banking Crisis[32]

This annex summarizes the analysis of the effect of banking linkages on the incidence of banking crises using a discrete response model (probit). International banking linkages are measured as in Annex 2.2.

The dependent variable, host country banking crisis, is defined as in Laeven and Valencia (2013). Following the literature, the crisis variable takes the value 1 in the first year of a crisis, is set to missing for the subsequent two years (as banks are impaired in the aftermath of a banking crisis), and is zero in the noncrisis years.[33] The sample period covers the period 2002–13 (2005–13 when international banking linkages are measured with cross-border claims). The probit model takes the following form:

$$P(hostcrisis_{i,t}|X) = F(\alpha\,X_{i,t-1} + \beta\,IBL_{i,t-1}$$

$$+\,\gamma\,global\,shock_t + \delta\,IBL_{i,t-1}$$

$$\times\,global\,shock_t + \varepsilon_{i,t}),$$

in which $X_{i,t-1}$ denotes the set of variables used in the benchmark specification. Drawing on the crisis prediction literature, $X_{i,t-1}$ controls for credit growth in the run-up to the crisis, real GDP growth rate, foreign

exchange reserves, foreign debt, and the current account balance. These variables are obtained from the IMF's International Financial Statistics database. $IBL_{i,t-1}$ measures the level of international banking linkages in country i. The term $global\,shock_t$ captures global (foreign) stress measured by the VIX. The Greek letters α, β, γ, and δ are parameters or vectors of parameters of the explanatory variables and their interactions, and $\varepsilon_{i,t}$ is the residual.

Annex Table 2.3.1 shows the detailed results from the probit regressions. Similar results are obtained using a logistic (or logit) regression model. Although these regressions include country-level control variables, they do not include country fixed effects. Whereas the inclusion of fixed effects biases the results of the probit regressions but not those of the logit regressions, the logit specification with fixed effects ignores all countries that did not have a crisis during the sample period, leaving a relatively small and potentially non-representative sample of countries. Including or substituting the measure of global stress with a dummy for the global financial crisis does not change the results.

The results are robust to the use of additional explanatory variables such as financial depth (measured by credit-to-GDP ratio and a more inclusive measure developed by IMF [forthcoming c]), government primary deficit, inflation, real effective exchange rate misalignment, and other country-level controls for governance and supervisory powers. In addition, alternate definitions of crises, derived from episodes of slowdown in GDP growth rates and domestic credit, yielded similar results.

---

[32]The author of this annex is Pragyan Deb.

[33]Minoiu and others (forthcoming) and Gourinchas and Obstfeld (2012) drop four years of observations after the crisis. This chapter uses only two years to account for quarterly frequency of the data and the shorter period under consideration.

Annex Table 2.3.1. Detailed Probit Regression Results

	International Banking Linkages Measured with					
	Cross-Border Claims		International Claims		Local Claims	
Real GDP Growth (year-over-year change, lagged)	−0.03	0.03	−0.05*	−0.01	−0.05*	−0.01
Credit Growth (lagged)	0.08***	0.05***	0.06***	0.04**	0.06***	0.04**
Foreign-Exchange-Reserves-to-GDP Ratio (lagged)	−2.59	−4.89*	−1.96	−3.02	−1.81	−2.94
Foreign-Debt-to-GDP Ratio (lagged)	0.39**	0.36*	0.48***	0.48***	0.43***	0.42**
Current-Account-Balance-to-GDP Ratio (lagged)	−0.14***	−0.15***	−0.16***	−0.17***	−0.15***	−0.17***
International Banking Linkages (lagged)	0.16	0.29	0.19	0.31	−0.14	−0.69
Global (foreign) Shock (VIX)		7.26***		6.36***		5.78***
IBL × Global Shock		−0.86		−0.82		−6.57
Observations	1,324	1,284	1,840	1,800	1,792	1,753
Number of Countries	46	46	46	46	45	45
Chi-squared	41.78	44.60	47.51	59.72	46.51	62.54

Source: IMF staff estimates.
Note: IBL = international banking linkages; VIX = Chicago Board Options Exchange S&P 500 Implied Volatility Index. Banking crises are defined as in Laeven and Valencia (2013). The estimates are derived from a random effects panel probit model. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

References

Allen, Franklin, Thorsten Beck, Elena Carletti, Philip Lane, Dirk Schoenmaker, and Wolf Wagner. 2011. *Cross-Border Banking in Europe: Implications for Financial Stability and Macroeconomic Policies.* London: Center for Economic and Policy Research.

Bailey, Natalia, Sean Holly, and Hashem Pesaran. Forthcoming. "A Two Stage Approach to Spatiotemporal Analysis with Strong and Weak Cross-Sectional Dependence." *Journal of Applied Econometrics.*

Barth, James R., Gerard Caprio, and Ross Levine. 2013. "Bank Regulation and Supervision in 180 Countries from 1999 to 2011." Working Paper No. 18733, National Bureau of Economic Research, Cambridge, Massachusetts.

Berkmen, Pelin, Gaston Gelos, Robert Rennhack, and James Walsh. 2012. "The Global Financial Crisis: Explaining Cross-Country Differences in the Output Impact." *Journal of International Money and Finance* 31 (1): 42–59.

Bernanke, Ben S. 2005. "The Global Saving Glut and the U.S. Current Account Deficit." Remarks at the Sandridge Lecture, Virginia Association of Economists, Richmond, Virginia, March 10.

Bremus, Franziska, and Marcel Fratzscher. 2014. "Drivers of Structural Change in Cross-Border Banking since the Global Financial Crisis." Discussion Papers of DIW Berlin 1411, German Institute for Economic Research, Berlin.

Bruno, Valentina, and Hyun Song Shin. Forthcoming. "Cross-Border Banking and Global Liquidity." *Review of Economic Studies.*

Cerutti, Eugenio. 2013. "Banks' Foreign Credit Exposures and Borrowers' Rollover Risks: Measurement, Evolution, and Determinants." Working Paper No. 13/9, International Monetary Fund, Washington.

Cerutti, Eugenio, Stijn Claessens, and Patrick McGuire. (2012). "Systemic Risks in Global Banking: What Can Available Data Tell Us and What More Data Are Needed?" BIS Working Papers No. 376, Monetary and Economic Department. Bank for International Settlements, Basel, Switzerland.

Cetorelli, Nicolas, and Linda S. Goldberg. 2011. "Global Banks and International Shock Transmission: Evidence from the Crisis." *IMF Economic Review* 59 (1): 41–76.

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

Claessens, Stijn, and Luc Laeven. 2004. "What Drives Bank Competition? Some International Evidence." *Journal of Money, Credit, and Banking* 36 (3): 563–83.

Claessens, Stijn, and Neeltje van Horen. 2014. "The Impact of the Global Financial Crisis on Banking Globalization." Working Paper No. 14/197, International Monetary Fund, Washington.

Cull, Robert, and María Soledad Martínez Pería. 2010. "Foreign Bank Participation in Developing Countries. What Do We Know about the Drivers and Consequences of This Phenomenon?" Policy Research Working Paper 5398, World Bank, Washington.

De Haas, Ralph, and Iman van Lelyveld. 2006. "Foreign Banks and Credit Stability in Central and Eastern Europe. A Panel Data Analysis." *Journal of Banking and Finance* 30 (7): 1927–952.

———. 2010. "Internal Capital Markets and Lending by Multinational Bank Subsidiaries." *Journal of Financial Intermediation* 19 (1): 1–25.

Demirgüç-Kunt, Asli, and Enrica Detragiache. 2002. "Does Deposit Insurance Increase Banking System Stability? An Empirical Investigation." *Journal of Monetary Economics* 49 (7): 1373–406.

Demirgüç-Kunt, Asli, Roos Levine, and Hong-Ghi Min. 1998. "Opening to Foreign Banks: Issues of Stability, Efficiency, and Growth." In *The Implications of Globalization of World Financial Markets*, edited by Seongtae Lee. Seoul: Bank of Korea.

Detragiache, Enrica, Thierry Tressel, and Poonam Gupta. 2008. "Foreign Banks in Poor Countries: Theory and Evidence." *Journal of Finance* 63 (5): 2123–60.

Fiechter, Jonathan, İnci Ötker-Robe, Anna Ilyina, Michael Hsu, André Santos, and Jay Surti. 2011. "Subsidiaries or Branches: Does One Size Fit All?" Staff Discussion Note No. 11/04, International Monetary Fund, Washington.

Figuet, Jean-Marc, Thomas Humblot, and Delphine Lahet. 2015. "Cross-Border Banking Claims on Emerging Countries: The Basel III Banking Reforms in a Push and Pull Framework." *Journal of International Financial Markets, Institutions, and Money* 34: 294–310.

Financial Stability Board (FSB). 2010a. "FSB Framework for Strengthening Adherence to International Standards." Financial Stability Board, Basel.

———. 2010b. "Promoting Global Adherence to International Cooperation and Information Exchange Standards." Financial Stability Board, Basel.

———. 2014. "Structural Banking Reforms." Financial Stability Board, Basel.

Forbes, Kristin. 2014. "Financial 'Deglobalization'? Capital Flows, Banks, and the Beatles." Speech at Queen Mary University, London, November 18.

Giannetti, Mariassunta, and Luc Laeven. 2012. "The Flight Home Effect: Evidence from the Syndicated Loan Market during Financial Crises." *Journal of Financial Economics* 104 (1): 23–43.

Gilchrist, Simon, Jae W. Sim, and Egon Zakrajšek. 2013. "Misallocation and Financial Market Frictions: Some Direct Evidence from the Dispersion in Borrowing Costs." *Review of Economic Dynamics* 16 (1): 159–76.

Goldberg, Linda. 2009. "Understanding Banking Sector Globalization." *IMF Staff Papers* 56 (1): 171–97.

Gourinchas, Pierre-Olivier, and Maurice Obstfeld. 2012. "Stories of the Twentieth Century for the Twenty-First." *American Economic Journal: Macroeconomics* 4 (1): 226–65.

Goyal, Rishi, Petya Koeva Brooks, Mahmood Pradhan, Thierry Tressel, Giovanni Dell'Ariccia, Ross Leckow, Ceyla Pazarba-

sioglu, and an IMF Staff Team. 2013. "A Banking Union for the Euro Area." IMF Staff Discussion Note No. 13/01, International Monetary Fund, Washington.

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

Houston, Joel, Chen Lin, and Yue Ma. 2012. "Regulatory Arbitrage and International Bank Flows." *Journal of Finance* 67 (5): 1845–95.

Ichiue, Hibiki, and Frederic Lambert. Forthcoming. "The Decline in Foreign Banking Claims: An Analysis with New Regulatory Survey Data." IMF Working Paper, International Monetary Fund, Washington.

International Monetary Fund (IMF). 2013a. *Central, Eastern, and Southeastern Europe—Regional Economic Issues*, Washington, April.

———. 2013b. "Key Aspects of Macroprudential Policy." IMF Policy Paper, International Monetary Fund, Washington, June.

———. 2014a. "Cross-Border Bank Resolution: Recent Developments." IMF Policy Paper, Washington, June 2. http://www.imf.org/external/np/pp/eng/2014/060214.pdf.

———. 2014b. "The Financing of Infrastructure in Sub-Saharan Africa: A Changing Landscape." Chapter 3, *Regional Economic Outlook: Sub-Saharan Africa*, Washington, October.

———. 2014c. "Global Liquidity—Issues for Surveillance." IMF Policy Paper, International Monetary Fund, Washington, March 11. http://www.imf.org/external/np/pp/eng/2014/031114.pdf.

———. 2014d. "Staff Guidance Note on Macroprudential Policy." IMF Policy Paper, International Monetary Fund, Washington, December.

———. Forthcoming a. "From Banking to Sovereign Stress—Implications for Public Debt." IMF Policy Paper, International Monetary Fund, Washington.

———. Forthcoming b. "Pan-African Banks: Opportunities and Challenges for Cross-Border Oversight." African Department Paper, International Monetary Fund, Washington.

———. Forthcoming c. "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." Staff Discussion Note, International Monetary Fund, Washington.

Kapan, Tümer, and Camelia Minoiu. 2013. "Balance Sheet Strength and Bank Lending during the Global Financial Crisis." Working Paper No. 13/102, International Monetary Fund, Washington.

Laeven, Luc, and Fabian Valencia. 2013. "Systemic Banking Crises Database." *IMF Economic Review* 61 (2): 225–70.

Lam, Raphael. 2013. "Cross-Border Activity of Japanese Banks." Working Paper No. No. 13/235, International Monetary Fund, Washington.

Lautenschläger, Sabine. 2014. "Start of the Single Supervisory Mechanism: From the Comprehensive Assessment to Day-

to-Day Supervision." Speech at the Euro Finance Week, Frankfurt, November.

McCauley, Robert, Patrick McGuire, and Götz von Peter. 2012. "After the Global Financial Crisis: From International to Multinational Banking?" *Journal of Economics and Business* 64 (1): 7–23.

McGuire, Patrick, and Götz von Peter. 2009. "The US Dollar Shortage in Global Banking and the International Policy Response." BIS Working Paper 291, Bank for International Settlements, Basel.

Minoiu, Camelia, Chanhyun Kang, V. S. Subrahmanian, and Anamaria Berea. Forthcoming. "Does Financial Connectedness Predict Crises?" *Quantitative Finance*.

Ongena, Steven, Alexander Popov, and Gregory F. Udell. 2013. "'When the Cat's Away the Mice Will Play': Does Regulation at Home Affect Bank Risk-Taking Abroad?" *Journal of Financial Economics* 108 (3): 727–50.

Peek, Joe, and Eric S. Rosengren. 2000. "Implications of the Globalization of the Banking Sector: The Latin American Experience." *Federal Reserve Bank of Boston Conference Series* 44 (June): 145–85.

Porter, Nathan, and Cesar Serra. 2011. "Evidence from Cross-Border Banking Groups." In "Mapping Cross-Border Financial Linkages: A Supporting Case for Global Financial Safety Nets." IMF Strategy, Policy, and Review Department (June 1), International Monetary Fund, Washington.

Reinhardt, Dennis, and Steven J. Riddiough. 2014. "The Two Faces of Cross-Border Banking Flows: An Investigation into the Links between Global Risk, Arms-Length Funding, and Internal Capital Markets." Working Paper 498, Bank of England, London.

Rose, Andrew K. 2004. "Do We Really Know That the WTO Increases Trade?" *American Economic Review* 94 (1): 98–114.

Saldías, Martin, and Ben Craig. Forthcoming. "Spatial Dependence and Data-Driven Networks of International Banks." Federal Reserve Bank of Cleveland Working Paper.

Schnabl, Philipp. 2012. "The International Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market." *Journal of Finance* 67 (3): 897–932.

Schoenmaker, Dirk, and Wolf Wagner. 2011. "The Impact of Cross-Border Banking on Financial Stability." Tinbergen Institute Discussion Paper 11-054/DSF18.

Viñals, José, and Erlend Nier. 2014. "Collective Action Problems in Macroprudential Policy and the Need for International Coordination." *Financial Stability Review* 18, Banque de France, Paris.

Viñals, José, Jonathan Fiechter, Aditya Narain, Jennifer Elliott, Ian Tower, Pierluigi Bologna, and Michael Hsu. 2010. "The Making of Good Supervision: Learning to Say 'No.'" IMF Staff Position Note No. 10/08, International Monetary Fund, Washington.

White, Halbert. 1980. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48 (4): 817–38.

THE ASSET MANAGEMENT INDUSTRY AND FINANCIAL STABILITY

SUMMARY

Financial intermediation through asset management firms has many benefits. It helps investors diversify their assets more easily and can provide financing to the real economy as a "spare tire" even when banks are distressed. The industry also has various advantages over banks from a financial stability point of view. Nonetheless, concerns about potential financial stability risks posed by the asset management industry have increased recently as a result of that sector's growth and of structural changes in financial systems. Bond funds have grown significantly, funds have been investing in less liquid assets, and the volume of investment products offered to the general public in advanced economies has expanded substantially. Risks from some segments of the industry—leveraged hedge funds and money market funds—are already widely recognized.

However, opinions are divided about the nature and magnitude of any associated risks from less leveraged, "plain-vanilla" investment products such as mutual funds and exchange-traded funds. This chapter examines systemic risks related to these products conceptually and empirically.

In principle, even these plain-vanilla funds can pose financial stability risks. The delegation of day-to-day portfolio management introduces incentive problems between end investors and portfolio managers, which can encourage destabilizing behavior and amplify shocks. Easy redemption options and the presence of a "first-mover" advantage can create risks of a run, and the resulting price dynamics can spread to other parts of the financial system through funding markets and balance sheet and collateral channels.

The empirical analysis finds evidence for many of these risk-creating mechanisms, although their importance varies across asset markets. Mutual fund investments appear to affect asset price dynamics, at least in less liquid markets. Various factors, such as certain fund share pricing rules, create a first-mover advantage, particularly for funds with high liquidity mismatches. Furthermore, incentive problems matter: herding among portfolio managers is prevalent and increasing.

The chapter does not aim to provide a final verdict on the overall systemic importance of the potential risks or to answer the question of whether some asset management companies should be designated as systemically important. However, the analysis shows that larger funds and funds managed by larger asset management companies do not necessarily contribute more to systemic risk: the investment *focus* appears to be relatively more important for their contribution to systemic risk.

Oversight of the industry should be strengthened, with better microprudential supervision of risks and through the adoption of a macroprudential orientation. Securities regulators should shift to a more hands-on supervisory model, supported by global standards on supervision and better data and risk indicators. The roles and adequacy of existing risk management tools, including liquidity requirements, fees, and fund share pricing rules, should be reexamined, taking into account the industry's role in systemic risk and the diversity of its products.

Introduction

In recent years, credit intermediation has been shifting from the banking to the nonbank sector, including the asset management industry.[1] Tighter regulations on banks, rising compliance costs, and continued bank balance sheet deleveraging following the global financial crisis have contributed to this shift. In advanced economies, the asset management industry has been playing an increasingly important role in the financial system, especially through increased credit intermediation by bond funds.[2] For emerging markets, portfolio flows—many of which are channeled through funds—have shown steady growth since the crisis. Globally, the

industry now intermediates assets amounting to $76 trillion (100 percent of world GDP and 40 percent of global financial assets; Figure 3.1).

The larger role of the asset management industry in intermediation has many benefits. It helps investors diversify their assets more easily and can provide financing to the real economy as a "spare tire" even when banks are distressed. The industry also has advantages over banks from a financial stability point of view. Banks are predominantly financed with short-term debt, exposing them to both solvency and liquidity risks. In contrast, most investment funds issue shares, and end investors bear all investment risk (see Figure 3.2, and see Annex 3.1 for a primer on the industry). High leverage is mostly limited to hedge funds and private equity funds, which represent a small share of the industry.[3] Therefore, solvency risk is low in

---

[1]In this chapter, the definition of the asset management industry includes various investment vehicles (such as mutual funds, exchange-traded funds, money market funds, private equity funds, and hedge funds) and their management companies (see Annex 3.1). Pension funds and insurance companies are excluded, as are other types of nonbank financial institutions.

[2]See October 2014 *Global Financial Stability Report*.

[3]However, these funds can still be a source of systemic risk, as shown during the Long-Term Capital Management episode in 1998. Mutual funds and exchange-traded funds do incur portfolio leverage

---

Figure 3.1. Financial Intermediation by the Asset Management Industry Worldwide

The asset management industry intermediates substantial amounts of money in the financial system.

1. World Top 500 Asset Managers' Assets under Management[1]

- Trillions of U.S. dollars (right scale)
- Percent of world GDP
- Percent of global financial assets excluding loans

The growth of investment funds has been particularly pronounced among advanced economies during the past decade.

2. Size of Investment Funds in Selected Advanced Economies

- AUM, trillions of U.S. dollars (right scale)
- AUM, percent of sample economies' GDP
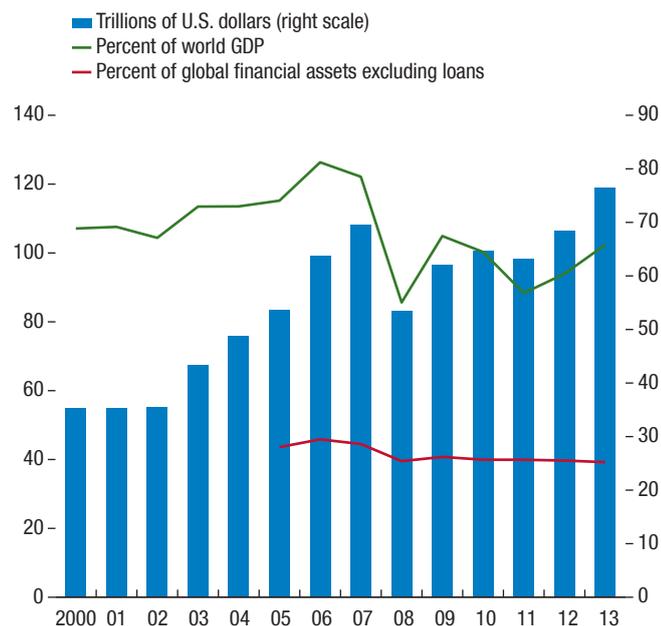
Sources: Bloomberg, L.P.; McKinsey (2013); Pensions and Investments and Towers Watson (2014); IMF, World Economic Outlook database; and IMF staff estimates.
[1]The change of asset under management is determined both by valuation changes of underlying assets as well as net inflows to funds.
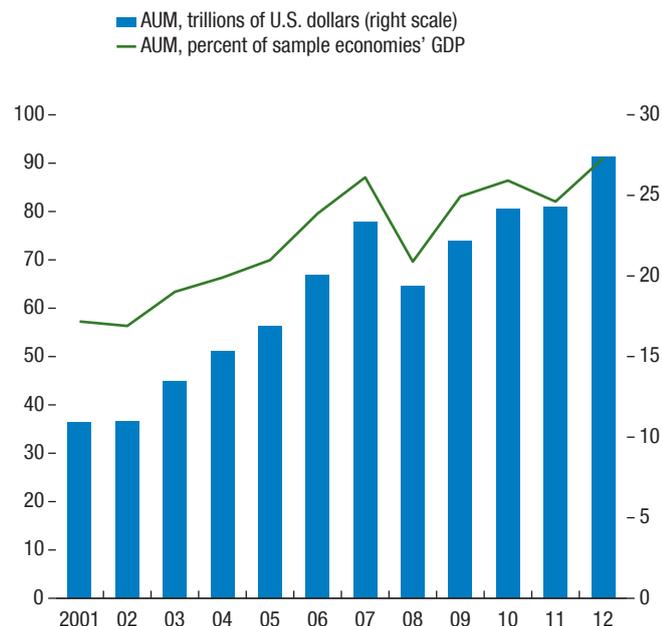
Sources: Organisation for Economic Co-operation and Development; and IMF World Economic Outlook database.
Note: AUM = assets under management. Economies comprise Canada, Germany, Ireland, Japan, Luxembourg, United Kingdom, and United States. Investment funds include mutual funds, money market funds, and exchange-traded funds.

Figure 3.2. Products Offered by Asset Managers and Their Recent Growth

Plain-vanilla products and privately offered separate account services dominate the markets as measured by assets under management.

Open-end funds, exchange-traded funds, and private equity funds have shown strong growth since the global financial crisis.

1. **Asset Managers' Intermediation by Investment Vehicles**
   (Percent of $79 trillion total assets under management, end-2013)
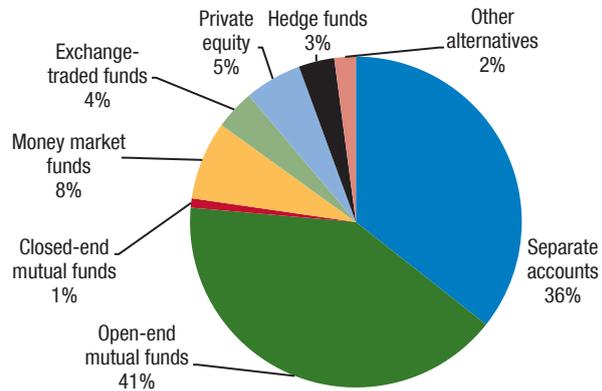
2. **Recent Growth of Selected Investment Vehicles**
   (Assets under management in trillions of U.S. dollars)

Sources: BarclayHedge; European Fund and Asset Management Association; ETFGI; Organisation for Economic Co-operation and Development; Pensions and Investments and Towers Watson (2014); Preqin; and IMF staff estimates.
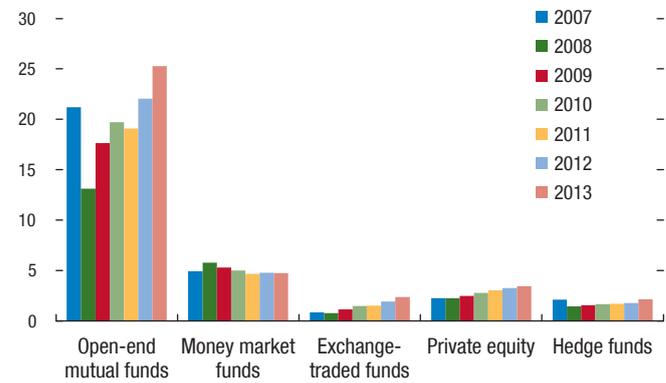
Sources: BarclayHedge; European Fund and Asset Management Association; Organisation for Economic Co-operation and Development; Preqin; and IMF staff calculations.

most cases (see October 2014 *Global Financial Stability Report*). Intermediation through funds also brings funding cost benefits and fewer restrictions for firms compared with bank financing—it does, however, also expose firms to more volatile funding conditions, so the advantages have to be weighed against the risks.

Nevertheless, the growth of the industry has given rise to concerns about potential risks.[4] By now, the assets under management of top asset management companies (AMCs) are as large as those of the largest banks, and they show similar levels of concentration.[5] For emerging markets, the behavior of fund flows has for some time been a key financial stability concern, as extensively discussed in the April 2014 *Global Financial Stability Report*. Similarly, risks from hedge funds

through derivatives and securities lending, about which only limited information is disclosed. However, most publicly offered products have regulatory leverage caps that are generally much lower than those for banks (see Table 3.1).

[4]A report by the Office of Financial Research (2013) summarizing potential systemic risks emanating from the industry spurred an active discussion among academics, supervisors, and the industry. A large number of qualitative analyses on this topic (CEPS-ECMI 2012; Elliott 2014; Haldane 2014) are available, but comprehensive, data-based evidence is still limited.

[5]In this chapter, the term AMC does not include asset management companies set up to handle distressed assets in the context of bank restructuring and resolution.

and money market funds are already well recognized. However, the importance of "plain-vanilla" products is less well understood (Feroli and others 2014). At the individual fund level, plain-vanilla funds face liquidity risk: the shares of open-end mutual funds and exchange-traded funds are usually redeemable or tradable daily, whereas assets can be much less liquid. However, the extent to which such risks at the level of an individual institution can translate into systemic risk is subject to ongoing research and debate.

Potential systemic risks from less leveraged segments of the industry are likely to stem from price externalities in financial markets and their macro-financial consequences. Systemically important effects may arise if features of the industry tend to amplify shocks or increase the likelihood of destabilizing price dynamics in certain asset markets compared with a situation in which investors invest directly in securities. These effects can have broader economic implications. For example, if intermediation through funds raises the probability of fire sales of bonds that are held by key players in the financial sector or that are used as collateral, then the risk of destabilizing knock-on effects on other institutions rises, with potentially important macro-financial consequences. Similarly, if funds exacerbate the volatility of capital flows in and out of

emerging markets or increase the likelihood of conta-gion, significant consequences will be endured by the recipient economies.[6]

Some key features of collective investment vehicles may give rise to such destabilizing dynamics compared with a situation without intermediaries. Conceptually, it is important to distinguish clearly between the types of risks that result from the presence of intermediaries and those that are merely a reflection of the behavior of end investors and would occur in the absence of intermediaries (Elliott 2014). Two main risk channels that are important in this context, even for unlever-aged funds, are (1) incentive problems related to the delegation of portfolio management decisions by end investors to funds, which, among other things, may lead to herding, and (2) a first-mover advantage for end investors (that is, incentives not to be the last in the queue if others are redeeming from a fund), which may result in fire-sale dynamics. These issues are dis-cussed in detail in this chapter.

In recent years, the importance of such risks is likely to have risen in advanced economies because of structural changes in their financial systems. Not only has the relative importance of the asset management industry grown, but banks have also retrenched from

---

[6]Other risks include operational risks and risks related to securi-ties lending, which are not discussed in detail in this chapter. See Cetorelli (2014).

Figure 3.3. Key Domiciles of Mutual Funds
(Mutual funds by domicile, percent of total assets under management, end-2014)

The mutual fund industry is dominated by U.S. and European funds. Among emerging market economies, Brazil has the largest fund sector.
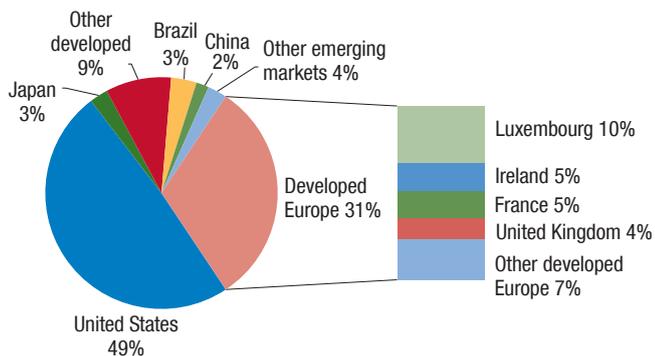
Sources: European Fund and Asset Management Association; and IMF staff calculations.

many market-making activities, possibly contributing to a reduction in market liquidity (October 2014 *Global Financial Stability Report*). Consequently, large-scale trading by funds could potentially have a larger effect on markets than in the past. Moreover, the role of fixed-income funds has expanded considerably—and price disruptions in fixed-income markets have potentially larger consequences than large price swings in equity markets. The volume of products offered to the general public in advanced economies has grown considerably.[7] Finally, the prolonged period of low interest rates in advanced economies has resulted in a search for yield, which has led funds to invest in less liquid assets, and is likely to have exacerbated the risks described above (October 2014 *Global Financial Stability Report*).

These considerations have sparked a policy discus-sion about intensifying oversight across advanced and emerging economies. In 2014, the Financial Stability Board (FSB) and International Organization of Securities Commissions (IOSCO) proposed assessment methodolo-gies to identify investment funds that might be global systemically important financial institutions (G-SIFIs) and as such would be regulated differently from the oth-ers (FSB and IOSCO 2014). This proposal was revised in March 2015, and includes approaches for identifying both investment funds and asset managers as G-SIFIs (FSB and IOSCO 2015). Market regulators in major jurisdictions (Figure 3.3), such as the U.S. Securities and Exchange Commission (SEC), are considering revising their approach to the oversight of asset managers and the products they offer, including through stress testing requirements. This is a paradigm shift. Until recently, securities regulators have mainly focused on investor pro-tection, with limited attention to financial stability risks.

This chapter aims to shed more light on the empiri-cal relevance of these issues, thereby contributing to the understanding of the systemic risk implications of the asset management industry. This task is challeng-ing given that the risks of concern have not yet or only partially materialized in advanced economies; inference, therefore, often has to be indirect. So far, the literature has only examined partial aspects of these problems in individual markets. This chapter provides an account of key risk profiles of the largest segments in the industry and an in-depth, original, data-based analysis of some of

---

[7]Retail investors are often seen to be less sophisticated and informed than institutional investors, and more prone to chase returns (Frazzini and Lamont 2008). This possibly exacerbates the incentive problems mentioned earlier.

the main issues featured in the public discussion, backed by interviews with asset managers and supervisors. The key questions are the following:

- What are the potential sources of financial stability risks from the asset management industry, particularly from the less leveraged, plain-vanilla segments?
- What is the empirical evidence on the various specific risk channels?
- What existing internal risk management and oversight tools can be used to mitigate financial stability risks? What needs to be done to better monitor and mitigate these risks?

The detailed empirical analysis finds evidence for many mechanisms through which funds can create and amplify risks, although their importance varies across asset markets:

- Mutual fund investments appear to affect asset price dynamics, at least in less liquid markets. The impact, however, does not seem to have risen over time. Assets that are held in a concentrated manner by funds perform worse during periods of stress.
- Various factors create run risk, including certain fund share pricing rules. To some extent, however, risks are mitigated by funds' liquidity management.
- The evidence points to the importance of incentive problems between end investors and portfolio managers. Herding among U.S. mutual funds has been rising across asset markets, particularly among retail-oriented funds (whose end investors are more fickle and for whom assessing the skills of portfolio managers is more difficult). The patterns of fund inflows by end investors also encourage poorly performing portfolio managers to take excessive risks.
- However, larger funds and funds belonging to larger AMCs do not necessarily contribute more to systemic risk. The investment *focus* appears to be relatively more important than *size* when gauging systemic risk.

Overall, the evidence calls for strengthening the microprudential supervision of risks and adopting macroprudential oversight of the industry:

- Currently, most securities regulators focus on investor protection and do not intensively supervise risks of individual institutions with the help of risk indicators or stress tests. This practice needs to be changed, supported by global standards on microprudential supervision and more comprehensive data.

- Moreover, macroprudential oversight frameworks should be established to address financial stability risks stemming from the industry. These stability risks originate in price externalities that can be missed by microprudential regulators and asset managers.
- The roles and adequacy of existing risk management tools, including liquidity requirements, fees, and fund share pricing rules, should be reexamined, taking into account the industry's role in systemic risk and the diversity of its products.

The chapter first lays out conceptual issues related to the nature of potential financial stability risks from the industry. Next, various empirical exercises are conducted to identify different behavioral patterns of mutual fund investors and their financial stability implications. The chapter then examines the industry's oversight framework and makes recommendations for reducing financial stability risks.

Financial Stability Risks of Plain-Vanilla Funds: Conceptual Issues

Plain-vanilla mutual funds and ETFs—the largest segment of the industry—do not suffer much from the known vulnerabilities of hedge funds and money market funds. Reforms are already underway to address risks related to hedge funds (which can incur high leverage and engage in complex strategies with few disclosure requirements) and money market funds (some of which offer redemptions at a constant nominal value per fund share, making their liabilities similar to deposits and vulnerable to runs). In general, these specific risks apply less to typical mutual funds and ETFs (Table 3.1 and Annex 3.1).

Risk Transmission Channels

Intermediation through plain-vanilla funds is, however, not risk free (Figure 3.4):[8]

---

[8]Apart from Table 3.1 and Annex 3.1, this chapter does not cover separate accounts in detail because of data limitations. However, SIFMA (2014) indicates that these accounts mainly invest in simple securities portfolios with little leverage. For pension fund and insurance company investors, separate accounts are bound by overall investment restrictions set by their respective regulators. Redemption risks appear to be limited as well because institutional investors tend to internalize the cost of their sales, and large redemptions can be settled in kind.

Table 3.1. Summary Characteristics and Risk Profiles of Major Investment Vehicles

Vehicle	2013 AUM (trillions of U.S. dollars)	Publicly Offered	Collective Investment Schemes	Typical Redemption and Trading Practice	Typical Settlement Method	Solvency Risk	Leverage through Borrowing[1,2]	Portfolio Leverage[2] (Derivatives)	Main Investor Clientele	Disclosure Gap[3]
Open-End Mutual Fund	25	Yes	Yes	End of day	Cash	Low	Possible with cap	Yes with cap	Retail, institutional	Low
Closed-End Mutual Fund	0.5	Yes	Yes	N.A. (primary) Intraday (secondary)	Cash	Low	Some yes with cap	Yes with cap	Retail, institutional	Low
Money Market Fund	4.8	Yes	Yes	End of day	Cash	Low	Possible with cap	Yes with cap	Retail, institutional	Low
Exchange-Traded Fund	2.3	Yes	Yes	Infrequent (primary) Intraday (secondary)	In kind (primary) Cash (secondary)	Low	Possible with cap	Yes with cap	Retail, institutional	Low
Synthetic ETF	0.1[4]				Cash	Low	Possible with cap	High derivative use	Institutional	Low
Private Equity Fund	3.5	No	Yes	N.A. (closed-end with long-term finite life)	Cash	High[5]	Some yes, no cap	No information	Institutional	Medium
Hedge Fund	2.2	No	Yes	Quarterly + lock-up period + 90 days advance notice	Cash	High[5]	High no cap	High no cap	Institutional	Medium
Separate Account[6]	22[7]	No	No	No information	Cash or in kind	Low	No information[8]	No information[8]	Institutional	High

Sources: BarclayHedge; Deutsche Bank (2014); ETFGI; EFAMA (2014); ICI (2014a, 2014c); McKinsey (2013); Metrick and Yasuda (2011); Morningstar (2012); OFR (2013); Preqin; PriceWaterhouseCoopers (2013); and IMF staff estimates.

Note: AUM = assets under management; ETF = exchange-traded fund; N.A. = not applicable.

[1]Borrowing includes issuing debt or taking bank loans.

[2]No cap means no regulatory cap, and with cap means there are regulatory caps on the leverage. For public funds in the United States, leverage is capped at 33 percent of assets including portfolio leverage. European Undertakings for Collective Investment in Transferable Securities (UCITS) funds can borrow up to 10 percent of assets, but only temporary borrowing is allowed and it should not be used for investment.

[3]Disclosure in this column is about securities, borrowing through loans, and cash holdings information. Across all products, there is very little information about derivatives and securities financing transactions (repurchase agreements and securities lending transactions), their counterparties, and collateral.

[4]The figure covers European-listed synthetic exchange-traded funds. Synthetic products are mainly seen in Europe and to a lesser extent in Asia. See Annex Table 3.1.1 for a description of synthetic products.

[5]In addition to taking leverage, these types of funds risk their own capital and balance sheets when investing given that they comingle client investors' money with their own money for investment.

[6]This is different from "separate account" used among insurance companies. See Annex Table 3.1.1 for description.

[7]The figure is based on the U.S. data reported in OFR (2013) and the European data reported in EFAMA (2014).

[8]Investment strategy should be in line with the mandate set by clients and their regulatory requirements (such as insurance and pension fund regulations).

- The delegation of investment decisions introduces incentive problems between end investors and portfolio managers that can induce destabilizing behavior and amplify shocks. Investors delegate day-to-day portfolio management to portfolio managers. Investors cannot directly observe managers' daily actions or their skills, and therefore provide incentives to managers to act in investors' interests (Rajan 2005).[9] A common (and imperfect) way of establishing

incentives is to evaluate funds relative to their peers and relative to benchmarks. This form of evaluation, in turn, can lead to a variety of trading dynamics with potentially systemic implications, such as herding or excessive risk taking (Box 3.1).[10,11]

[9]Legally, asset managers have a duty to act as fiduciaries on behalf of their clients.

[10]Similarly, the same type of informational issues can make it difficult for investors to distinguish between problems at the fund level versus problems at the AMC level, possibly leading to "brand name" effects, in which operational and reputational concerns about one fund spill over to others in the same fund family.

[11]Separate issues arise from passive, index-linked investing. Increasing investment of this form has been argued to distort asset

Figure 3.4. Unleveraged Open-End Funds and Systemic Risk
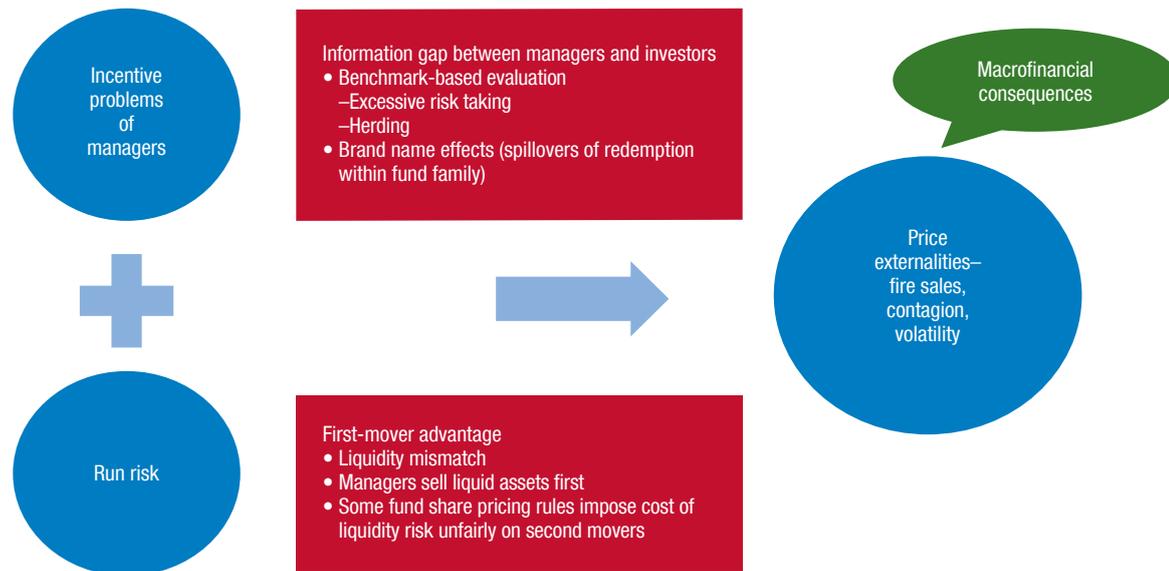
Source: IMF staff.

- Easy redemption options can create run risks due to a first-mover advantage.[12] Investors can have an incentive to exit faster than the others even without constant net asset value (NAV) or guaranteed returns if the liquidation value of fund shares declines as investors wait longer to exit. This decline in value could happen for various reasons. First, asset managers may use cash buffers and sell relatively more liquid assets first in the face of large redemptions. Second, certain funds have fund share pricing rules that pass the costs of selling assets—possibly at fire-sale prices—on to the remaining investors (Box 3.2). Such effects are intensified when funds are investing in relatively less liquid assets, and thereby create large mismatches between the market liquidity of assets and liquidity offered to end investors (October 2014 *Global Financial Stability Report*).[13]

---

prices and risk-return tradeoffs (Wurgler 2010 and Box 3.1). This chapter does not explore these issues.

[12]The incentive to redeem quickly is often referred to as "strategic complementarity," and is similar to the mechanism behind bank runs (as in Diamond and Dybvig [1983]). More generally, problems related to the delegation of investment decisions or first-mover advantage are also present in other forms of financial intermediation, albeit to different degrees. For instance, pension funds and insurance companies face much lower redemption risks.

[13]A related issue concerns the pricing of infrequently traded securities. The October 2014 *Global Financial Stability Report* discusses some of the issues related to the so-called matrix pricing.

A large proportion of funds issue easily redeemable shares, and liquidity mismatches have been rising (Figures 3.5 and 3.6). Open-end funds are exposed to redemption risk because investors have the ability to redeem their shares (usually on a daily basis) while funds have increasingly been investing in relatively illiquid securities such as high-yield corporate bonds and emerging market assets.

Large-scale sales by funds may exert significant downward asset price pressures, which could affect the entire market and trigger adverse feedback loops. The effects on asset prices could have broader macrofinancial consequences, affecting the balance sheets of other actors in financial markets; reducing collateral values; and reducing credit financing for banks, firms, and sovereigns. The effects could also be spread unevenly across jurisdictions. For instance, the main impact of trades by funds domiciled in advanced economies could be felt in emerging markets (see April 2014 *Global Financial Stability Report* for details).

Although these potential risks and propagation channels are recognized as theoretical possibilities, there is disagreement about their importance in practice. Advanced economies have experienced few cases in which asset management activities outside of hedge funds and money market funds triggered or amplified

Box 3.1. Possible Incentive Problems Created by Delegated Management

The delegation of investment decisions introduces incentive problems between end investors and fund managers, which can induce destabilizing behavior and amplify shocks. As discussed in the primer on the asset management industry (Annex 3.1), end investors delegate day-to-day control of portfolios to managers. Investors cannot directly observe managers' abilities, nor do they see every single trade and portfolio position. Investors, therefore, provide incentives to asset managers to act in investors' interests (Rajan 2005). A common way of providing incentives is to evaluate asset managers relative to their peers and to benchmarks. This evaluation can take direct or indirect forms: (1) managers' compensation can be linked to relative performance (Ma, Tang, and Gomez 2013) or (2) investors inject money into funds that perform well relative to their benchmarks. The effect of the latter is similar to the effect of the former if compensation increases with assets under management (AUM). These incentive problems, in turn, can lead to a variety of dynamics with potentially systemic implications (Stracca 2006). More specifically, they can lead to the following:

- *Excessive risk taking*—If a fund's AUM grow more with good performance than shrink with poor performance, incentives are created to incur more risk when the fund is falling behind (Chevalier and Ellison 1997; Ferreira and others 2012; see the example in Table 3.1.1). Similar incentives exist in a "tournament" setting, in which funds are evaluated based on their interim performance (say, in the middle of the year) compared with peers (Basak, Pavlova, and Shapiro 2008).[1]

- *Contagion*—By contrast, if fund managers become more risk averse in response to past losses, and if they are evaluated against their peers or benchmarks, they may be induced to retrench to the benchmark in response to losses. This behavior, in turn, can induce the transmission of shocks across assets and result in momentum trading (Broner, Gelos, and Reinhart 2006). See Calvo and Mendoza (2000), Chakravorti and Lall (2003), and Ilyina (2006) for other types of models linking benchmark-based compensation to contagion.

- *Herding, return chasing, and incentives to run*—Evaluation relative to average performance tends to induce risk-averse portfolio managers to mimic the behavior of peers (Scharfstein and Stein 1990; Arora and Ou-Yang 2001; Maug and Naik 2011). Incentives to herd are reinforced because end investors can exit funds quickly, and mutual fund managers cannot afford to wait until their peers' private information is revealed and incorporated fully in asset prices (Froot, O'Connell, and Seasholes 2001). Vayanos (2004) shows that when fund managers lose AUM because of poor performance, "flights to quality" may occur. Feroli and others (2014) construct a model in which performance evaluation relative to benchmarks creates incentives for fund managers to join sell-offs during downturns and chase yield during upturns. Buffa, Vayanos, and Woolley (2014) discuss theoretically how such benchmark-centric assessments can contribute to the buildup of bubbles.

- *Churning and noise trading*—Delegated portfolio management may induce managers to churn (engage

Table 3.1.1. An Illustrative Example of Asset Managers' Incentives for Risk Taking
Because investors reward winners more than they punish poor performers, it pays to take risks.

Options	Likelihood (percent)	Outcome: Change in Net Asset Value	Net Inflows to Fund (millions of U.S. dollars)	Additional Fee Income (1 percent of assets under management, in millions of U.S. dollars)
Benchmark Portfolio	100	Same as benchmark	0	0
Gamble	50	10% in excess of benchmark	100	1
	50	10% below benchmark	–20	–0.2
	Expected outcome	Same as benchmark	40	0.4

[1]This is also known as the "risk-shifting" problem. More generally, risk shifting arises when earnings for managers are convex based on their compensation. Limited liability also contributes to the convexity of manager earnings. See Ross (2004) for a qualification of the payoff convexity argument. See also Massa and Patgiri (2009).

Box 3.1 *(continued)*

in noise trading) to signal their talent and superior knowledge, given that it is difficult to identify talent and effort (Allen and Gorton 1993; Dow and Gorton 1997; Dasgupta and Prat 2006).

- *Market depth and volatility*—Performance evaluation relative to a benchmark may lead to higher price volatility of securities that are included in the benchmark. Since information acquisition may be hindered by these relative-performance-based

contracts, the depth of the market may be reduced (Igan and Pinheiro 2012). Basak and Pavlova (2014) develop a general-equilibrium asset price model that incorporates incentives for institutional investors to do well relative to their index. The induced investment patterns create excess correlations among stocks belonging to an index. It also increases the volatility of index stocks and of the overall market.

Box 3.2. Fund Share Pricing Rules and First-Mover Advantage

Certain forms of fund share pricing can give rise to a first-mover advantage for investors to run. The key factor is how investment losses and trading costs are distributed between buy-and-hold and redeeming fund shareholders. If these are borne by the fund and therefore by the buy-and-hold shareholders, investors can recover more cash by redeeming early.

Inflexible net asset value (NAV) pricing can generate a first-mover advantage for an open-end mutual fund (Table 3.2.1). In the United States, funds issuing redeemable securities are required to sell, redeem, or repurchase such securities based on the NAV of the security "next computed" after receipt of the order. Transaction costs—trading fees, market

Table 3.2.1. Comparison of Fund Pricing Rules
(Millions of U.S. dollars)

Transactions	UCITS Swing Pricing (Full)	UCITS-AIF Dual Pricing	U.S. Open-End Mutual Fund (1940 Act)
Beginning NAV	100	100	100
Net Flows	−15	−15	−15
Purchases	+5	+5	+5
Redemptions	−20	−20	−20
Total Costs of Selling Assets (0.1 percent, including bid-ask spread)	0.015	0.015	0.015
Transaction Costs Incurred by Investors Purchasing Fund Shares	−0.005[1]	0	0
Transaction Costs Incurred by Investors Redeeming Fund Shares	0.020	0.015	0
Transaction Costs Incurred by Fund and Remaining Investors	0	0	0.015[2]
Ending NAV	85.000	85.000	84.985
Memo	Estimated transaction costs borne by trading investors		Actual transaction costs borne by fund

Source: BlackRock (2014b).
Note: AIF = Alternative Investment Fund (European directive governing products including hedge funds and private equity funds); NAV = net asset value (mutual fund share price, per share); UCITS= Undertaking of Collective Investment in Transferable Securities (European Union directive governing publicly offered investment funds). In the United States, investment companies (as defined) are regulated primarily under the U.S. Investment Company Act of 1940.
[1]Because fund NAV has swung to the bid price because of net redemptions, purchasing investors benefit to the extent that they purchase units that are cheaper than preswung NAV. This benefit is offset by the costs paid by redeeming clients.
[2]In certain circumstances, portfolio managers may choose to use cash buffers or borrow funds (or both) to meet redemptions without incurring transaction costs.

Box 3.2 *(continued)*

impact, and spread costs—are borne by the funds. This reduces a fund's NAV, possibly by a substantial amount if market liquidity dries up. The European framework, in contrast, allows for pricing rules such as swing- or dual-pricing rules, as described in Table 3.2.1, that adequately impose transaction costs on redeeming shareholders instead of the fund. This helps reduce remaining shareholders' incentive to run.

The share pricing practice of exchange-traded funds (ETFs) is different from that of open-end mutual funds. As shown in Figure 3.2.1 and Annex 3.1, ETFs do not directly transact with end investors. "Authorized participants"—typically major

broker-dealers—trade in between. Only authorized participants trade with ETFs in the primary market, and trades are usually settled in kind. Intraday liquidity to end investors is offered in the secondary market by authorized participants.[1] The key difference between ETFs and mutual funds in the context of first-mover advantage is that ETFs are not required to pay cash back to investors at NAV.[2] Authorized participants trade ETF shares with clients or on stock exchanges at the ETF share price determined in the secondary market. Therefore, depending on market conditions, an ETF's share price could be higher or lower than the ETF's indicative NAV.

Figure 3.2.1. Structure of Exchange-Traded Funds
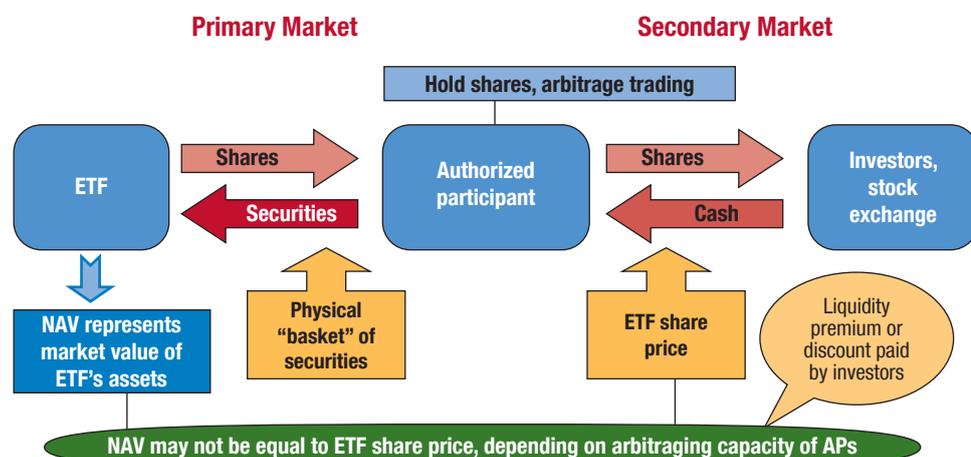
Source: IMF staff.
Note: AP = authorized participant; ETF = exchange-traded fund; NAV = net asset value.

[1]Although there is a widespread perception that ETFs face higher redemption risks because they offer intraday liquidity to shareholders, intraday liquidity (offered in the secondary market) is not the same as intraday redemption (offered in the primary market). Primary market activities, which result in fund flows, are much less frequent than secondary market trading (ICI 2014c; BlackRock 2014a).

[2]In the United States, ETFs operate with the Securities and Exchange Commission's special exemption from the 1940 Act requirement that open-end funds repay redeeming shareholders at the next NAV calculated after an order is submitted (ICI 2014b).

Box 3.2 *(continued)*

Redeeming shareholders need to pay for the cost of market liquidity risk by accepting an ETF share price below NAV if market liquidity dries up. Authorized participants are usually arbitrageurs, and if they see a major gap between NAV and ETF share prices, they trade in the direction to close the gap. If investors find it easier to sell ETF shares relative to the underlying assets, this will tend to result in a discount to NAV. The discount can be accentuated when funding conditions reduce authorized participants' arbitrage capacity (Figure 3.2.2). The cost of "fire sales" of ETF shares is borne by the trading shareholders, not by the ETF or buy-and-hold shareholders, reducing buy-and-hold shareholders' incentive to run.

Economically, these flexible fund share pricing rules are similar to countercyclical redemption and purchase fees that reflect market liquidity cost and are added to NAV. If a U.S. 1940 Act fund imposes purchase and redemption fees that are retained by the fund[3] and reflect the bid-ask spreads for transactions (or ETF NAV and share price gap), the outcome would be similar to that of funds with flexible share pricing rules. At the same time, such fees also help ensure equality between buy-and-hold investors and trading investors.

Figure 3.2.2. Difference between NAV and ETF Share Price
(Percent of NAV, all countries, equity funds)

The ETF share can be traded in the secondary market at a discount to NAV when markets are under generalized stress.
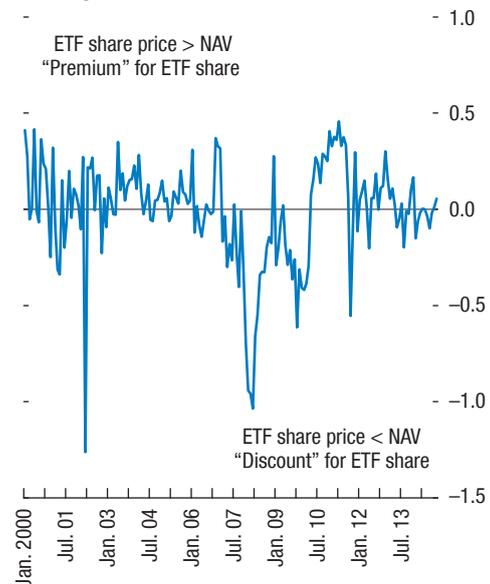
Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: ETF = exchange-traded fund; NAV = net asset value.

[3]Current U.S. rules do allow for the introduction of fees that are added to funds' NAV, which can then be distributed to remaining shareholders.

---

systemic distress.[14] The realization of brand risk and redemptions from PIMCO funds in September 2014 did not result in major disruptive market movements because, overall, bond funds continued to receive net inflows. However, the academic literature has documented contagion and amplification effects for some markets, in particular emerging markets.[15] Moreover, recent structural shifts in many markets following the global financial crisis require a fresh review of the evidence.

Against this backdrop, this chapter empirically explores the precise channels through which mutual funds and ETFs can affect financial stability. The aim

[14]There have been some cases of non–money market mutual fund distress in emerging markets. For example, in 2001, a fund managed by Unit Trust of India, which was outside the ambit of the Securities and Exchange Board's jurisdiction, became unable to meet its obligations due to the absence of timely corrective action to bring the sale/repurchase price of the units in line with the fund's net asset value. With a risk of a run on the Unit Trust of India and possible adverse financial market impact, India's government came out with a rescue package. The total bail-out amounted to US$76 million.

[15]In addition to the literature on emerging markets discussed in the April 2014 *Global Financial Stability Report*, various studies examine the role of funds in transmitting shocks across markets in advanced economies. Using U.S. data during the global financial crisis, Hau and Lai (2010) find that mutual funds helped transmit shocks from bank equities to nonfinancial firms' equities, and Manconi, Massa, and Yasuda (2012) find that mutual funds that incurred losses from securitized debt sold off corporate bonds, which induced a price impact on bonds held by these funds.

Figure 3.5. Liquidity Mismatches
(Size of bubbles represents relative global assets under management as of end-2013)

The mismatch between the redemption risk to funds and market liquidity of funds' assets is most notable among bond mutual funds—especially corporate and emerging market debt funds, though these are relatively smaller segments.
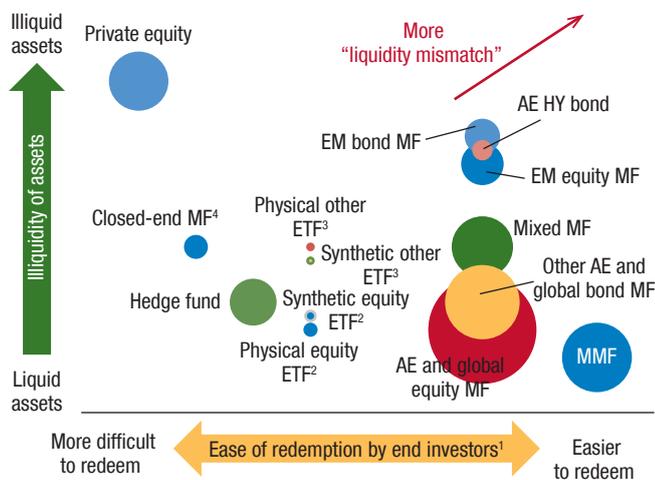
Sources: BarclayHedge; Deutsche Bank; ETFGI; European Fund and Asset Management Association; Lipper; Preqin; and IMF staff estimates.
Note: The liquidity ranking of assets is based on IMF staff's judgment. AE = advanced economy; EM = emerging market; ETF = exchange-traded fund; HY = high yield; MF = mutual fund; MMF = money market fund.
[1]For ETFs, the ease-of-redemption measure ranks lower than that for open-end MFs (all MFs in the figure excluding closed-end MFs) because end investors do not directly redeem shares from funds (see Annex 3.1 and Box 3.2).
[2]Generally, equity derivatives markets are less liquid than cash equity markets.
[3]For bonds, especially corporate bonds, derivatives markets can offer better market liquidity than the cash bond market. For some firms, the notional principal for their credit default swaps is larger than their outstanding debt.
[4]Closed-end mutual funds tend to invest in relatively less liquid assets than open-end mutual funds (Chordia 1996; Deli and Varma 2002). Some funds may repurchase shares.

leverage and securities lending, and issues related to resolution are only touched upon (FSOC 2014).[16]

Financial Stability Risks of the Mutual Fund Industry: Empirical Analysis

This section examines various aspects of potential financial stability risks using a wide range of macro- and micro-level data. Three main questions are explored. First, does fund investment affect asset price dynamics? Second, what determines fund flows and how do funds manage liquidity? And third, what is the degree of herding and interconnectedness, and what is the relationship between a fund's contribution to systemic risk and its size?[17]

Mutual Fund Investment and Asset Price Dynamics

Aggregate mutual fund flows and asset prices

Do fund flows affect asset price dynamics in the United States and in emerging markets? For mutual funds to have a destabilizing effect, fund trades must first, at least in the aggregate, have an impact on prices. The literature suggests the existence of price pressures related to mutual fund flows.[18] The analysis here updates and complements such findings, analyzing weekly net inflows to U.S. mutual funds investing in U.S. equities and various types of U.S. bonds, and their relationship to the respective market index returns. It also investigates mutual fund investment flows into bonds and equities in a number of emerging markets (see Annex 3.2 for details). The analysis goes

is not to provide a final verdict on the overall systemic importance of the potential risks, or draw definite conclusions about whether certain AMCs and their funds should be designated as SIFIs. Rather, the chapter carries out a quantitative analysis of a number of key risk transmission and amplification channels, testing some of the underlying hypotheses, and updating and complementing the existing literature. Given the current absence of a broad-based empirical assessment of the issues, this chapter fills an important gap. In particular, whereas most existing studies cover equity markets, the analysis here also covers bond markets. The chapter does not discuss all sources of risk. In particular, operational risks, risks related to hidden

[16]Furthermore, the analysis in the chapter does not cover separate accounts held at funds.
[17]The main data sources for mutual funds are Lipper (a global mutual fund database with information at the fund level); the Center for Research in Security Prices (CRSP) U.S. mutual fund database (with security-by-security asset holdings information and details of fee structures); EPFR Global; and Lipper's eMaxx, which shows global mutual fund ownership of bonds at the security level.
[18]Studies include Warther (1995); Edelen (1999); Edelen and Warner (2001); Cao, Chang, and Wang (2008); and Ben-Raphael, Kande, and Wohl (2011). The main conclusion from these studies is that aggregate mutual fund flows affect contemporaneous stock returns. Coval and Stafford (2007) show that sudden increases or decreases in net flows to funds result in price pressure effects even in the extremely liquid U.S. equity market. Manconi, Massa, and Yasuda (2012) document a price impact on corporate bonds following sell-offs by funds. Similarly, Jotikasthira, Lundblad, and Ramadorai (2012) document that investor flows domiciled in developed markets induced fire sales in emerging markets, with a significant price impact. Feroli and others (2014) analyze several subsegments of bond fund flows, and find evidence for flow-price feedback loops, except for U.S. Treasuries.

Figure 3.6. Growth in Bond Funds by Investment Focus
(Assets under management of bond funds worldwide; billions of U.S. dollars)
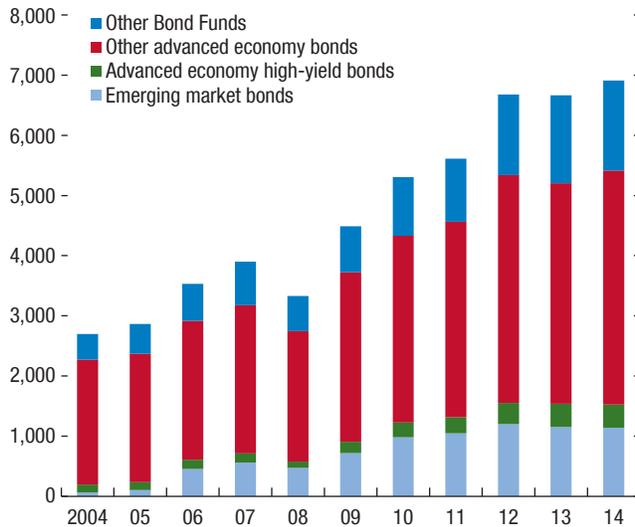
Sources: Lipper; and IMF staff calculations.

beyond most of the literature by examining the price impact of the "surprise" component of fund flows, following Acharya, Anshuman, and Kumar (2014).[19,20]

The evidence is consistent with mutual fund flows affecting asset returns in smaller, less liquid markets (Table 3.2). Surprise outflows are associated with lower same-week asset returns in emerging markets, and to a lesser extent in U.S. high-yield bond and municipal bond markets. The annualized price impact is not negligible: bond returns rise by about 5 percentage points when aggregate fund inflows are higher than the top 25th percentile, and fall by a similar magnitude for outflows exceeding the top 25th percentile across bond categories. In emerging markets, and also in the U.S. municipal bond market, the negative price effects from sell-offs tend to be larger than the positive price effects from purchases. The price impact of surprise flows is significantly larger when global risk aversion (as measured by the Chicago Board Options Exchange Market Volatility Index, or VIX) is high. More-

[19]As will be shown later in this chapter, mutual fund flows partly respond to past fund returns and are therefore partially predictable. Surprises are measured by the residuals of a standard vector autoregression model for flows and returns; see Annex 3.2.

[20]In contrast to much of the literature, this analysis uses weekly, not monthly, data, which allows for better identification of the effects. Nevertheless, inference remains difficult at this frequency.

Table 3.2. Mutual Fund Flows and Asset Returns

	Emerging Markets		United States			
	Equity	Bond	Equity	All Bond	High-Yield Bond	Municipal Bond
Estimation Periods	2004–14	2004–14	2007–14	2007–14	2007–14	2007–14
Single Equation Model with Excess Asset Return as Dependent Variable						
Surprise flows have significant impact on returns	Yes	Yes	Yes in 2012–14	Yes in 2008–10	Yes*	Yes
Asymmetry: Impact of surprise inflows is different from impact of surprise outflows	Outflows have larger impact than inflows	Outflows have larger impact than inflows	Limited**	Inflows have larger impact than outflows	No	Outflows have larger impact than inflows
VIX sensitivity: Surprise flows have higher impact on returns when the VIX is high	Yes	Yes	Limited**	Limited**	Yes	Yes
Vector Autoregression with Unadjusted Flows and Returns						
Flows help predict returns	No	Yes	No	Yes***	No	Yes***

Sources: Bank of America Merrill Lynch; Morgan Stanley; Bloomberg, L.P.; EPFR Global; ICI; and IMF staff estimates.
Note: VIX = Chicago Board Options Exchange Market Volatility Index. Surprise flows are residuals from a vector autoregression model, VAR, with two endogenous variables (mutual fund flows into each asset class and representative benchmark asset returns for the respective market over the one-month Eurodollar deposit rate) and the VIX (contemporaneous and lagged) as an exogenous variable. Mutual fund flows to emerging markets are investment flows into each country from all mutual funds from various jurisdictions covered by EPFR Global. U.S. fund flows data are investors' flows into mutual funds with a stated investment focus, covering funds domiciled in the United States. U.S. data are from Investment Company Institute, except for U.S. high-yield bond funds, which come from EPFR Global. Explanatory variables in the base single equation model include contemporaneous and lagged surprise flow, lagged excess return, the VIX, and the volatility of excess return (estimated with a generalized autoregressive conditional heteroskedasticity, GARCH, model). The model is estimated for the whole indicated period as well as rolling three-year periods in between. The results in the bottom line are based on generalized impulse responses.
*For the entire sample period, the results are not significant. However, three-year subperiod estimates show that the coefficient on contemporary surprise flows is always statistically significant and positive, but declines steadily over time. Limited ** indicates significance between the 5 percent and 10 percent significance levels. ***Indicates not robust to all specifications.

over, bond markets show evidence of nonlinearities, with unusually large surprise inflows or outflows associated with a disproportionate impact on bond returns. There is no evidence, however, for an increase in the price impact over time—if anything, the evidence across markets indicates a decline in the effect.[21]

The price impact pattern provides support for the existence of a first-mover advantage only in less liquid markets. Flows helping to predict price movements would be consistent with the presence of incentives to run.[22] Such predictive power of flows is more likely to be present in less liquid markets. In line with this notion, the evidence indicates that flows have an impact on future returns of emerging market bonds, and to a lesser extent, in U.S. bond and municipal bond markets. For the latter two markets, however, the results are not robust across econometric specifications. Possibly, the considered aggregate bond categories may be too broad and too liquid to unambiguously pick up the effect.[23]

Effect of mutual fund holdings and their concentration on bond yields

Does concentration of holdings among mutual funds matter during periods of stress? Some mutual funds have a large footprint in specific market segments, raising concerns that decisions by a few portfolio managers may have a large price impact in those markets. Since the global financial crisis, mutual fund bond holdings and their concentration have risen somewhat (Figure 3.7, panels 1 and 2).[24] The evidence in the literature suggests that concentration matters for stock price dynamics, in particular during periods of volatility.[25] This section investigates this issue further

using security-level bond ownership data, assessing whether mutual fund holdings and their concentration were correlated with the degree of bond yield changes around the global financial crisis and the taper shock in 2013, after controlling for bond-specific characteristics (see Annex 3.2 for details). The analysis goes beyond the literature to date by covering different asset markets, including corporate bonds for advanced economies, and corporate and public sector bonds for emerging market economies.

The findings suggest that larger mutual fund holdings and greater ownership concentration adversely affect bond spreads in periods of stress (Figure 3.7, panels 3 and 4). During the period of sharp price adjustments around the global financial crisis in 2008, bonds with larger fund ownership and those with a higher concentration of ownership experienced higher increases in credit spreads. Possibly, this is related to incentives to run created by funds. In the face of price drops of assets held by their fund, end investors may be induced to redeem quickly, for fear that they could be disadvantaged if they exit late. The effect was most pronounced among those securities with the highest initial spreads. This may suggest that funds either try to actively alter their holdings in a crisis by reducing exposures to riskier bonds, or are forced to sell riskier securities to meet investor redemptions. Investor concentration made bonds from emerging market and developing economies more vulnerable to the 2013 taper episode, but this was not the case for bonds from advanced economies.

### Behavior of Fund Flows and Fund Liquidity Management

Roles of end investors and asset managers

Mutual fund investments are driven by the decisions of both end investors (fund flows) and asset managers (portfolio rebalancing). A fund's investment in a specific asset can increase either because the fund receives money from end investors that is proportionally allocated to all assets, or because the portfolio manager invests relatively more money into the asset (portfolio rebalancing). To ascertain the relative importance of each factor, the analysis compares the variances of (1) changes in the return-adjusted weights of each security in a fund's portfolio and (2) fund flows (see Annex 3.2). For U.S.-domiciled funds, the results indicate that about 70 percent of

---

[21]The evidence on contemporaneous price effects does not conclusively prove that fund flows drive returns. For example, fund flows and returns could both be driven by news. Still, this would leave the question open of why mutual fund flows behave distinctively (since not everybody can trade in the same direction in response to news).

[22]The argument (as laid out in Stein [2014]) is that if outflows are first met with cash and the sale of more liquid assets, while less liquid assets are sold gradually, predictable downward pressure would be created on the prices of these less liquid assets. This, in turn, would create an incentive for end investors to pull out quickly if others are withdrawing.

[23]See also Collins and Plantier (2014). Moreover, the effects are more likely to be present at times of stress, and are therefore not easily picked up in an estimation spanning a long period.

[24]Concentration is measured by identifying, for each individual bond, the largest five investors among mutual funds. Alternative measures (top 10 investor holdings and Herfindahl index) yield similar results.

[25]Greenwood and Thesmar (2011) report that fragility, measured by the concentration of mutual fund ownership of large U.S. stocks

and the correlation of trading among investors, strongly predicts price volatility over 1990–2007. For Spanish stocks, Desender (2012) finds that ownership concentration is valued positively (negatively) by the stock market during down (up) market periods.

Figure 3.7. Bond Ownership Concentration and Its Effects on Credit Spreads

Mutual fund concentration in bond markets has increased somewhat since the global financial crisis.
(Share of individual bonds held by the five largest mutual funds in 2008 and 2013, percentage points)

1. Concentration of Mutual Fund Bond Ownership: U.S. Bonds

2. Concentration of Mutual Fund Bond Ownership: Emerging Market and Developing Economy Bonds
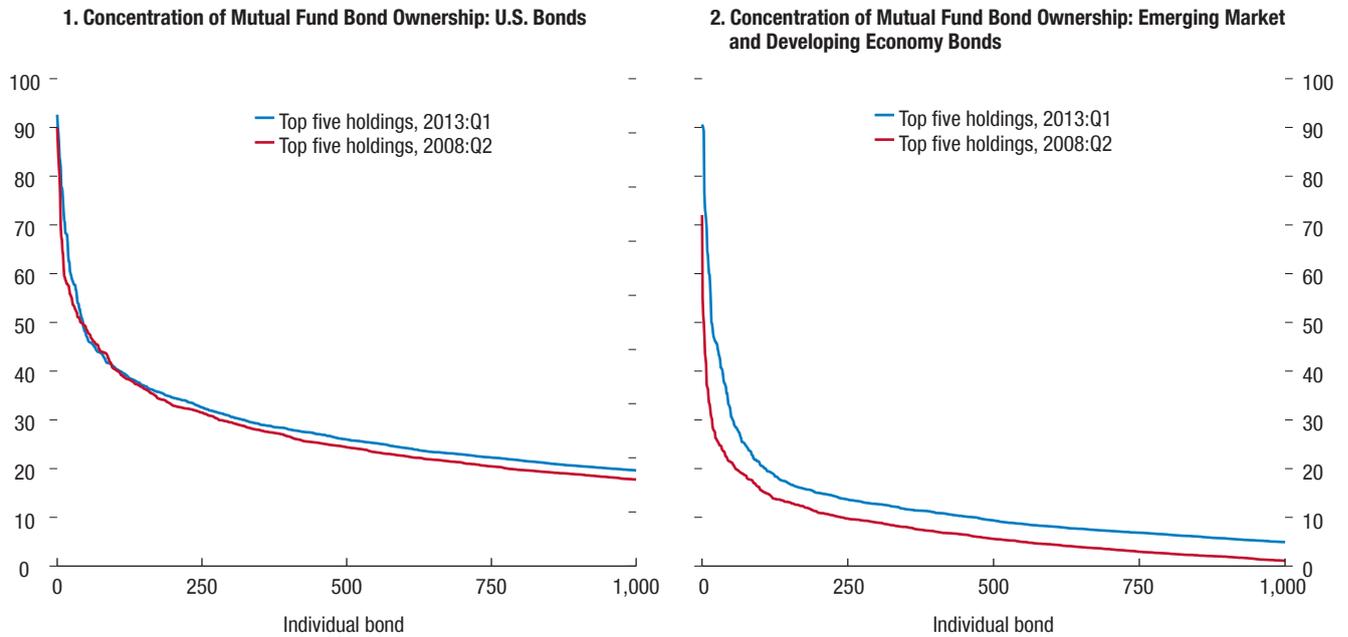
Bonds with higher mutual fund holding concentration were more adversely affected during stress periods in 2008 and 2013.
(Increase in credit spreads by share of bonds held by the five largest mutual funds, percentage points)

3. Corporate Bonds Issued by U.S. Issuers, 2008:Q2 and 2008:Q4

**4. Bonds Issued by Emerging Market and Developing Economies, 2013:Q1 and 2013:Q2**
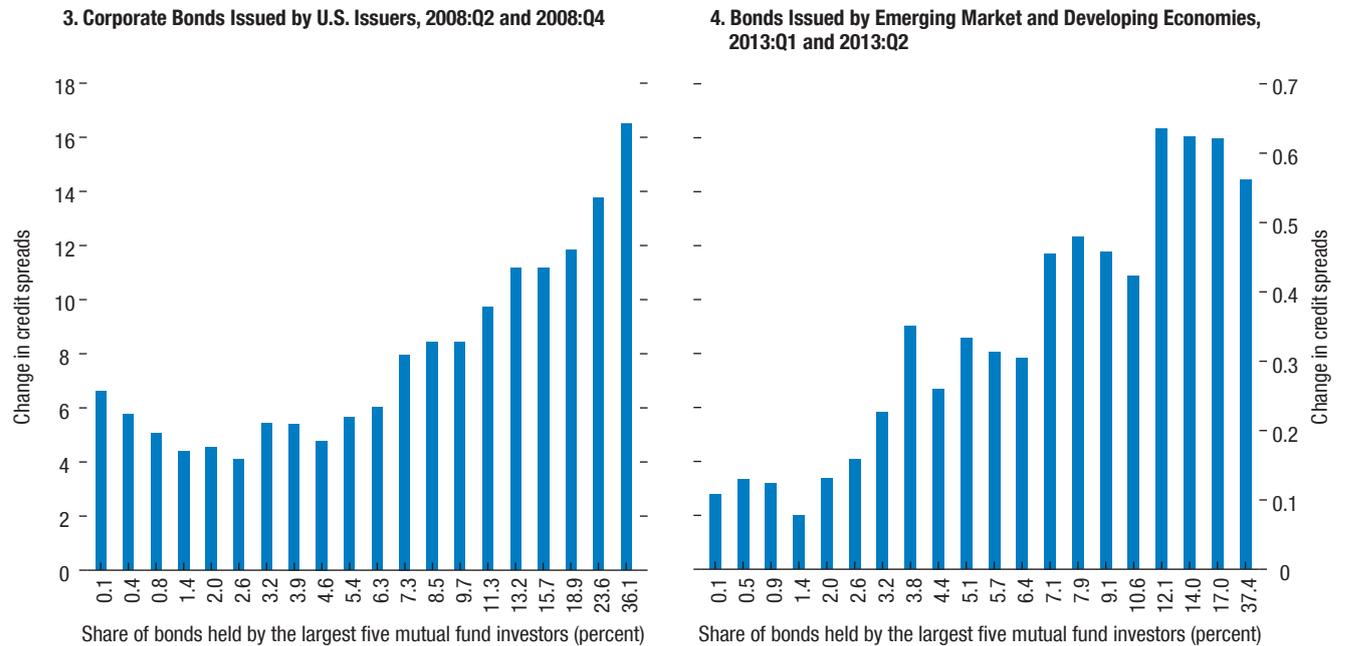
Sources: eMaxx; and IMF staff calculations.
Note: In all panels, holdings by the five largest mutual funds are identified for each individual bond. Bonds are sorted in different buckets on the horizontal axis according to the share of the bond held by the five largest mutual funds. The vertical axes in panels 3 and 4 show the average change in credit spreads (bond yields over benchmark government bond yields of the same currency and similar maturity) for bonds in each bucket, between 2008:Q2 and 2008:Q4, and 2013:Q1 and 2013:Q2, respectively.

Figure 3.8. Drivers of Fund Flows from End Investors
(Monthly fund flows, percent of total net assets)

Fund flows are strongly influenced by asset class performance, a fund's own performance, and the VIX.

Periods with high VIX see a flight to quality from equity to bond funds, especially to government bond funds.
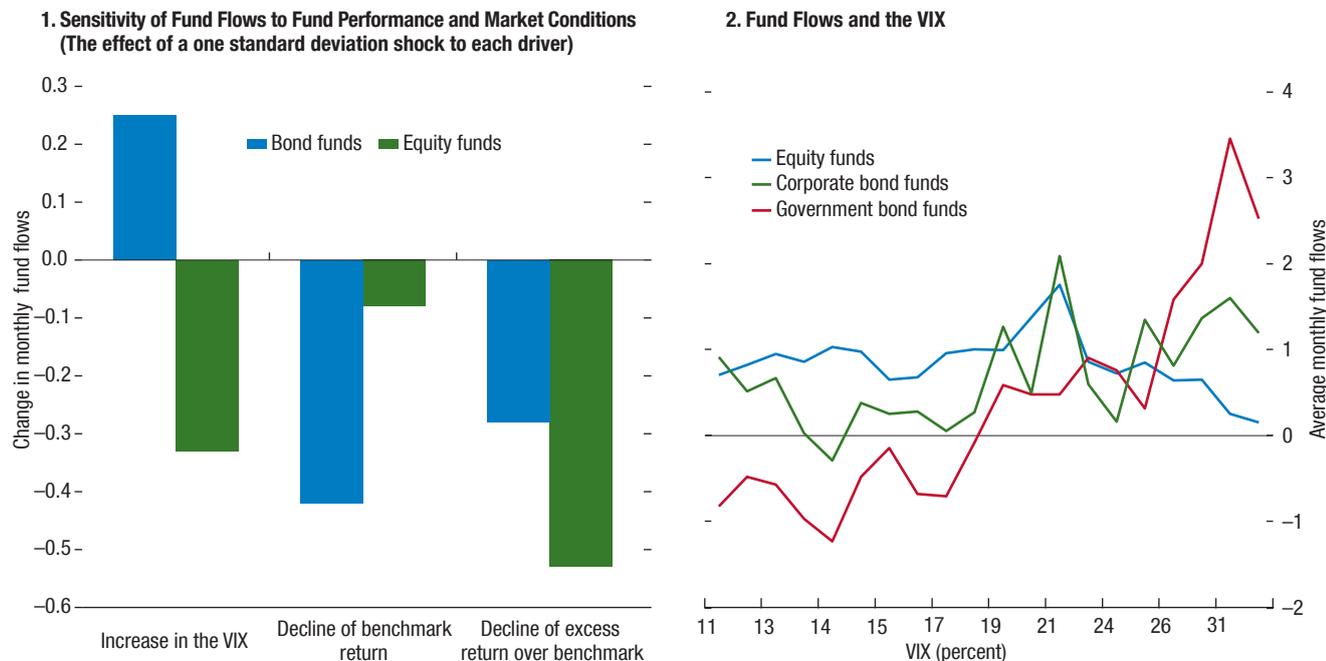
1. Sensitivity of Fund Flows to Fund Performance and Market Conditions (The effect of a one standard deviation shock to each driver)

2. Fund Flows and the VIX

Sources: Bloomberg, L.P.; and IMF staff estimates. Additional data: Calculated based on data from the survivor-bias-free U.S. mutual fund database ©2014 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business.
Note: VIX = Chicago Board Options Exchange Market Volatility Index. Estimates in panel 1 are based on a regression of fund flows on the VIX, benchmark performance (lagged), excess performance over benchmark (lagged), age, and size. The model is estimated using share-class-level data covering 1998–2014. For more details on estimations and data, see Annex 3.2. Panel 2 splits observations into 20 quantiles based on the VIX. For each of these quantiles, the simple average for the VIX and fund flows is reported by type of fund.

the variance of funds' flows into assets is attributable to managers' decisions, with the remaining 30 percent attributable to end investors. This decomposition does not, however, take into account that, as discussed earlier, managers' behavior is to a significant extent indirectly driven by the incentives provided by end investors, including through the pattern of inflows.

Determinants of fund flows

Given the importance of fund inflows for mutual fund investment and induced price effects, this section investigates the determinants of net fund injections by end investors. The analysis uses monthly net inflows for U.S. mutual funds and ETFs at the funds' share-class level for open-end bond and equity funds, covering the period 1998–2014 (Annex 3.2).[26] Explanatory

[26]A mutual fund can issue multiple classes of shares that only differ in the structure of various types of fees (FINRA 2011). The sample includes U.S.-domiciled open-end mutual funds and ETFs, irrespective of their investment focus. For instance, U.S. funds

variables include fund performance (benchmark return and fund return in excess of the benchmark return), the VIX, fund characteristics (size, age, clientele) and structures (purchase and redemption fees, and dummies for index funds and for ETFs), and the liquidity of the underlying asset class.

End investors' flows to funds, especially those from retail investors, are procyclical and display a "flight to quality" during times of stress (Figure 3.8):

- Fund flows increase after good market performance of the respective asset class. This indicates that investors pursue momentum strategies, increasing their allocation to asset classes that have performed well in the past, and selling past losers.
- End investors engage in a flight to quality during episodes of stress. As uncertainty (measured by the

investing in emerging market debt are included. The focus is on the United States because of data availability on fees, as a result of more comprehensive disclosure requirements.

Figure 3.9. Convexity of Fund Flow–Performance Relationship
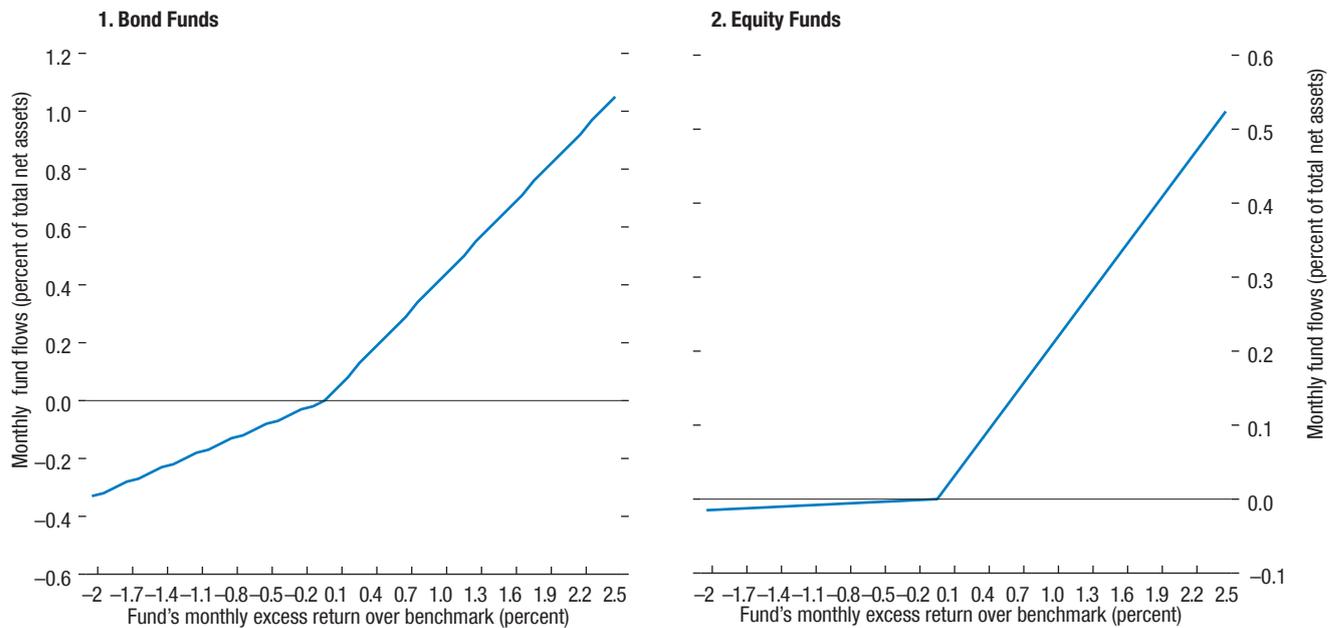
Sources: Bloomberg, L.P.; and IMF staff estimates. Additional data: Calculated based on data from the survivor-bias-free U.S. mutual fund database ©2014 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business.
Note: Estimates in the two panels are based on a regression of net inflows on VIX, benchmark performance (lagged), excess performance over benchmark (lagged), and age. The model allows for different slopes for negative and positive values of excess performance over benchmark. The estimation uses share-class-level data covering 1998–2014. For more details, see Annex 3.2.

VIX) rises, end investors shift away from equity funds to bond funds, especially to sovereign bond funds. A closer look at subgroups of bond funds and emerging market assets reveals that investors also flee from corporate and emerging market bonds when the VIX rises.[27]

- Relative performance is a main driver of fund inflows. This behavior by end investors provides incentives for herding, as discussed earlier.
- Investors disproportionately pour money into funds with strong recent performance, creating an incentive for managers of poorly performing funds to increase risks. Funds with excess returns over their benchmark receive disproportionately more inflows (Figure 3.9). In line with the existing evidence based on U.S. equity mutual fund data (Chevalier and Ellison 1997), investors inject money into winning funds to a greater extent than they punish poor performers (implying a convexity in the performance-inflow relationship). Thus, poorly performing fund managers have an incentive to take more risky bets (see Box 3.1

[27]Based on similar analysis for funds (from all jurisdictions) investing in emerging market assets using EPFR Global. This is in line with the findings of the April 2014 *Global Financial Stability Report*.

for details). The convexity is weaker for bond funds. Similar to the findings in Ferreira and others (2012), an analysis for non-U.S. funds shows that convex patterns are observed in some but not all economies, with equity funds generally displaying more convexity.

Client types, fees, and to some extent the market liquidity of assets and fund characteristics influence the sensitivity of fund flows to performance (Figure 3.10):

- Institutional investors appear to be less influenced by recent past performance. However, this result is not robust across all subperiods considered. Institutional investors are likely to be more sophisticated than retail investors, and findings in the April 2014 *Global Financial Stability Report* show that flows from institutional investors to emerging market assets are less sensitive to changes in the VIX.[28]

[28]However, in the presence of more fundamental financial and macroeconomic problems, institutional investors withdraw more aggressively than retail investors. For instance, Schmidt, Timmermann, and Wermers (2013) point out that institutional investors were the first ones to recognize problems with money market funds and instigated a run in 2009. The April 2014 GFSR finds that institutional investors sold off more when emerging market sovereigns were downgraded to below investment grade.

Figure 3.10. Liquidity Risk and Fund Structures

Among equity funds, fund flows of funds investing in liquid stocks are less sensitive to performance.

Redemption fees are effective in mitigating outflows.

1. Relative Sensitivity of Equity Fund Flows to Performance
(Response of flows into liquid and illiquid funds to a one standard deviation decline in benchmark returns, difference with respect to rest of funds)

2. Fund Flows by Redemption Fees
(The effect of a one standard deviation decline of returns)
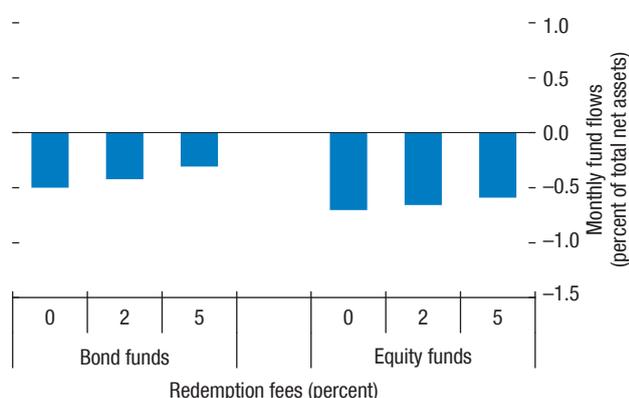
Redemption fees have helped mitigate redemptions during stress episodes, especially for emerging market funds.

However, mutual fund fees, especially redemption fees, have declined during the past 15 years because of competitive pressures in the industry.

3. Redemptions during Stress Episodes, by Redemption Fee Levels

4. Trend of Mutual Fund Fees
(Simple average, percent)
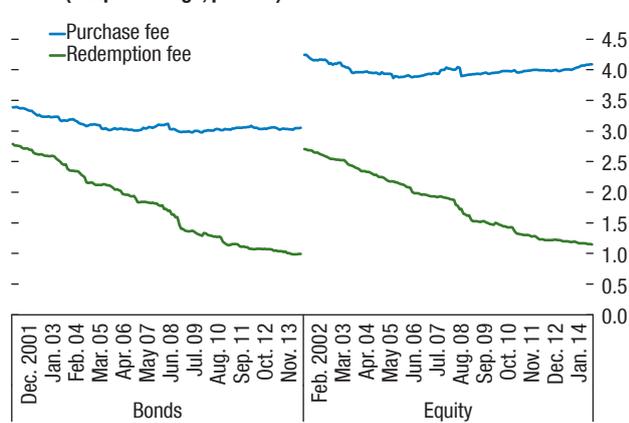
Source: IMF staff estimates. Additional data: Calculated based on data from the survivor-bias-free U.S. mutual fund database ©2014 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business.

Note: EM = emerging market; VIX = Chicago Board Options Exchange Market Volatility Index. Fees are maximum reported fees in the prospectus. Redemption fees include narrowly defined redemption fees and contingent deferred sales charges. Estimates in panels 1 and 2 are based on a regression of net inflows on the VIX, benchmark performance (lagged), excess performance over benchmark (lagged), age, size, and the reported fund characteristics (added one at a time) interacted with excess performance over benchmark (lagged). The estimation uses share-class-level data covering 1998–2014. Panel 3 computes the difference between average flows before the crisis period and average flows during the reported stress episodes (September to December 2008 for the global financial crisis, and May to September 2013 for the tapering episode). Fund flows are standardized by the beginning-of-period total net assets. Funds are classified as having low redemption fees if redemption fees are equal to zero. Funds are classified as having high redemption fees if redemption fees are greater than or equal to 3 percent in 2008 and 1 percent in 2013. For more details on estimations and data, see Annex 3.2.

- Fees are generally effective in dampening redemptions following short-term poor performance, though competitive pressures in the industry challenge their use. In particular, redemption fees appear to be effective. However, among bond funds, the effectiveness of fees appears to vary across fund types: the fees dampen redemptions for emerging market bond funds, but not for U.S. government bond or corporate bond funds. Moreover, competitive pressures and transparency requirements in the industry have driven down fees during the past 15 years (Figure 3.10, panel 4), which would make it difficult for individual funds to adopt adequate fees in line with their investment risk without sector-wide coordination or regulation.[29]

- The sensitivity of redemptions to benchmark performance is larger for equity funds investing in less liquid stocks. This result is in line with the findings in Chen, Goldstein, and Jiang (2010) for U.S. equity funds. As discussed by Stein (2014), a higher redemption sensitivity of less liquid funds is consistent with the existence of a first-mover advantage. Although one would expect the evidence to be stronger for bond funds (because of their larger liquidity mismatches; Figure 3.5), that is not the case. One reason could be that bond funds with higher liquidity mismatches manage their liquidity risk more carefully, as discussed in the following section.

Brand name effects are present, albeit weak. This analysis examines 18 events in which a "flagship fund" of a large AMC experienced large redemptions (see Annex 3.2 for details). The test is whether funds in the fund family hit by the flagship shock experience larger outflows than similar funds not in the fund family. Out of the 18 events, 10 cases show statistically significant negative brand name effects, 3 cases show statistically positive effects, and the other 5 cases show no significant effects (Figure 3.11).

How do funds manage liquidity risks?

The effects of fund flows on fund investment can be cushioned by liquidity risk management. For instance, if a fund holds sufficient cash buffers when

Figure 3.11. Brand Name Effects
(Cumulative fund flows from event date in percent of total net assets, mean difference from median comparator funds)

Brand name effect: 18 events with a "flagship fund shock"
(Mean across events; flows in percent of total net assets, nonfamily = 0)

Source: IMF staff estimates. Additional data: Calculated based on data from the survivor-bias-free U.S. mutual fund database ©2014 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business.
Note: "Flagship shocks" for large asset management companies are identified as periods with large outflows from flagship funds (10 percentage points above those of the median of funds with shared investment objectives). Regression analysis for each of those events is used to test whether funds in the affected flagship family receive lower net inflows relative to nonfamily funds. See Annex 3.2 for details.

faced with large redemptions, the effect on sales pressures will be dampened. Moreover, funds' share pricing rules and redemption policies can be designed to reduce redemption risks. Existing research (though somewhat old and focused on equity funds) shows that funds investing in illiquid assets tend to take the form of closed-end funds with no redemption risk, charge fees for fund share purchases and redemptions, and hold more cash (Chordia 1996; Deli and Varma 2002). This section looks at how fund managers use these tools to manage liquidity risks by examining their cash holding patterns in relation to flow volatility, current fund flows, and various fund characteristics, including liquidity of assets and client type (institutional or retail). In contrast to previous studies, the analysis here also covers bond funds and uses more recent data.[30]

---

[29]Figure 3.10 shows the maximum charge reported in the fund's prospectus. In practice, funds often offer discounts, reducing effective fees to much lower levels. ICI (2014b) reports that effective purchase fees declined from nearly 4 percent in 1990 to 1 percent in 2013.

[30]Funds can also manage liquidity using derivatives, something not studied here because of a lack of data.

Figure 3.12. Funds' Liquidity Risk Management

Cash holdings are high for those funds experiencing large inflows or outflows.

1. Cash Holding by Fund Flows
(Using monthly share-class-level data for 1998–2014)
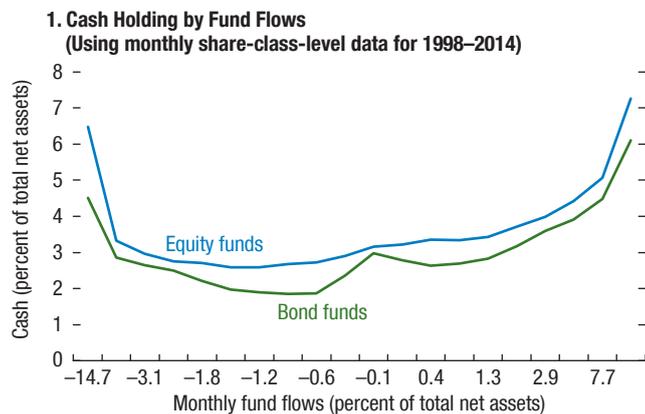
Funds charge higher fees to retail investors and when investing in illiquid assets…

2. Mutual Fund Fees by Investment Focus and Clientele
(Simple average, percent)
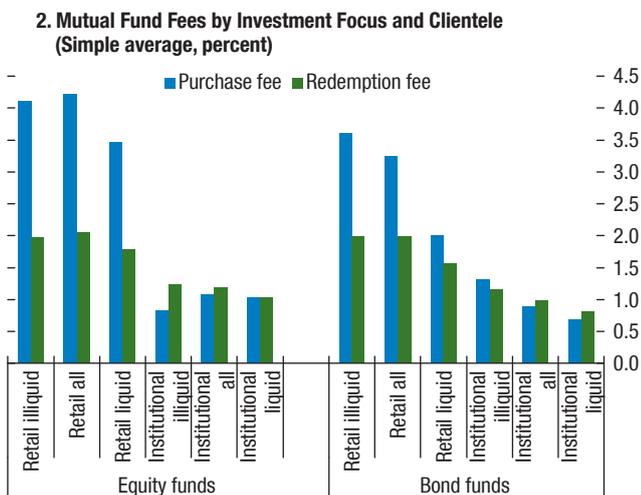
…and hold more cash when investing in relatively illiquid assets, facing higher fund flow volatility. They hold less cash when they have predominantly institutional clients.

3. Differences in Cash Holdings across Funds
(Percent of total net assets)
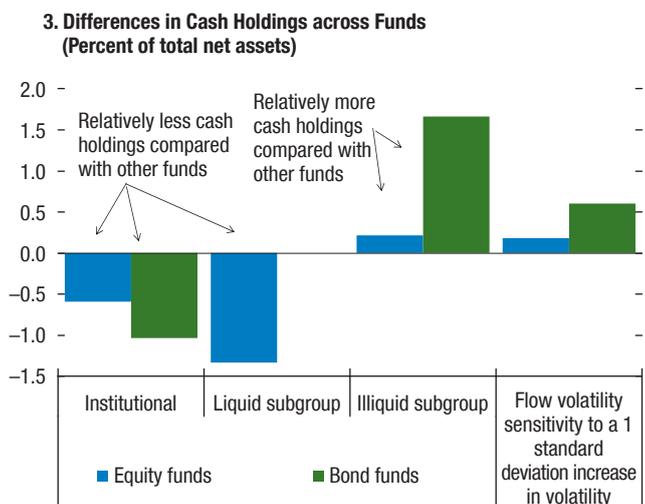
Sources: Calculated based on data from the survivor-bias-free U.S. mutual fund database ©2014 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business; and IMF staff estimates.
Note: Panel 1 is based on monthly data from 1998 to 2014 for each fund share class. It splits observations into 20 quantiles based on net fund flows (in percent of total net assets). For each of these quantiles, the panel shows the mean percentage of cash in funds' portfolios. In panel 2, fees are maximum reported fees in the prospectus. Redemption fees include narrowly defined redemption fees and contingent deferred sales charges. Estimates in panel 3 are based on a regression of cash holdings (in percentage of total portfolio) as a function of net inflow volatility, lagged net inflows, and the reported fund characteristics dummies.

Generally, asset managers choose cash buffers and fee policies to limit liquidity risks, though competitive pressures have been reducing the use of redemption fees (Figure 3.12):

- Asset managers appear to actively manage their liquidity risks with precautionary cash buffers (Figure 3.12). Cash holdings are high for those funds experiencing very large outflows (in line with a precautionary motive) and inflows (presumably because managers take some time to fully invest new money). Estimation results confirm that funds also hold higher cash buffers when they face more volatile flows from investors and when these investors are primarily less stable retail investors. Similarly, cash holdings are higher for funds investing in relatively less liquid assets.

- Funds with higher liquidity risks tend to charge higher fees (Figure 3.12, panel 2). Fees are generally set lower for institutional investors. Funds investing in more illiquid assets tend to set higher fees than those investing in liquid assets.

Herding, Interconnectedness, and Contribution to Systemic Risk

Herding (correlated trading)

How prevalent is herding? Empirical evidence of mutual fund herding is abundant, although reported mag-

Figure 3.13. Herding among U.S. Mutual Funds
(Percent)

Recently, U.S. mutual funds have been herding more in U.S. equity and corporate bond markets.
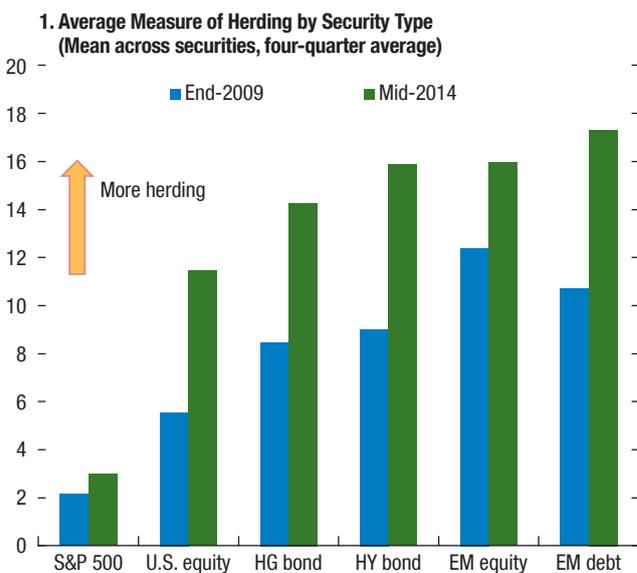
Retail funds tend to herd more than institutional funds.
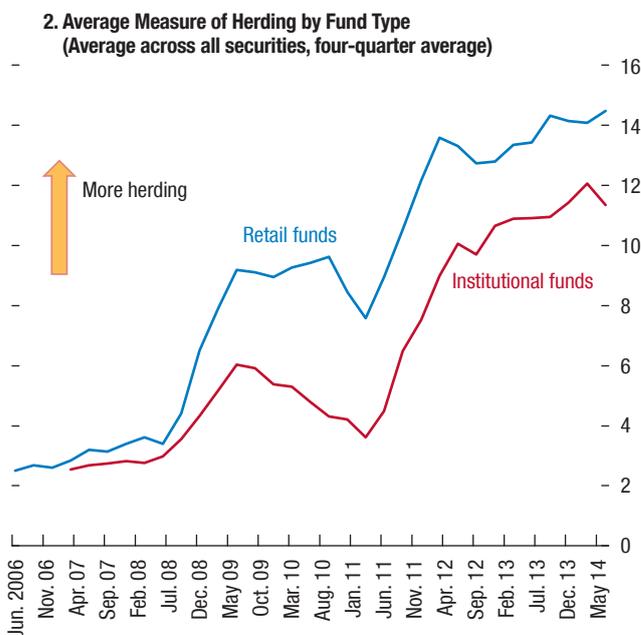
1. Average Measure of Herding by Security Type
(Mean across securities, four-quarter average)

2. Average Measure of Herding by Fund Type
(Average across all securities, four-quarter average)

Source: IMF staff estimates. Additional data: Calculated based on data from the survivor-bias-free U.S. mutual fund database ©2014 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business.
Note: EM = emerging market; HG = high grade; HY = high yield. The herding measure is that proposed by Lakonishok, Shleifer, and Vishny (1992). It assesses the strength of correlated trading among mutual funds investing in each security, controlling for their overall trade trends (see Box 2.5 of April 2014 *Global Financial Stability Report*). Note that the market as a whole cannot trade in the same direction, since at any given time there must be a buyer for each seller. The measure is 0 when there is no sign of herding among mutual funds. It is calculated every quarter, looking at the fund-level activity in each security, and then averaged across securities. The measure is computed when there are at least five funds that changed the holdings of a security in each quarter for each security. The CRSP database contains security-by-security holdings of all U.S.-domiciled open-end mutual funds, covering more than 750,000 securities. To make the analysis computationally feasible, this chapter works with subsamples of securities that are randomly selected. Except for the S&P 500 sample, the herding measure is calculated with 50,000 randomly selected securities for each of the subgroups. In panel 1, the difference in herding across neighbor categories is statistically significant at the 5 percent confidence level, except for the case of EM debt versus EM equity, and HY bond versus HG bond. The difference in herding by fund type (panel 2) is significant at the 1 percent confidence level.

nitudes vary across markets (Grinblatt, Titman, and Wermers 1995; Wermers 1999; Borensztein and Gelos 2003; Choi and Sias 2009; Brown, Wei, and Wermers 2013). Using data on security-by-security holdings of U.S. open-end mutual funds, the degree of herding is measured using the method developed by Lakonishok, Shleifer, and Vishny (1992).[31] This is a measure of correlated trading within this investor group. Even though it does not conclusively allow for an identification of

[31]See Box 2.5 in the April 2014 *Global Financial Stability Report* for details. The Lakonishok, Shleifer, and Vishny (1992) index is a highly robust measure for detecting herding (in the sense of correlated trading patterns). It does, however, have a bias toward underestimating the magnitude of herding. Correcting for this bias is difficult and methods for doing so are the subject of ongoing debate. The downward bias increases with lower transaction numbers. Given that over the past five years, the data show a mild decline in the number of transactions per security, the results likely underestimate the true increase in herding shown in Figure 3.1.

"herding" in a strict sense (namely, actions taken only because investors see other investors taking them), at a minimum it does provide an informative measure of the degree to which this class of investors moves together, regardless of the underlying reasons.

Herding among U.S. mutual funds is on the rise across fund styles (Figure 3.13). This finding is true for both U.S. equities and corporate bonds in recent years. For U.S. equities, mutual funds appear to co-move more during distress episodes. Retail-oriented funds show consistently higher levels of herding than do institutional-oriented funds. This could be because retail investors are more prone to quickly reallocate money from funds with poor recent performance to funds with high recent returns (Frazzini and Lamont 2008), possibly because it is more difficult for them than for institutional investors to assess and monitor portfolio managers. This difficulty in assessing and monitoring managers and the result-

ing volatility of inflows would exacerbate the role of incentive problems described earlier in driving herding behavior. The rise in herding coincides with the adoption of unconventional monetary policies in the United States, and could be related to an accentuated search for yield by mutual funds.[32] Herding levels are higher for emerging market and high-yield assets and lowest for the S&P 500 market, consistent with the notion that herding is more likely to be prevalent in relatively more opaque and less liquid markets (Bikhchandani, Hirshleifer, and Welch 1992).

Linkages between parent asset management companies and funds

Mutual funds and most other investment vehicles have few direct solvency linkages with their AMCs. AMCs' own balance sheets are legally separated from those of the mutual funds they manage, as required by regulations.[33] This separation does not necessarily apply to other types of investment vehicles, though. For some hedge funds and private equity funds, AMCs' assets can be comingled with clients' assets. Another example of linkage is AMC parents' support for funds during crisis episodes. In 2008, because of reputational concerns, some financial institutions provided emergency liquidity support for money market funds and other fixed-income funds their group AMCs were managing (Moody's 2010).

Interconnectedness through ownership

Banks and insurance companies are major owners of AMCs, and the overall stability implications of these arrangements are unclear (Figure 3.14). Without proper oversight of related-party exposures and concentrated exposures, funds could be used as funding vehicles for their AMC's parent banks.[34] Moreover, many such banks are G-SIFIs. These interrelationships increase the concentration of financial services providers across various subsegments of the financial sector, creating potentially very influential and complex mega conglomerates. Information sharing between a bank and its group AMC is another

---

[32]For high-grade bonds, econometric estimates of the relationship between herding and proxies for unconventional monetary policy show a positive, albeit weak, link.

[33]See Annex 3.1. AMCs' own balance sheets are also much smaller than the clients' money they manage (2 percent to 12 percent of assets under management for the top AMCs).

[34]For instance, certain types of synthetic ETFs could be used by their AMCs' parent banks to obtain cash in exchange for collateral securities that banks do not want to keep on hand.

Figure 3.14. Ownership Structure of the 25 Largest Global Asset Management Companies
(Number)
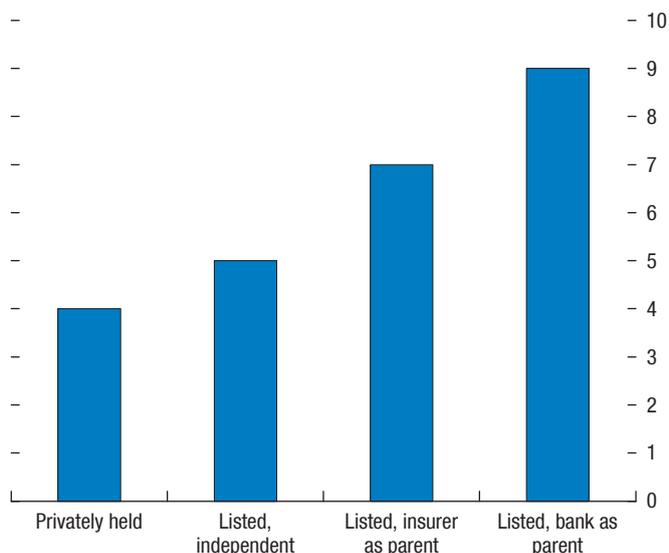
Sources: Pensions and Investments and Towers Watson (2014); and IMF staff calculations.
Note: Parent banks include Amundi, Bank of New York Mellon, BNP Paribas, Deutsche Bank, Goldman Sachs, HSBC, J.P. Morgan Chase, Natixis Global Asset Management, and UBS. Parent insurance companies include Allianz (for PIMCO), Axa, Metlife, Generali, Legal and General Group, and Prudential.

potential concern. Massa and Rehman (2008) provide evidence that such information sharing exists for banks and AMCs, most likely through informal channels. However, bank affiliation could also have effects that may be desirable from a financial stability point of view, including access to a central bank's emergency liquidity facility through AMCs' parent banks and more supervisory scrutiny.

Interconnectedness through bank funding

The roles of mutual funds as funding providers for banks appear to vary across instruments and countries (Figure 3.15). Mutual funds are more important providers of long-term bank financing in the United States than in other economies. However, their role appears to be less important than that of money market funds' role in short-term (bank) funding.

The relationship between size and contribution to systemic risk

An actively discussed question in global regulatory fora is whether large asset managers and funds should be designated as SIFIs and receive more intense oversight. This section does not intend to fully answer this ques-

Figure 3.15. Bank Financing by Mutual Funds and Money Market Funds

Mutual funds invest in long-term bank bonds, but generally they are not the main holders of bank bonds…

…whereas money market funds play a more significant role in short-term funding markets.

1. Share of Long-Term Bank Bonds Held by Mutual Funds
(Percent of total outstanding covered in eMaxx)

2. Money Market Funds' Share in Short-Term Funding Markets
(Percent of euro area short-term bank funding and U.S. repo and CP outstanding)
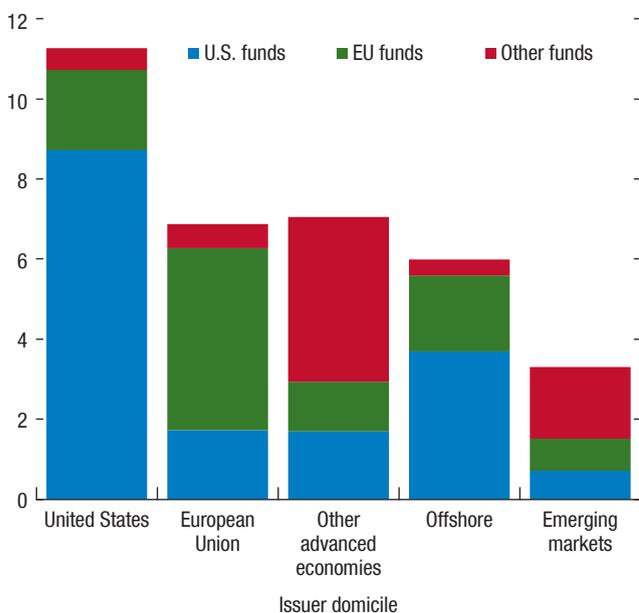
Sources: eMaxx; and IMF staff calculations.
Note: EU = European Union.
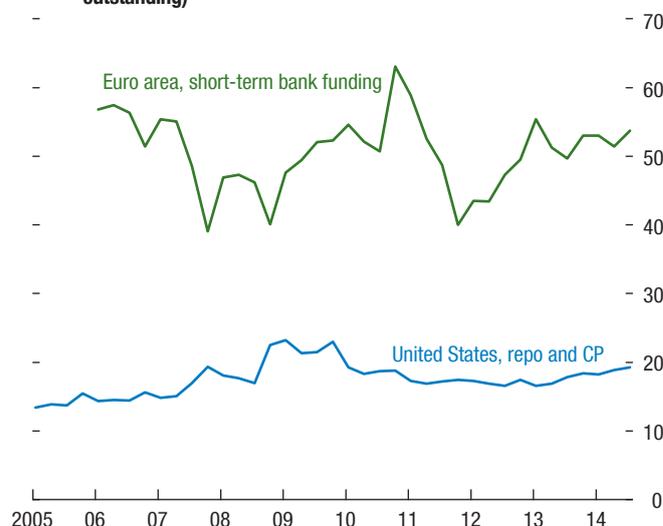
Sources: European Central Bank; Federal Reserve; and IMF staff estimates.
Note: CP = commercial paper; repo = repurchase agreement.

tion. As discussed earlier, each segment of the industry has its distinctive risks, many of which are hard to quantify because of data gaps. However, the analysis attempts to partially address the issue by asking how funds' contribution to systemic risk in advanced economies relates to fund size, investment focus, and size of their AMCs, using the conditional value-at-risk (CoVaR) method (see Annex 3.2).

Funds' contributions to systemic risk depend relatively more on their investment focus than on their size (Figure 3.16). Estimations based on a sample of about 1,500 funds (not shown) reveal that investment orientation, VaR, and fund size, among other characteristics, are significantly related to a fund's contribution to systemic risk (Annex 3.2). The relative importance of size, however, differs across market segments.

For a given fund size, the systemic risk contribution bears little relation to the size of a fund's AMC (Figure 3.16, panel 2). The average contribution to systemic risk does not increase with a fund's AMC's size (the picture looks the same when the investment focus of funds is controlled for), at least not for the top asset managers considered here. Although this exercise only

examines one segment of the broad asset management industry and CoVaR is only one of the many possible systemic risk measures, it highlights the importance of incorporating product-line and investment-focus perspectives, in addition to mere size, when discussing the designation of AMCs and funds as SIFIs.

Revamping the Oversight Framework to Address Financial Stability Risks

Key Features of Current Regulation

The industry is regulated, albeit with a focus on investor protection. Substantial regulatory requirements are in place for publicly offered funds.[35] Regulation focuses on investors being given sufficient information to understand the investment product, on investors'

[35]Regulatory frameworks for funds appear to be generally strong around the globe—the IMF and World Bank assessments of securities regulation under the IOSCO Principles show a generally high level of compliance with principles dealing with disclosure to investors and other consumer-protection-related standards. Some emerging market and developing economies, however, have serious gaps in their legal frameworks that fail to adequately separate the funds' assets from those of the asset manager. This raises risks to customer assets.

Figure 3.16. Contribution to Systemic Risk by Mutual Funds

The systemic risk contribution differs across funds' investment orientations.

A fund's systemic risk contribution is not related to its AMC's size.

1. **Average Contribution to Systemic Risk by Investment Focus (Percent)**

2. **Contribution to Systemic Risk of Top Fund Families by Size of Asset Management Company**
   (Contribution to systemic risk averaged across funds in the same family, percent)
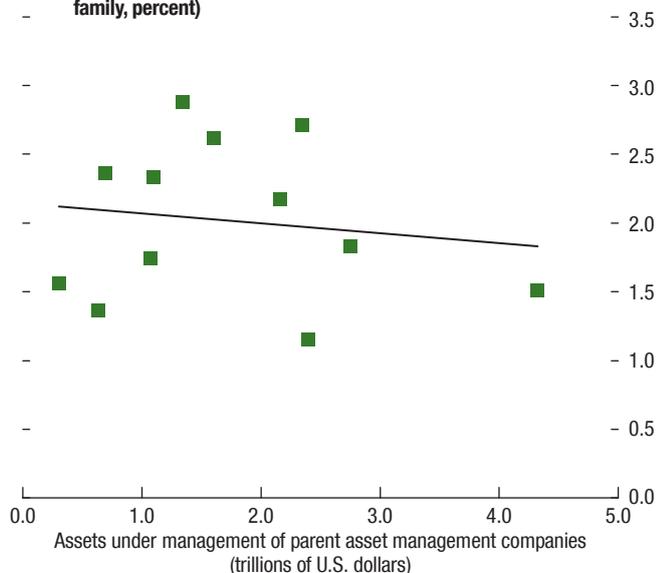
Sources: Lipper; Pensions and Investments and Towers Watson; and IMF staff estimates.
Note: AE = advanced economy; AMC = asset management company; CoVaR = conditional value-at-risk; EM = emerging market. The impact of fund A's distress on systemic risk is measured by the difference of CoVaR when fund A is in a normal state (median VaR) and in a distressed state (worst 5 percentile VaR). The financial system consists of an equity index for banks and insurers from AEs and about 1,500 mutual funds, taking the largest 100 funds (globally) for each of the five investment focus categories (AE sovereign, AE corporate bond, EM bond, AE equity, and EM equity) and for three different fund domiciles (the United States, Europe, and the other advanced economies). Weekly net asset value data are used to compute fund returns and monthly total net asset (TNA) data to measure the size of each fund from January 2000 to November 2014. The system is measured by a TNA-weighted average of fund returns (the results are robust when the simple average is used instead). The assets under management of the AMC include assets managed with different investment vehicles such as separate account and alternative funds. Caution should be taken in comparing the precise ranking of systemic risk contributions across fund categories since the sample period may not capture the realization of relevant tail risks. Moreover, the measure does not identify whether the contribution is causal or driven by a common factor.

assets being protected from fraud and other risks, and on asset managers not taking advantage of investors. For these purposes, disclosure, investment restrictions (including concentration limits), caps on leverage, liquidity risk management, pricing and redemption policies, and separation of client assets from those of AMCs play important roles (Table 3.3). Regulatory requirements for privately offered products have also been strengthened since the global financial crisis. AMCs that offer investment products are subject to rules that focus on protecting clients from fraud or negligence and that aim to ensure the business continuity of the AMC.

The importance of liquidity risks to the industry is recognized and is an integral part of current regulation and industry practices:

- Regulatory requirements to manage liquidity risks exist, though they are often rather general. Funds are generally restricted to liquid assets or required to maintain certain liquid asset ratios; they must have risk management frameworks (data collection, profiling of redemptions, and stress testing) in place. Many asset managers have internal liquidity risk management frameworks for their funds, with regular monitoring of clients' liquidity needs and stress testing. These liquidity management tools are in line with FSB suggestions (FSB 2013).

- For very large redemptions, funds also have a variety of tools, subject to local regulatory requirements. For macroprudential purposes, the FSB (2013) and the October 2014 *Global Financial Stability Report* suggest that regulation and fund contracts should include tools, such as fees, gates, side-pockets, and

Table 3.3. Selected Regulations for Publicly Offered Funds

Issues	Requirements
Investment Restrictions	• Typically, investments in illiquid securities and complex products are restricted and positions cannot be concentrated in a single issuer. • Use of leverage and derivatives is capped. Public funds in the United States, for example, can only employ leverage of up to 33 percent of assets, including portfolio leverage embedded in derivatives. UCITS funds can only temporarily borrow up to 10 percent of assets. UCITS funds can invest in financial derivatives, subject to conditions on underlying assets, counterparties, and valuation, and exposure cannot exceed the total net value of the portfolio.
Liquidity	• Publicly offered funds are subject to liquidity requirements. • Specific fund classes, such as money market funds, have extensive liquidity requirements. • In the United States, funds can hold only a limited amount of illiquid assets. "Liquid asset" is defined only broadly by regulation, but more detailed definitions can be included in fund contracts. • In the European Union, regulators provide a list of assets that are eligible to meet liquidity requirements, but there is no liquidity ratio requirement. A similar approach is followed by other jurisdictions, such as Brazil. • In Singapore, liquidity requirements differ by fund type. • Funds are expected to have risk management frameworks, including liquidity risk management, but few jurisdictions provide details on how these frameworks should work. • In 2011, IOSCO established its Principles of Liquidity Risk Management for Collective Investment Schemes.
Pricing of Fund Assets, Fund Shares, and Redemption	• Portfolios are generally priced at market value for NAV calculation, although some illiquid assets are valued following fair value accounting rules. However, during times of distress, some prices may not reflect accurate market values, especially when there are limited market transactions. • Rules are in place aiming to ensure that prices for purchases and redemption of shares are set so as to treat investors fairly, but some rules can result in a first-mover advantage (see Box 3.2 for details). • Various jurisdictions allow suspension of redemption as an extreme measure. • Under the European Union's UCITS scheme, funds can specify redemption restrictions, typically used for funds investing in less liquid securities.

Source: IMF staff.
Note: IOSCO = International Organization of Securities Commissions; NAV = net asset value; UCITS = Undertaking for Collective Investment in Transferable Securities (a type of publicly offered fund governed by the European Union UCITS directive).

suspension of redemptions, to manage large redemptions.[36] Existing regulation and fund contracts indeed allow for these tools. In addition, asset managers can make use of credit lines, delays in cash payout upon redemption (within regulatory limits), and payment in kind.[37] The available tools often vary depending on local requirements.[38] For extreme measures, such as suspensions, funds are usually required to obtain permission from regulators, and they are strictly limited to extraordinary circumstances to prevent abuse. Consequently, restrictions on redemptions have been used only rarely in advanced markets, and are generally associated with the failure or winding down of a fund—redemptions are suspended to ensure that pricing of the shares is fair across investors when a portfolio has become too difficult to price (IOSCO 2011).

Limitations of Current Oversight

The current oversight framework is not set up to fully address risks, neither at the institutional nor systemic level:
- *Regulation lacking in specificity*—Key regulations, especially regarding liquidity requirements and liquidity risk management, are broad and lack specific guidance, allowing for wide-ranging interpretations and practices across jurisdictions (Table 3.3). For instance, liquid asset requirements are often stipulated without a precise definition of "liquid assets." Requirements for risk management frameworks are often not detailed in legislation. Regulatory requirements themselves also vary substantially across jurisdictions, reflecting the broad-principle-based approach of global standards (IOSCO Principles).
- *Insufficient supervision of individual and systemic risks*—Supervision of funds and asset managers

[36]Gates constrain redemption amounts to a specific proportion on any one redemption day. Suspension is full closure of a fund to redemption. Side-pockets legally separate impaired or illiquid securities to prevent them from affecting a fund's return until market conditions stabilize.

[37]Asset managers argue that payment in kind is particularly useful for institutional clients. For instance, when institutional clients are simply changing portfolio managers, they are willing to accept securities instead of cash and transfer the securities to a new manager to avoid losses related to large-scale sales. Transfer of securities from one manager to another is straightforward because the securities are kept at a custodian bank, segregated from the AMC's assets.

[38]For instance, in some countries, funds are not allowed to take credit lines or pay in kind to retail investors. The minimum redemption frequency for publicly offered funds is set differently across jurisdictions, and funds are not allowed to delay settlement beyond the limit (seven days in the United States and two weeks in the European Union).

is generally weak across jurisdictions.[39] In many jurisdictions, oversight of funds has been focused on disclosure to protect retail investors. Regular supervision of risks is generally not the focus of supervisors.[40] As a result, no financial soundness indicators have been developed for the industry, and stress testing of funds and AMCs by regulators has been rare—a major contrast with bank supervisory practice. For some regulators, the number of asset managers and funds impose resource challenges. Moreover, international coordination and guidance on supervisory practices is sparse, since the IOSCO Principles focus on regulations. Good practices by asset managers provide some comfort, but in the presence of liquidity and price externalities, each fund and asset manager is likely to underestimate liquidity needs and the potential for correlated price effects in the presence of large shocks (Liang 2015).

Improving Oversight

Securities regulators should enhance the microprudential oversight of risks (Table 3.4):

- *Enhance regulation by providing more specifics for funds' liquidity requirements*—Key regulations should provide a clearer definition of liquid assets. More specific guidance should be given to match the liquidity profile of each fund category to its redemption policy.

- *Strengthen the microprudential supervision of risks related to individual institutions*—Regulators should regularly monitor market conditions and review whether funds' risk management frameworks are sufficient, especially with regard to liquidity risks. Greater resources should be devoted to supervising risks, including developing analytical and stress-testing capacities so that regulators can effectively challenge asset managers' practices.

- *Ensure that funds do not take excessive leverage*— Caps limit overall leverage of publicly offered funds. Nevertheless, leverage and its regulatory

compliance should be regularly monitored with better data on derivatives.[41]

- *Adopt approaches based on products, activities, or both*—Focusing on activities and products in addition to size seems appropriate given that the industry is diverse and differences in investment focus seem to matter significantly for funds' contribution to systemic risk.

- *Raise the quality of supervisory practices across jurisdictions by introducing global standards*—International standards and guidelines for better supervision should be significantly expanded and enhanced. Supervisors should share best practices, especially in the area of liquidity risk. For instance, coordinated efforts should be undertaken to develop financial soundness indicators as well as stress-testing frameworks for the industry. The IMF could play a key role here, based on its experience in developing common financial soundness indicators and stress-testing frameworks for banks.[42]

A macroprudential perspective should be integrated into the oversight of the industry, and the adequacy of existing tools for macroprudential purposes should be reexamined:

- *Bring a macroprudential focus on systemic risk to oversight of the sector*—As illustrated by the empirical analysis, price externalities are the key channel of systemic financial stability risk from this industry. Thus, assessments of individual institutions are not sufficient for assessing systemic risk. Incorporating monitoring of linkages to other sectors that rely on the industry for financing may even be necessary.[43]

- *Existing risk management tools and rules could be used with a view to safeguard financial stability*—To

---

[39]A consistent finding in Financial Sector Assessment Programs of the IMF and the World Bank is that most jurisdictions with substantial asset management industries have sound regulatory frameworks but show weaknesses in the intensity of supervision of funds and asset managers.

[40]There are some exceptions. For instance, supervisors in France and Brazil have risk-oriented and data-driven financial stability risk management frameworks that foresee collecting the data and using them to monitor potential risks; the supervisors can conduct stress testing on their own, and challenge asset managers if risks are found.

[41]Adam and Guettler (forthcoming) document that, among U.S. corporate bond funds, (1) the use of credit default swaps (CDS) rose from 20 to 60 percent between 2004 and 2008; (2) CDS are mostly used to enhance credit risk taking, rather than hedging; (3) funds belonging to a larger fund family are more likely to use CDS; (4) underperforming funds often increase their CDS exposures to enhance returns; and (5) CDS users tend to perform worse on average than non-users.

[42]The *Global Financial Stability Report* began reporting financial soundness indicators for banks in 2003. At first, the data were collected from national authorities or commercial databases without harmonizing methods. The effort has since developed into a more harmonized statistical framework (http://www.imf.org/external/np/sta/fsi/eng/fsi.htm), with a full compilation guide. The IMF now periodically publishes details of the indicators. It has also been contributing to the building of common stress-testing frameworks (IMF 2012).

[43]The October 2014 *Global Financial Stability Report* discusses how cooperation between microprudential, macroprudential, and business conduct regulators could be carried out in practice.

Table 3.4. Summary of Analysis and Policy Implications for Mutual Funds and ETFs

Results	Policy Implications
Does Fund Investment Affect Asset Prices?	
Flow-price impact analysis: Fund flows affect aggregate asset prices, at least in less liquid markets, in both advanced and emerging market economies.	• Regulators need to monitor financial stability risks from the industry from a macroprudential perspective, especially in smaller, less liquid, fixed-income markets.
Concentration and price-impact analysis: Mutual funds' concentration in bond markets has risen. During stress episodes, bonds with more concentrated mutual fund ownership tend to experience larger price drops.	• Adequacy of concentration limits may need to be reconsidered.
What Drives Run Risk? What Can Be Done to Mitigate It?	
End investors: End investors, especially retail investors, chase past returns and display a flight to quality during times of stress, making fund flows procyclical.	• Properly pricing-in the cost of liquidity is important in reducing the first-mover advantage, by avoiding passing on to remaining investors the costs associated with the sales of illiquid assets. Regulators should examine the benefit of flexible NAV pricing rules (such as swing and dual pricing), illiquid asset valuation rules, and ETF structures to adequately reflect liquidity risk costs.
First-mover advantage: In line with the notion of a first-mover advantage, among equity funds, redemptions are more sensitive to returns for less liquid funds. However, the same is not true for bond funds (which generally have higher liquidity mismatches than equity funds). In emerging markets, fund flows predict future price movements, consistent with a first-mover advantage.	• Consider imposing minimum redemption fees for funds with large liquidity mismatches. Fees that are added to NAV avoid harming investors as a whole, while pricing-in the cost of liquidity.
Funds' liquidity risk management: Funds use various liquidity management tools. They hold higher cash buffers when they experience large outflows, face higher redemption risks, are retail focused, and invest in illiquid assets. Fees are generally effective in reducing redemptions.	• More generally, the adequacy of the requirements for liquid assets and liquidity risk management should be reexamined, incorporating financial stability risks from the industry.
Does Asset Managers' Behavior Amplify Risks?	
Managers' decision vs. end investors' decision: Portfolio managers' trading accounts for about 70 percent of the variance in funds' investments.	• Ensure that managers are in compliance with regulatory requirements and are not taking excess risks (including hidden leverage).
Excessive risk taking: By rewarding winners disproportionately more than punishing losers, end investors encourage excessive risk taking by managers in various advanced economies. The tendency is stronger for equity funds than for bond funds.	• Reduce information gaps between managers and investors (and regulators) by upgrading disclosure requirements to better reflect the fund's economic risks, especially regarding the use of derivatives and securities financing transactions.
Herding: Herding among U.S. mutual funds has been intensifying, particularly in smaller, less liquid markets. Retail-investor-oriented funds tend to herd more.	• Financial stability risks from mutual funds could stem from many small funds taking similar positions. Regulators should pay attention to this possibility, not just focus on the positions of large funds.
Brand name effects: Evidence suggests that large redemption shocks to a flagship fund often spill over to other funds in the family, although the effects have been weak so far.	
Contribution to Systemic Risk and Size	
Fund size and systemic risk: Generally, larger funds contribute more to systemic risk, but the investment focus of funds matters more.	• The SIFI discussion for funds and asset managers should take into account specific risks of products in addition to size.
Parent AMC size and its funds' systemic risk: There is little relationship between a fund's contribution to systemic risk and its AMC's size.	• Oversight of the industry should not simply focus on large funds and AMCs.

Source: IMF staff.
Note: AMC = asset management company; ETF = exchange-traded fund; NAV = net asset value; SIFI = systemically important financial institution.

mitigate price externalities, rules on investment restrictions (such as concentration limits), liquidity requirements, and redemption policies may need to be updated in line with funds' risk profiles (October 2014 *Global Financial Stability Report*).

• *Further efforts should be aimed at reducing the first-mover advantage*—As discussed, and partly confirmed in the empirical analysis, a first-mover advantage can arise for various reasons. Some of these are difficult

to address, such as the liquidity pecking order of sales. Others, however, such as the degree of liquidity mismatches, can at least partially be addressed with good supervision. Most important, accounting-based illiquid asset valuation rules and inflexible fund share pricing rules that increase investors' incentives to run should be revised. In this context, so-called swing- or dual-pricing rules could play a role (Box 3.2). Charging redemption fees, which are found to be effective

in smoothing redemptions, is another alternative for pricing-in the cost of liquidity. However, competitive pressures have probably resulted in fee levels that are likely too low from a financial stability perspective (Figure 3.10, panel 4). Therefore, coordinating on an industry-wide minimum level of fees for funds investing in illiquid assets could be considered.[44] In doing so, fee policies should match funds' specific characteristics rather than impose one-size-fits-all requirements.[45]

- *Caution is needed in the use of gates and suspensions*— They should be part of the toolkit. Nonetheless, their imposition may also send negative signals to the market and lead to preemptive runs ahead of the instruments coming into force (FSB 2013; October 2014 *Global Financial Stability Report*).

- *Be equipped with "better" data*—Publicly offered funds disclose substantial information. However, the disclosed data—aimed at investor protection— are often not sufficient for nor suited to systemic financial stability analysis. For instance, many jurisdictions do not require standardized quantitative disclosure of derivatives and securities financing transactions, such as outstanding positions, details on collateral, and counterparties.[46] Better disclosure and reporting is also important for reducing information gaps that lead to incentive problems of delegated portfolio management. Supervisors should also make further efforts to collect data on privately offered products, including separate accounts. Even though investor-protection concerns with regard to these products are lower, their investment patterns can affect financial markets.

[44]These fees would not have to benefit the AMC but could be added to NAV and be redistributed to investors. For instance, in the United States, Rule 22c-2 under the 1940 Investment Company Act as amended provides that the fund board of an open-end fund must consider whether to impose a redemption fee (up to 2 percent) that flows back into the fund's NAV (BlackRock 2014b).

[45]Nevertheless, the imposition of such a fee would raise various practical problems, including those related to cross-border coordination. An inadequate framework could also drive investors away from this industry to other, less regulated products.

[46]In the United States, mutual funds disclose only qualitative information on their derivatives positions. In the European Union, heightened concerns about the use of derivatives by synthetic ETFs in 2011 (see Annex 3.1) have led the industry to voluntarily disclose detailed derivatives positions, including derivatives exposures, counterparties, and the type and amount of collateral. This practice has subsequently evolved into requirements for ETFs and more broadly for UCITS (ESMA 2012). In Brazil, supervisors obtain information from the central counterparty and from exchanges that clear derivatives transactions.

Various other aspects not covered in the empirical analysis in this chapter deserve attention by national authorities. Improving the liquidity and transparency of secondary markets, specifically for longer-term debt markets, would reduce risks related to liquidity mismatches.[47] For example, expanding trade reporting initiatives to all global fixed-income sectors should help reduce the opacity of secondary markets (October 2014 *Global Financial Stability Report*). Compensation structures for portfolio managers may merit scrutiny (Box 3.1). The composition of benchmark indices also deserves attention, with a view to minimizing possible associated distortions. The authorities could assess their ability to provide emergency liquidity to break vicious feedback loops between funding and market liquidity in times of stress. However, providing emergency liquidity creates clear moral hazard risk and therefore requires enhanced supervision (October 2014 *Global Financial Stability Report*).

Conclusion

Financial stability risks can emanate from intermediation through asset managers even in the absence of leverage and guaranteed returns. The discussion in this chapter stresses the importance of separating the effects that stem from end investors, and would be present even in the absence of financial intermediaries, from those that are introduced by the presence of asset managers. The delegation of day-to-day portfolio management introduces fundamental incentive problems between end investors and fund managers, which can induce destabilizing behavior and amplify shocks. In addition, easy redemption options can create risks of runs because of the presence of a first-mover advantage. The destabilization of prices in certain asset segments (particularly bonds) can affect other parts of the financial system through funding markets and balance sheet and collateral channels.

The chapter has shed some light on the importance of various dimensions of these risks. Complementing and expanding on existing studies, the analysis finds evidence consistent with the notion that mutual fund investments affect asset price dynamics, at least in less liquid markets. Some factors point to the existence of incentives to run in segments of the industry. The observed pattern of fund inflows and redemptions by end investors creates incentives for fund managers to herd and, in

[47]Evidence suggests that herding declines with transparency (Gelos 2011).

some markets, for poorly performing fund managers to increase risk. Indeed, herding among U.S. mutual funds has been rising across asset markets. Funds managed by larger AMCs do not necessarily contribute more to systemic risk; investment focus appears to be relatively more important than size when gauging systemic risk.

Although these risks are not fundamentally new, their relevance has risen with structural changes in the financial sectors of advanced economies. The relative importance of the asset management industry has grown, and banks have also retrenched from many market-making activities, contributing to a reduction in market liquidity. Moreover, the role of fixed-income funds, which entail larger contagion risks than traditional equity investment, has expanded considerably. A broader range of products are available to less sophisticated investors. Last, the prolonged period of low interest rates in advanced economies has resulted in a search for yield, which has led funds to invest in less liquid assets.

The chapter offers five main policy messages:

- First, securities regulators should enhance microprudential supervision of risks stemming from individual institutions building on regulators' own risk analysis and stress testing, supported by global standards for supervision and better data and risk indicators.
- Second, regulatory and supervisory reforms are needed to incorporate a macroprudential approach.
- Third, liquidity rules, the definition of liquid assets, investment restrictions, and reporting and disclosure rules could be enhanced.
- Fourth, consideration should be given to the use of tools that adequately price-in the cost of liquidity, including minimum redemption fees, improvements in illiquid asset valuation, and mutual fund share pricing rules.
- Fifth, given that the industry is diverse and that differences in investment focus seem to matter significantly for funds' contribution to systemic risk, a product- or activity-based emphasis seems to be important.

Annex 3.1. Primer on the Asset Management Industry

Investment vehicles are broadly separated into "collective investment schemes" (referred to as "funds" in this chapter) that pool money from a number of investors and invest in financial assets, and what are called "separate accounts" or "discretionary mandates" that manage the money of single institutional investors or high net worth individuals (Annex Table 3.1.1). Collective

investment schemes are further divided into various products. Most of them are open-end mutual funds investing in equities (Annex Figure 3.1.1).

Funds are often established as legal entities (corporations or trusts) that must be separated from an asset manager, and a fund's assets are kept at a custodian, segregated from the assets of AMCs (Annex Figure 3.1.2). This segregation of an AMC and the funds it manages is a key component of the regulatory framework for investor protection.

Annex Table 3.1.1. Features and Risk Profiles of Key Investment Vehicles

Vehicle	Features and Risk Profiles
Separate Account	• Providers of separate account services privately manage the money of institutional investors (including pension funds, insurance companies, and sovereign wealth funds) or high net worth individuals. • Little is known about this segment because contracts are private and can vary substantially across clients. • An industry survey (SIFMA 2014) indicates that these accounts entail simple securities portfolios with little leverage. The accounts are also subject to client investors' regulatory requirements. • Redemption risk for this group is moderate because institutional investors tend to internalize the cost of their sales, and large redemptions can be paid in kind (especially if clients are changing asset managers).
Open-End Mutual Fund	• These funds issue "redeemable equity securities" and stand ready to buy back their shares at their current net asset value (NAV)—the price per share of a fund. • These funds invest in generally liquid publicly traded bonds and equities. • Many of the funds offer daily liquidity to clients, making liquidity risk the key risk for the fund. • In particular, some funds invest in relatively illiquid securities (for example, corporate bonds instead of equity). This is often referred to as "liquidity transformation" that could lead to "liquidity mismatch," which makes the fund vulnerable to redemptions. • These funds have little leverage through borrowing, though they could be taking portfolio leverage using derivatives (the same applies for money market funds and exchange-traded funds, below). Although regulations impose caps on the use of leverage, little quantitative information is available.
Closed-End Mutual Fund	• These funds issue a fixed number of shares in the primary market that trade intraday on the secondary stock market at market-determined prices. Investors buy or sell shares through a broker, but cannot redeem their shares directly from the fund, so these funds do not suffer much liquidity risk. • However, their popularity suffers from the fact that their shares are usually traded in the secondary market at a lower value than their NAV. • Many closed-end funds borrow additional money, often using preferred shares, and they also take portfolio leverage, subject to regulatory limits (ICI 2014a).
Money Market Fund (MMF)	• These funds invest in short-term cash equivalent instruments such as commercial paper, Treasury bills, and certificates of deposit, and play a major role in short-term funding markets. • MMFs experienced major runs and liquidity distress during the global financial crisis. All U.S. MMFs offered constant NAV (mutual fund price per share) at $1 per share. This structure created a first-mover advantage because funds continued to honor the $1 per share repayment even though their actual NAV was worth less as the result of losses from asset-backed commercial paper, which was perceived to be liquid and safe before the crisis. • Constant NAV MMFs continue to exist in the United States and several other jurisdictions.
Exchange-Traded Fund (ETF)	• ETF shares are traded in primary and secondary markets (see Box 3.2 for details). • ETF shares can be created or redeemed in the primary market between the fund and "authorized participants" (APs) in large units. APs are typically large securities dealers. Only primary market transactions cause fund flows to ETFs. The settlement between ETFs and APs are usually in kind, meaning that the exchange of ETF shares and the basket of securities is in line with the ETF's investment objectives. • APs then trade the ETF shares in the secondary market with clients and counterparties on stock exchanges. This intraday trading in secondary markets provides intraday liquidity to end investors. • Most ETFs are index funds, tracking the performance of a specific index.
Synthetic ETF	• Synthetic ETFs are offered mainly in Europe. • Instead of directly holding underlying assets (called physical ETFs), synthetic ETF returns are generated using derivatives, especially swaps. • Synthetic ETFs could be used for various investment strategies, ranging from simple index tracking to leveraged and short-selling strategies. • The extensive use of derivatives (asset swaps) has led to strong concerns about portfolio leverage, counterparty risks, and the quality of collateral for asset swaps. A number of official sectors expressed such concerns in 2011, including the Financial Stability Board (2011) and the IMF. • In response, many ETF providers reduced synthetic products and expanded the disclosure of derivatives positions, including a list of counterparties and the collateral basket for asset swaps (Morningstar 2012).

(continued)

**Annex Table 3.1.1. Features and Risk Profiles of Key Investment Vehicles** *(continued)*

Vehicle	Features and Risk Profiles
Private Equity Fund	• Private equity is a broad term that refers to any type of equity participation in which the equity is not freely tradable on a public stock market, such as equities of private companies and public companies that are delisted. • Private equity funds often monitor and participate in managing the companies whose equity they hold. They aim to maximize financial returns by a sale or an initial public offering of the companies. • There are four main subclasses among private equity funds: (1) *venture capital* that invests in early-stage, high-potential, growth startup companies; (2) *buyout funds* that acquire existing business units or business assets; (3) *mezzanine funds* that invest in both growth equity and the subordinate debt layer—namely, the "mezzanine" between senior debt and equity—of buyout transactions; and (4) *distressed asset funds,* which are a specialized segment of buyouts that target mature and distressed companies. In addition, there are real estate and infrastructure funds. • Some private equity funds could be leveraged, but they are smaller components of the private equity industry (Metrick and Yasuda 2011). • Moreover, these alternative investment vehicles offer limited liquidity to end investors, matching the funds' long-term investment horizon. • Contagion risks are also limited because private equity funds invest in companies not traded in markets.
Hedge Fund	• These funds cover a large variety of investment strategies, ranging from publicly traded equity (highly liquid holdings) to distressed debt vehicles and structured credit products (highly illiquid holdings). Use of leverage and derivatives also varies considerably depending on the strategy. Unlike mutual funds, hedge funds have no cap on leverage. • Hedge funds tend to be more nimble than mutual funds regarding their investment strategy, leading to potentially rapid alterations in their risk characteristics. Depending on their funding and trading strategies, there can be significant interconnection with other financial institutions.

Sources: ICI (2014a, 2014c); Metrick and Yasuda (2011); Morningstar (2012); TheCityUK (2012); and IMF staff.

Annex Figure 3.1.1. Investment Vehicles by Size, Domicile, and Investment Focus

Most assets are managed with simple investment vehicles.

1. Investment Vehicles
(Percent of $43 trillion total assets under management, end-2013)
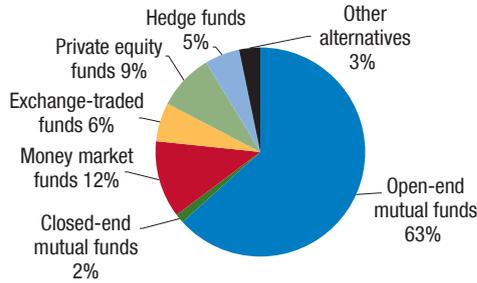
Sources: BarclayHedge; European Fund and Asset Management Association; ETFGI; Organisation for Economic Co-operation and Development; Preqin; and IMF staff calculations.

Most mutual funds invest in equities. (Bond funds, especially high-yield corporate and emerging market debt funds, are smaller components).

3. Mutual Funds by Investment Focus
(Percent of $30 trillion total assets under management, end-2013)

Sources: European Fund and Asset Management Association; and IMF staff calculations.

The mutual fund industry is dominated by U.S. and European funds, but Brazil and China show a notable presence among emerging markets.

2. Mutual Funds by Fund Domicile
(Percent of $32 trillion total assets under management, 2014:Q2)
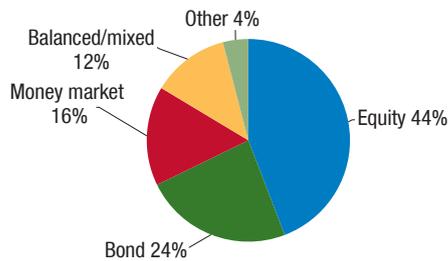
Sources: European Fund and Asset Management Association; and IMF staff calculations.

Exchange-traded funds are offered predominantly in the United States, where the use of exotic structures is restricted.

4. Exchange-Traded Funds by Region
(Percent of $2.3 trillion total assets under management, end-2013)
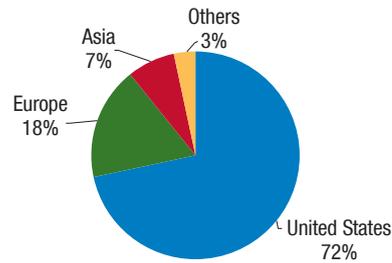
Sources: Deutsche Bank; and IMF staff calculations.

(continued)

Annex Figure 3.1.1. Investment Vehicles by Size, Domicile, and Investment Focus *(continued)*

Exchange-traded funds primarily invest in equities.

**5. Exchange-Traded Funds by Investment Focus**
(Percent of $2.3 trillion total assets under management, end-2013)

Commodity
1%
Other
0%
Fixed income
16%
Equity
83%

Sources: Deutsche Bank; and IMF staff calculations.

A large number of private equity funds are involved in buyout, venture capital, and real estate funds.

6. Private Equity Funds by Type
(Percent of total number of funds participating in Preqin's survey 2014)

Buyout, Real estate, Venture capital, Mezzanine, Distressed assets, Fund of funds, Infrastructure, Other

Source: Preqin.
Note: Some funds are involved in multiple investment strategies.
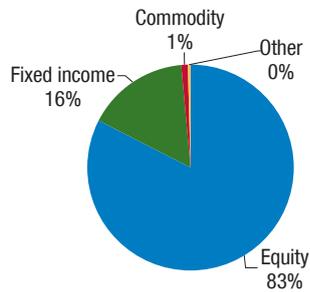
Private equity funds are primarily located in the United States and Europe.

7. Private Equity Funds by Location of Offices
(Percent of total number of funds participating in Preqin's survey, 2014)

United States, Europe, Asia Pacific, Other, Australia, South America
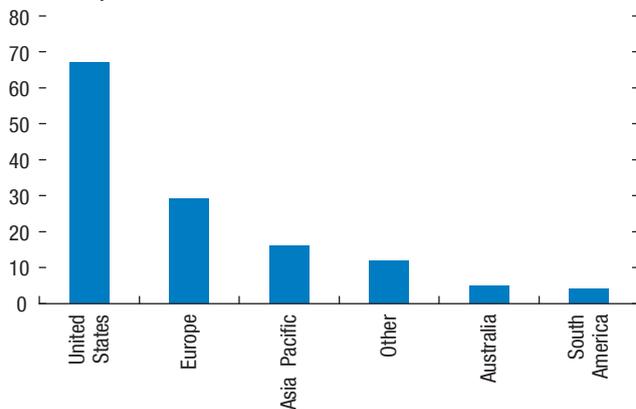
Source: Preqin.
Note: Some funds have offices in multiple countries.

A large number of hedge funds are domiciled in off-shore jurisdictions.

8. Hedge Funds by Country
(Percent of $1.4 trillion total assets under management covered in Hedge Fund Research, 2014)

Cayman Islands, United States, British Virgin Islands, Channel Islands, Luxembourg, Ireland — Country of domicile

United States, United Kingdom, Switzerland, Singapore, Japan, Sweden — Country of operation
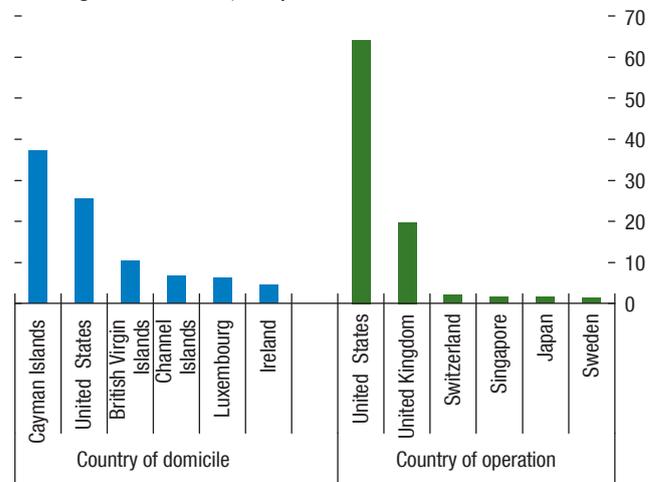
Sources: Hedge Fund Research; and IMF staff calculations.

Annex Figure 3.1.2. Operation of a Fund

A fund signs an investment management agreement with an asset management company (AMC), which manages the fund's portfolio, risks, trading of securities, and securities financing transactions. End investors are equity shareholders of a fund and are the owners of the funds' assets in the sense that each share represents an investor's proportional ownership of the fund's asset holdings and the income those assets generate. However, end investors do not have full control over a fund. They typically cannot ascertain the exact makeup of a fund's portfolio at any given time, nor can they directly influence which securities the fund manager buys and sells or the timing of these trades. Fund boards represent and protect shareholder rights vis-à-vis AMCs.
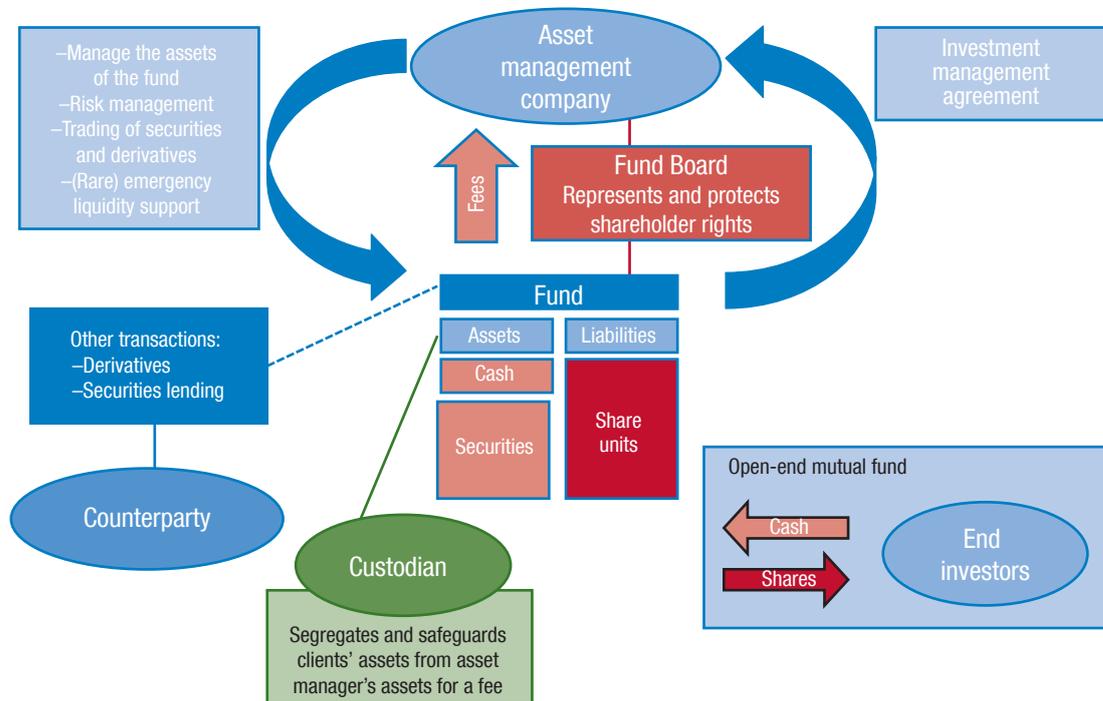

Source: IMF staff.
Note: Examples of asset management companies are BlackRock, Franklin Templeton, and PIMCO; examples of funds are BlackRock iShare Core S&P 500 ETF and PIMCO total return funds. Custodians are usually large banks such as Bank of New York Mellon, J.P. Morgan, and State Street. Funds often lend the securities they hold to various counterparties to earn fee income (securities lending). Securities borrowers usually provide cash collateral. Counterparties are usually investment banks, prime brokers, and other broker-dealers that are engaged in short-selling of the borrowed securities.

Annex 3.2 Empirical Framework

Aggregate flow-price relationship

The aggregate flow-price relationship analysis examines whether mutual fund flows have an impact on asset prices at the macro level. Mutual fund flows to 23 emerging markets[48] are investment flows into each country from all mutual funds from various jurisdictions covered by EPFR Global. U.S. fund flows data are investors' flows into mutual funds with a stated investment focus, covering funds domiciled in the United States. U.S. data are from ICI, except for U.S. high-yield bond funds data, which come from EPFR Global. The analyses investigate weekly flows, but the results are similar using monthly flows. The price impact is measured by the total excess return of the respective index for each asset class in dollar terms over the one-month Eurodollar deposit rate.

The analysis here focuses first on surprise flows following Acharya, Anshuman, and Kumar (2014). As shown in the fund flows analysis later in this annex, mutual fund investors chase past returns, making fund flows predictable to some extent. Markets are likely to have priced in the effects from predictable flows by the time the money arrives, which limits the correlation between flows and returns. One would instead need to examine the part of fund flows that is not priced in the market. Surprise flows are estimated as residuals μ_{Fjt} for each asset class j from the following vector autoregression (VAR) model with the Chicago Board Options Exchange Market Volatility Index (VIX) as an exogenous variable.

$$\begin{bmatrix} R_{jt} \\ F_{jt} \end{bmatrix} = \mathbf{A} + \mathbf{B_1}\begin{bmatrix} R_{jt-1} \\ F_{jt-1} \end{bmatrix} + \cdots + \mathbf{B_p}\begin{bmatrix} R_{jt-p} \\ F_{jt-p} \end{bmatrix}$$

$$+ \boldsymbol{\gamma_0} VIX_t + \cdots + \boldsymbol{\gamma_q} VIX_{t-q} + \begin{bmatrix} \mu_{Rjt} \\ \mu_{Fjt} \end{bmatrix} \qquad (3.1)$$

R_t and F_t are excess index return and fund flows, respectively, and p and q are the lengths of lags. For U.S. assets, the model is estimated with a standard

[48]Economies include current emerging markets as well as "graduated" emerging markets that were considered to be emerging at some point during the sample period. For equities, the sample includes Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Pakistan, Peru, the Philippines, Poland, Russia, South Africa, Taiwan Province of China, and Turkey. For bonds, the sample additionally includes Bulgaria, Lebanon, Sri Lanka, Ukraine, Uruguay, and Vietnam, but excludes the Czech Republic, India, Israel, Jordan, Korea, and Taiwan Province of China.

VAR. For emerging market assets, a panel VAR excluding the VIX is applied. The details of the variable definitions are given in Annex Table 3.2.1.

Various single-equation models are estimated to investigate the relationship between surprise flows and asset returns. More specifically, the following models are estimated for each asset class j, using a panel regression with country fixed effects and robust standard errors (with clusters to correct for heterogeneity within countries, in addition to cross-country heterogeneity) for mutual fund flows into emerging market assets, and ordinary least squares (with Newey-West standard errors corrected for autocorrelation and heteroscedasticity) for end investor asset flows into U.S. mutual funds.

Base model:

$$R_{jt} = \alpha + \sum_{p=1}^{P} \beta_p R_{jt-p} + \sum_{q=0}^{Q} \gamma_q \hat{\mu}_{Fjt-q} + \sum_{r=0}^{R} \delta_r VIX_{t-r}$$

$$+ \sum_{s=0}^{S} \theta_s \, Asset \, Volatility_{jt-s} \qquad (3.2)$$

Model with asymmetry:

$$R_{jt} = \alpha + \sum_{p=1}^{P} \beta_p R_{jt-p} + \sum_{q=0}^{Q} \{\gamma_{1q}\hat{\mu}_{Fjt-q} + \gamma_{2q}\hat{\mu}_{Fjt-q}$$

$$\times Indicator(1 \, if \, \hat{\mu}_{Fjt-q} > 0)\} + \sum_{r=0}^{R} \delta_r \, VIX_{t-r}$$

$$+ \sum_{s=0}^{S} \theta_s \, Asset \, Volatility_{jt-s} \qquad (3.3)$$

Model with nonlinearity by the levels of the VIX:

$$R_{jt} = \alpha + \sum_{p=1}^{P} \beta_p R_{jt-p} + \sum_{q=0}^{Q} \gamma_{1q}\hat{\mu}_{Fjt-q} + \gamma_2\hat{\mu}_{Fjt}$$

$$\times Indicator(1 \, if \, VIX_t > Threshold_j)$$

$$+ \sum_{r=0}^{R} \delta_r \, VIX_{t-r} + \sum_{s=0}^{S} \theta_s \, Asset \, Volatility_{jt-s} \quad (3.4)$$

in which $\hat{\mu}$ is the estimated residual in equation 3.

In addition, the section examines the dynamic relationship between unadjusted (that is, nonsurprise) flows and returns to assess the presence of a first-mover advantage. The analysis is based on generalized impulse response functions from VARs as in equation (3.1). In addition, impulse responses based on Cholesky decompositions using both possible orderings were computed.

Concentration and its effects on bond yields

The concentration analysis is based on the Lipper eMaxx bond ownership data, as used in Manconi, Massa, and Yasuda (2012). This database contains details of institutional holdings for each fixed-income security, covering $7 trillion in total fixed-income secu-

Annex Table 3.2.1. List and Definition of Variables for Empirical Exercises

Variables	Description	Data Source
Aggregate Flow and Return Analysis		
EM equity flows	Weekly mutual fund equity investment flows into each economy from all mutual funds covered by EPFR Global.	EPFR Global
EM bond flows	Weekly mutual fund bond investment flows into each economy from all mutual funds covered by EPFR Global.	EPFR Global
U.S. equity flows	Flows from end investors to U.S.-domiciled mutual funds investing in domestic equities.	ICI
U.S. bond flows, all bonds	Flows from end investors to U.S.-domiciled mutual funds investing in domestic bonds (both government and corporate).	ICI
U.S. HY corp. bond flows	Flows from end investors to mutual funds investing in U.S. high-yield corporate bonds.	EPFR Global
U.S. muni. flows	Flows from end investors to U.S.-domiciled mutual funds investing in municipal bonds.	ICI
EM equity returns	MSCI country equity index.	Bloomberg, L.P.
EM bond returns	Country index from J.P. Morgan EMBIG Global Index.	Bloomberg, L.P.
U.S. equity returns	MSCI country equity index.	Bloomberg, L.P.
U.S. bond returns, all bonds	Bank of America Merrill Lynch total return index for U.S. government and corporate bonds.	Bloomberg, L.P.
U.S. HY corp. bond returns	Bank of America Merrill Lynch total return index for U.S. high-yield corporate bonds.	Bloomberg, L.P.
U.S. muni. returns	Bank of America Merrill Lynch total return index for U.S. municipal bonds.	Bloomberg, L.P.
Benchmark yield	One-month Eurodollar deposit rate.	Bloomberg, L.P.
VIX	Chicago Board Options Exchange Market Volatility Index.	Bloomberg, L.P.
Asset volatility	Staff estimates based on asset returns data and GARCH in mean model.	IMF staff
Price Impact of Concentration in Bond Markets		
Spread	Bond yield minus the yield of benchmark sovereign bond with the same currency and similar maturity.	Bloomberg, L.P.
Concentration	Share of bonds held by the largest five mutual fund investors for each bond. Quarterly.	eMaxx
Bid-ask spread	Bid-ask yield spreads for each bond (end of quarter).	Bloomberg, L.P.
Modified duration	Computed from bond's yield to maturity, coupon rate, and time to maturity, assuming semi-annual distributions (end of quarter).	Bloomberg, L.P.
Issue size	Log of issuance size.	eMaxx
Covenants ratio	The number of covenants attached to a bond relative to a maximum of 18.	Bloomberg, L.P.
Drivers of Fund Flows and Liquidity Risk Management		
Fund flow	For each fund (i) and time (t), fund flows (it) = [TNA(it)−TNA(it−1)×{1+return(it)}]/ TNA(it−1). Return(it) is computed by CRSP based on NAV. Monthly.	CRSP
Performance	Monthly excess fund return (changes of NAV) over benchmark, averaged over prior three months.	CRSP
Benchmark performance	Monthly return of benchmark index, averaged over prior three months. The same benchmark is assigned for funds with the same broad investment focus (for instance, S&P 500 for U.S. domestic equity funds).	DataStream L.P.
HIGH_VIXD	High VIX dummy equals 1 when VIX > 30 percent.	DataStream L.P.
Cash	Cash and cash equivalents holdings in percent of total portfolio. Quarterly.	CRSP
Flow volatility	Standard deviation of flows over the prior 12 months, divided by the mean flows over the same period.	CRSP
Fund Characteristics		
Size (S/M/L)	Dummies based on 20th and 80th percentiles.	CRSP
Age	Years since initial offer.	CRSP
Purchase fee	Maximum in prospectus.	CRSP
Redemption fee	Maximum in prospectus (sum of type R [redemption] and C [contingent deferred sales charge]).	CRSP
Index dummy	1 if index fund.	CRSP
ETF dummy	1 if ETF.	CRSP
Institutional dummy	1 if institutional but not retail in CRSP.	CRSP
Liquid bond fund dummy	1 if a fund's investment focus is one of the following: short-term U.S. government funds and Treasury funds or short-term investment-grade debt funds.	CRSP
Illiquid bond fund dummy	1 if a fund's investment focus is one of the following: corporate debt BBB rated funds, EM local currency debt funds, EM debt funds, or high current yield funds.	CRSP
Liquid equity fund dummy	1 if a fund investment focus is S&P 500.	CRSP
Illiquid equity fund dummy	1 if a fund's investment focus is one of the following: micro/small cap funds; equity global small company; equity international small company; emerging markets, China, India, and Latin America.	CRSP

Note: corp. = corporate; CRSP = Survivor-bias-free U.S. mutual fund database, Center for Research in Security Prices; EM = emerging market; ETF = exchange-traded fund; HY = high yield; ICI = Investment Company Institute; EMBIG = Emerging Markets Bond Index Global; GARCH = generalized autoregressive conditional heteroscedasticity; muni. = municipal; S/M/L = small, medium, large; VIX = Chicago Board Options Exchange Market Volatility Index.

rities (based on par value) held by more than 19,000 funds. Institutional investors covered in the database are U.S. and some European insurance companies; U.S. mutual funds; top U.S. public pension funds; and European, Canadian, and Asian mutual funds. Data are based on disclosure information of security-level holdings by these institutional investors (especially for mutual funds and U.S. insurance companies). This analysis focuses on a subcomponent of these data, specifically corporate bonds for advanced economies and both sovereign and corporate bonds for emerging market economies.

The casual observation on the effects of ownership concentration on spreads in Figure 3.7 is confirmed with formal empirical analysis, reported in Annex Figure 3.2.1. The dependent variable is the change in individual bond yield spreads over a benchmark sovereign bond yield with the same currency and similar maturity between 2008:Q2 and 2008:Q4 and between 2013:Q1 and 2013:Q2. This change is regressed on various control factors and measures of mutual fund sector concentration. The following cross-section model is estimated using a quantile regression approach (for quantile j=10th, 25th, 50th, 75th, 90th percentile), because a preliminary analysis indicates the presence of nonlinearities between the dependent and independent variables (see Annex Table 3.2.1 for the list of variables):

$$\Delta Spread_{ij} = \alpha_j + \beta Spread_{ij,t=0}$$

$$+ \gamma Bond\ Characteristics_{ij,t=0}$$

$$+ \delta Concentration_{ij,t=0} \qquad (3.5)$$

Control factors are *Spread*, which is the initial level of the yield spread to control for the credit risk of the security; and bond-specific characteristics, including liquidity (bid-ask spread), bond price sensitivity to interest rate changes (duration), issue size, and covenants, in line with Manconi, Massa, and Yasuda (2012). Concentration is measured primarily by the share of bonds held by the largest 5 funds, but key results are robust to other definitions, such as the share held by the largest 10 funds, the share held by all mutual funds, and the Herfindahl index among mutual fund investors. All explanatory variables are measured as of 2008:Q2 or 2013:Q1 to control for possible endogeneity. Outliers in observed market price data were reduced by winsorizing the 5 percent tail of the respective distributions.

Relationship between a fund's liquidity risk and its management

The main mutual fund and ETF data source is the CRSP survivor-bias-free database covering publicly offered open-end mutual funds domiciled in the United States. Even though CRSP's data cover only U.S.-domiciled funds, CRSP provides more details on funds' fee structures and assets, including quarterly security-level holdings, than other global fund databases such as EPFR Global or Lipper for Investment Management. These global data are used for some additional robustness tests or for extending some analysis to funds domiciled outside the United States.

Data are cleaned for outliers. In line with Coval and Stafford (2007); Jotikasthira, Lundblad, and Ramadorai (2012); and Jinjarak and Zheng (2014), the data are excluded if they meet the following conditions: (1) monthly returns are higher than 200 percent or lower than −50 percent; (2) monthly change in total net assets (TNA) is higher than 200 percent or lower than −100 percent; or (3) fund TNA is less than US$5 million. In addition, for cash balance analysis, portfolio allocation weight data by broad asset types are discarded if the sum of allocation weights is less than 95 percent or greater than 105 percent. Weights may have a negative value because of derivatives and securities held in short positions. Outliers are removed by discarding data when any single weight takes a value of less than −100 percent.

The roles of portfolio managers and end investors

Following Raddatz and Schmukler (2012), a fund's net investment in a security is divided into fund flows from end investors and the contribution of the changes of portfolio weights to the security, determined by portfolio managers. The term F_j is the total investment in security j (net of valuation effects) from all funds i in the sample. This investment is divided into

$$F_j = \sum_i \frac{Fund\ i's\ holding\ of\ asset\ j}{Total\ asset\ j\ held\ by\ all\ funds\ in\ sample} \times \Delta w_{ij}$$

$$+ \sum_i \frac{Fund\ i's\ holding\ of\ asset\ j}{Total\ asset\ j\ held\ by\ all\ funds\ in\ sample}$$

$$\times Fund\ flows\ to\ i \qquad (3.6)$$

In the equation, Δw_{ij} is the change in portfolio weight of fund i to asset j, net of valuation effects. The first term of the equation represents manager's choice and

Annex Figure 3.2.1. Drivers of Changes in Credit Spreads during Stress Episodes
(Changes in credit spreads in percentage points, by the levels of the spread changes)

During the global financial crisis, bonds that were held in a more concentrated manner were adversely affected, especially those with high initial spread levels.

The same was true for emerging market and developing economy bonds during the "taper shock" episode.

1. Global Financial Crisis: U.S. Dollar Bonds Issued in the United States
   (Changes between 2008:Q2 and 2008:Q4)

Percentiles of spread change between 2008:Q2 and 2008:Q4

2. Taper Shock: Emerging Market and Developing Economies
   (Changes between 2013:Q1 and 2013:Q2)

Percentiles of spread change between 2013:Q1 and 2013:Q2 among issuers from emerging market and developing economies

Sources: eMaxx; and IMF staff estimates.

the second represents end investor's choice. Then, the variance of F_j is calculated as the sum of each component's variation. This variance is estimated on a quarterly basis for all funds covered in the CRSP database for the period 2005:Q1–2014:Q4, excluding securities held by fewer than five funds.

Fund flows analysis

This analysis studies the drivers of monthly net flows for U.S. mutual funds and ETFs at the funds' share-class level for open-end bond and equity funds, covering the period 1998–2014.[49] Explanatory variables include fund performance and benchmark performance, the VIX, and various fund characteristics (size, age, clientele, purchase and redemption fees, fund types, and the liquidity of the underlying asset classes). The list of variables used in the analysis is explained in Annex Table 3.2.1. The following model (for share

[49]A fund may issue several classes of shares. The only difference across share classes is fees. "Fund's TNA" means the sum of TNA of each share class issued by the fund.

class i, month t, and benchmark j) is estimated with share-class fixed effects and year fixed effects as in Chen, Goldstein, and Jiang (2010), and using robust standard errors. An analogous specification was run including the interaction terms with benchmark performance instead of excess return over benchmark.

$$
\begin{aligned}
Fund\ flows_{it} = {} & \beta_0\ Benchmark\ Performance_{jt-1} \\
& + \beta_1\ Performance_{it-1} + \beta_2\ VIX_t \\
& + \beta_3\ HIGH\_VIXD_t + \beta_4\ VIX_t \\
& \times HIGH\_VIXD_t \\
& + \lambda Fund\ Characteristics_i \\
& + \delta Performance_{it-1} \\
& \times Fund\ Characteristics_i \qquad (3.7)
\end{aligned}
$$

The test for convexity in the flow-performance relationship follows a piecewise-linear specification as in Sirri and Tufano (1998) and Ferreira and others (2012). This approach measures different linear slopes for the lowest

20th, middle 60th, and top 20th percentiles of performance. Each month, funds are ranked according to their performance, ranging from zero (poorest performance) to one (best performance). The following model is estimated,

$$Fund\ flows_{it} = \beta_0\ Benchmark\ Performance_{jt-1}$$
$$+ \beta_1 VIX_t + \beta_2 HIGH\_VIXD_t$$
$$+ \beta_3 VIX_t \times HIGH\_VIXD_t$$
$$+ \lambda Fund\ Characteristics_i$$
$$+ \delta_1 Low_{i,t-1} + \delta_2 Mid_{i,t-1}$$
$$+ \delta_3 High_{i,t-1}, \tag{3.8}$$

in which the three levels of relative performance are defined as follows:

$$Low_{i,t-1} = min\{0.2, Rank_{i,t-1}\}$$
$$Mid_{i,t-1} = min\{0.6, Rank_{i,t-1} - Low_{i,t-1}\}$$
$$High_{i,t-1} = Rank_{i,t-1} - (Low_{i,t-1} + Mid_{i,t-1}) \quad Rank \in [0,1]$$

Analysis of redemption fees in times of stress

This analysis examines the role of redemption fees during times of stress. It covers two stress events: the 2008 global financial crisis and the taper episode in 2013. We compute the difference between average flows before the crisis periods (May to August 2008 and December 2012 to April 2013) and average flows during the stress periods (September to December 2008 and May to September 2013) for funds with high and low redemption fees. Funds are classified as having low redemption fees if redemption fees are equal to zero. Funds are classified as having high redemption fees if redemption fees are greater than or equal to 0.03 percent in 2008 and 0.01 percent in 2013.[50] Flows are standardized by the beginning-of-period TNA. For 2008, the focus is on equity funds because there is evidence of flight to quality into bond funds. For 2013, the focus is on emerging market equity and bond funds.

Cash holdings analysis

Drivers of fund cash holdings are investigated by estimating the model in equation (3.9). For share class i and quarter t, the model is estimated with a pooled panel regression at the share-class level, including year fixed effects and using robust standard errors. Because

the cash balance shows a U-shaped pattern with respect to fund flows (Figure 3.12), the model estimates a different coefficient for funds with large outflows (fund flows below $\delta = -1.5$ percent of TNA).[51]

$$Cash_{it} = \beta_1 Flow\ volatility_{it} + \beta_2 Fund\ flow_{it}$$
$$+ \beta_3 I(Fund\ flow_{it} < \delta) + \beta_4 Fund\ flow_{it}$$
$$\times I(Fund\ flow_{it} < \delta)$$
$$+ \lambda Fund\ Characteristics_i \tag{3.9}$$

Brand name effect analysis

"Flagship shocks for large AMCs" are identified as follows: First, a "shock" happens when a fund's flow-to-TNA ratio is below the median of its peer group (those with the same Lipper investment objective code) by 10 percentage points or more. Second, a fund with a "shock" is identified as "flagship" when its TNA is the largest of the funds administered by the same AMC (a fund family) at the end of the month before the shock. Third, the flagship shock corresponds to a large AMC if the flagship fund's asset manager was among the top 25 as measured by end-year TNA for the shock year or any of the previous four years.

There are "brand name effects" if, in the three months including and after the flagship shock (s, $s+1$, $s+2$; where s is the event month), funds in the same family receive significantly lower inflows relative to comparator funds outside the family.[52] For each event (period s), a separate cross-sectional regression model is estimated for the difference between the cumulative net inflows to each fund i between dates s and $s+2$ and the median cumulative net inflows for funds with the same investment objective j. Explanatory variables are lagged excess return, age, and a flagship family dummy.

$$Cumulative\ Fund\ flow_{ij\_\{s,s+2\}}$$
$$- Median(CumulativeFund\ flow_{j\_\{s,s+2\}})$$
$$= \beta_1 Performance_{is-1} + \beta_2 Age_{it}$$
$$+ \beta_3 Family\ Dummy(i \in I^s)$$
$$for\ all\ events\ s\ and\ for\ all\ funds\ i\ with$$
$$investment\ objective\ j \tag{3.10}$$

---

[50]The 2013 analysis studies emerging market funds, and therefore yields very few observations when using the 0.03 threshold.

[51]The cash holdings empirical analysis excludes sectoral, hedged, and short equity funds.

[52]Some of the identified flagship events overlap. Overlapping cases are treated as a single event and the family dummy is set to 1 if a share class belongs to either of the affected flagships' families.

I^s identifies the funds (at share-class level) that are managed by the same AMC that manages the "shocked" flagship fund (excluding the flagship itself).

Systemic risk

Systemic risk is measured for the system of mutual funds, banks, and insurance companies from advanced economies.

- Mutual funds' NAV and total net asset data are from Lipper. For each of the three fund domicile areas (the United States, Europe, and other advanced economies) and the five asset classes (advanced economy equities, advanced economy sovereign bonds, advanced economy corporate bonds, emerging market equities, and emerging market bonds), a sample consisting of the top 100 funds, measured by total net assets, was selected, resulting in 1,500 funds. Data covering January 2000 to November 2014 were cleaned by dropping funds with fewer than 10 observations and excluding observations with weekly NAV returns of less than –60 percent or greater than 80 percent.
- For the banking and insurance sectors, weekly returns are computed using Thomson Reuters equity indices for European and U.S. banks and insurance companies.
- The system's return is computed as the average of funds, banks, and insurance returns weighted by their relative asset size. Data on total assets of banks, insurance companies, and mutual funds are from quarterly flow-of-funds data for the United States and the euro area. An alternative measure using a simple average was also used, yielding similar results.

Systemic risk is estimated following the static CoVaR approach put forward by Adrian and Brunnermeier (2011), using quantile regressions. First, the returns of the system are regressed on the returns of each individual institution i when that institution has the lowest 5th percentile returns:

$$R_t^{System,i} = \alpha_i + \beta_i R_t^i + \varepsilon_{it}. \tag{3.11}$$

Then, CoVaR is computed as the VaR of the system conditional on institution i being in distress (defined as when its return R^i is below its 5 percent VaR, $-VaR_{5\%}^i$):

$$CoVaR_i = \hat{\alpha}_i + \hat{\beta}_i R^i = \hat{\alpha}_i - \hat{\beta}_i VaR_{5\%}^i. \tag{3.12}$$

The contribution to systemic risk of an institution i is computed as the difference between the $CoVaR_i$ when

institution i is in distress and the $CoVaR_i$ when institution i has median return ($\Delta CoVaR_i$):

$$\Delta CoVaR_i = CoVaR_{5\%}^i - CoVaR_{50\%}^i$$

$$= -\hat{\beta}_i(VaR_{5\%}^i - VaR_{50\%}^i). \tag{3.13}$$

The relationship between fund size and its contribution to systemic risk is examined with the following cross-section regression model:

$$\Delta CoVaR_{ij} = Constant_j + \alpha VaR_i + \gamma Logsize_i$$

$$+ \delta Return_i + \varepsilon_i. \tag{3.14}$$

The model controls for asset class (j) specific fixed effects and fund i's risk (VaR) and return (average in the sample period). Fund size is the log of average size in U.S. dollars over the sample period. Fixed effects are positive and significant for advanced economy equities and emerging market equities and bonds, negative for advanced economy sovereign bonds, and not significant for advanced economy corporate bonds. All the other coefficients for control variables are significant and positive at the 5 percent level. The coefficient for size is positive and significant at the 10 percent level. Alternative regressions that allow the parameters on VaR, size, and returns to vary by asset class show qualitatively similar results.

References

Acharya, Viral, Ravi Anshuman, and Kiran Kumar. 2014. "Foreign Fund Flows and Stock Returns: Evidence from India." Unpublished. New York University.

Adam, Tim, and André Guettler. Forthcoming. "Pitfalls and Perils of Financial Innovation: The Use of CDS by Corporate Bond Funds." *Journal of Banking and Finance.*

Adrian, Tobias, and Markus K. Brunnermeier. 2011. "CoVaR." Working Paper 17454, National Bureau of Economic Research, Cambridge, Massachusetts.

Allen, Franklin, and Gary Gorton. 1993. "Churning Bubbles." *Review of Economic Studies* 60 (4): 813–36.

Arora, Navneet, and Hui Ou-Yang. 2001. "Explicit and Implicit Incentives in a Delegated Portfolio Management Problem: Theory and Evidence." Working Paper, University of North Carolina, Chapel Hill.

Basak, Suleyman, and Anna Pavlova. 2014. "Asset Prices and Institutional Investors." *American Economic Review* 103 (5): 1728–58.

———, and Alexander Shapiro. 2008. "Offsetting the Implicit Incentives: Benefits of Benchmarking in Money Management." *Journal of Banking and Finance* 32 (9): 1882–993.

Ben-Raphael, Azi, Shmuel Kande, and Avi Wohl. 2011. "The Price Pressure of Aggregate Mutual Fund Flows." *Journal of Financial and Quantitative Analysis* 46 (2): 585–603.

Bikhchandani, Sushil, David Hirshleifer, and Ivo Welch. 1992. "A Theory of Fads, Fashion, Custom and Cultural Change as Informational Cascades." *Journal of Political Economy* 100: 992–1026.

BlackRock. 2014a. "ETFs Help Improve Market Stability." October.

———. 2014b. "Fund Structures and Systemic Risk Mitigants." *Viewpoint*, September.

Borensztein, Eduardo, and Gaston Gelos. 2003. "A Panic Prone Pack? The Behavior of Emerging Market Mutual Funds." *IMF Staff Papers* 50 (1): 43–63.

Broner, Fernando A., Gaston Gelos, and Carmen M. Reinhart. 2006. "When in Peril, Retrench: Testing the Portfolio Channel of Contagion." *Journal of International Economics* 69 (1): 203–30.

Brown, Nerissa, Kelsey Wei, and Russ Wermers. 2013. "Analyst Recommendations, Mutual Fund Herding, and Overreaction in Stock Prices." *Management Science* 60 (1).

Buffa, Andrea, Dimitri Vayanos, and Paul Woolley. 2014. "Asset Management Contracts and Equilibrium Prices." Working Paper 20480, National Bureau of Economic Research, Cambridge, Massachusetts.

Calvo, Guillermo A., and Enrique G. Mendoza, 2000. "Rational Contagion and the Globalization of Securities Markets." *Journal of International Economics* 51 (1): 79–113.

Cao, Charles, Eric Chang, and Ying Wang. 2008. "An Empirical Analysis of the Dynamic Relationship between Mutual Fund Flow and Market Return Volatility." *Journal of Banking and Finance* 32 (10): 2111–23.

Center for European Policy Studies–European Capital Markets Institute (CEPS-ECMI). 2012. "Rethinking Asset Management from Financial Stability to Investor Protection and Economic Growth." Report of a CEPS-ECMI Task Force.

Cetorelli, Nicola. 2014. "Hybrid Intermediaries." *Federal Reserve Bank of New York Staff Reports* 705.

Chakravorti, Suji, and Subir Lall. 2003. "Managerial Incentives and Financial Contagion." Working Paper 2003–21, Federal Reserve Bank of Chicago.

Chen, Qi, Itay Goldstein, and Wei Jiang. 2010. "Payoff Complementarities and Financial Fragility: Evidence from Mutual Fund Outflows." *Journal of Financial Economics* 97 (2): 239–62.

Chevalier, Judith, and Glenn Ellison. 1997. "Risk Taking by Mutual Funds as a Response to Incentives." *Journal of Political Economy* 106 (6): 1167–200.

Choi, Nicole, and Richard W. Sias. 2009. "Institutional Industry Herding." *Journal of Financial Economics* 94 (3): 469–91.

Chordia, Tarun. 1996. "The Structure of Mutual Fund Charges." *Journal of Financial Economics* 41 (1): 3–39.

Collins, Sean, and Christopher Plantier. 2014. "Are Bond Mutual Fund Flows Destabilizing? Examining the Evidence from the 'Taper Tantrum'." Working Paper, Investment Company Institute, Washington.

Coval, Joshua, and Erik Stafford. 2007. "Asset Fire Sales (and Purchases) in Equity Markets." *Journal of Financial Economics* 86 (2): 479–512.

Dasgupta, Amil, and Andrea Prat. 2006. "Financial Equilibrium with Career Concerns." *Theoretical Economics* 1 (1): 67–93.

Deli, Daniel, and Raji Varma. 2002. "Closed-end versus Open-end: The Choice of Organizational Form." *Journal of Corporate Finance* 8 (1): 1–27.

Desender, Kurt. 2012. "Ownership Structure and Stock Price Performance during Turbulent Financial Markets." Unpublished, Universidad Carlos III de Madrid.

Deutsche Bank. 2014. *ETF Annual Review and Outlook*. January 16.

Diamond, Douglas W., and Philip H. Dybvig. 1983. "Bank Runs, Deposit Insurance, and Liquidity." *Journal of Political Economy* 91 (3): 401–19.

Dow, James, and Gary Gorton. 1997. "Noise Trading, Delegated Portfolio Management, and Economic Welfare." *Journal of Political Economy* 105 (5): 1024–50.

Edelen, Roger. 1999. "Investor Flows and the Assessed Performance of Open-end Mutual Funds." *Journal of Financial Economics* 53 (3): 439–66.

———, and Jerold Warner. 2001. "Aggregate Price Effects of Institutional Trading: A Study of Mutual Fund Flow and Market Returns." *Journal of Financial Economics* 59: 195–220.

Elliott, Douglas. 2014. "Systemic Risk and the Asset Management Industry." Economic Studies at Brookings, Brookings Institution, Washington.

European Fund and Asset Management Association (EFAMA). 2014. "Asset Management in Europe: Facts and Figures: 7th Annual Review." European Fund and Asset Management Association, Brussels.

European Securities and Markets Authority (ESMA). 2012. "Guidelines for Competent Authorities and UCITS Management Companies." ESMA/2012/832EN, Paris.

Ferreira, Miguel, Aneel Keswani, Antonio Miguel, and Sofia Ramos. 2012. "The Flow-Performance Relationship around the World." *Journal of Banking and Finance* 36 (6): 1759–80.

Feroli, Michael, Anil K. Kashyap, Kermit Schoenholtz, and Hyun Song Shin. 2014. "Market Tantrums and Monetary Policy." Chicago Booth Research Paper 14–09, University of Chicago Booth School of Business, Chicago.

Financial Industry Regulatory Authority (FINRA). 2011. "Understanding Mutual Fund Classes." Investor Alert, Financial Industry Regulatory Authority, Washington.

Financial Stability Board (FSB). 2011. "Potential Financial Stability Issues Arising from Recent Trends in Exchange-Traded Funds." Financial Stability Board, Basel.

———. 2013. "Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Strengthening

Oversight and Regulation of Shadow Banking Entities." FSB Policy Document, Financial Stability Board, Basel.

Financial Stability Board (FSB), International Monetary Fund (IMF), and World Bank. 2011. "Financial Stability Issues in Emerging Market and Developing Economies." Report to the G-20 Finance Ministers and Central Bank Governors, Financial Stability Board, Basel.

Financial Stability Board (FSB) and International Organization of Securities Commissions (IOSCO). 2014. "Assessment Methodologies for Identifying Non-bank Non-insurer Global Systemically Important Financial Institutions." Consultation Document, Financial Stability Board, Basel.

———. 2015. "Assessment Methodologies for Identifying Non-bank Non-insurer Global Systemically Important Financial Institutions." The Second Consultation Document, Financial Stability Board, Basel.

Financial Stability Oversight Council (FSOC). 2014. "Notice Seeking Comment on Asset Management Products and Activities." U.S. Department of the Treasury, Washington. http://www.treasury.gov/initiatives/fsoc/rulemaking/Pages/open-notices.aspx.

Frazzini, Andrea, and Owen A. Lamont. 2008. "Dumb Money: Mutual Fund Flows and the Cross-Section of Stock Returns." *Journal of Financial Economics* 88 (2): 299–322.

Froot, Kenneth A., Paul G. J. O'Connell, and Mark S. Seasholes. 2001. "The Portfolio Flows of International Investors." *Journal of Financial Economics* 59 (2): 151–93.

Gelos, Gaston. 2011. "International Mutual Funds, Capital Flow Volatility, and Contagion: A Survey." IMF Working Paper 11/92, International Monetary Fund, Washington.

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

Grinblatt, Mark, Sheridan Titman, and Russ Wermers. 1995. "Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior." *American Economic Review* 85 (5): 1088–105.

Haldane, Andrew. 2014. "The Age of Asset Management?" Speech at the London Business School, April 4.

Hau, Harald, and Sandy Lai. 2010. "The Role of Equity Funds in the Financial Crisis Propagation." Research Paper No. 11–35, Swiss Finance Institute, Geneva.

Igan, Deniz, and Marcelo Pinheiro. 2012. "The Effects of Relative Performance Objectives on Financial Markets." MPRA Paper 43452, University Library of Munich.

Ilyina, Ana. 2006. "Portfolio Constraints and Contagion in Emerging Markets." *IMF Staff Papers* 53 (3): 351–74.

International Monetary Fund (IMF). 2012. "Macrofinancial Stress Testing—Principles and Practices." Washington.

———. 2014. "Staff Guidance Note on Macroprudential Policy." Washington.

International Organization of Securities Commissions (IOSCO). 2011. "Principles on Suspensions of Redemptions in Collective Investment Schemes." Madrid.

Investment Company Institute (ICI). 2014a. "The Closed-end Fund Market, 2013." *ICI Research Perspective* 20 (1).

———. 2014b. *ICI Factbook 2014.* Washington: Investment Company Institute.

———. 2014c. "Understanding Exchange-Traded Funds: How ETFs Work." *ICI Research Perspective* 20 (5).

Jinjarak, Yothin, and Huanhuan Zheng. 2014. "Granular Institutional Investors and Global Market Interdependence." *Journal of International Money and Finance* 46: 61–81.

Jotikasthira, Chotibhak, Christian Lundblad, and Tarun Ramadorai. 2012. "Asset Fire Sales and Purchases and the International Transmission of Funding Shocks." *Journal of Finance* 67 (6): 2015–50.

Lakonishok, Josef, Andrei Shleifer, and Robert Vishny. 1992. "The Impact of Institutional Trading on Stock Prices." *Journal of Financial Economics* 32 (1): 23–44.

Liang, Nellie. 2015. "Asset Management and Financial Stability." Presentation at the Brookings Institution, January 9.

Ma, Linlin, Yuehua Tang, and Juan-Pedro Gomez. 2013. "Portfolio Manager Compensation in the U.S. Mutual Fund Industry." http://ssrn.com/abstract=2024027 or http://dx.doi.org/10.2139/ssrn.2024027.

Manconi, Alberto, Massimo Massa, and Ayako Yasuda. 2012. "The Role of Institutional Investors in Propagating the Crisis of 2007–08." *Journal of Financial Economics* 104 (3): 491–518.

Massa, Massimo, and Rajdeep Patgiri. 2009. "Incentives and Mutual Fund Performance: Higher Performance or Just Higher Risk Taking?" *Review of Financial Studies* 22 (5): 1777–815.

Massa, Massimo, and Zahid Rehman. 2008. "Information Flows within Financial Conglomerates: Evidence from the Banks-Mutual Funds Relation." *Journal of Financial Economics* 89 (2): 288–306.

Maug, Ernst, and Narayan Naik. 2011. "Herding and Delegated Portfolio Management: The Impact of Relative Performance Evaluation on Asset Allocation." *Quarterly Journal of Finance* 1 (2): 265–92.

McKinsey. 2013. *Financial Globalization: Retreat or Reset?* McKinsey Global Institute.

Metrick, Andrew, and Ayako Yasuda. 2011. "Venture Capital and Other Private Equity: A Survey." *European Financial Management* 17 (4): 619–54.

Moody's. 2010. "Sponsor Support Key to Money Market Funds." August 9.

Morningstar. 2012. "Synthetic ETFs under the Microscope: A Global Study." Morningstar ETF Research.

Office of Financial Research (OFR). 2013. "Asset Management and Financial Stability." Office of Financial Research, U.S. Department of Treasury, Washington.

Pensions and Investments and Towers Watson. 2014. "The World's 500 Largest Asset Managers." Towers Watson, New York.

PriceWaterhouseCoopers. 2013. *Asset Management 2020: A Brave New World.* London: PriceWaterhouseCoopers.

Raddatz, Claudio, and Sergio Schmukler. 2012. "On the International Transmission of Shocks: Micro-Evidence from

Mutual Fund Portfolios." *Journal of International Economics* 88 (2): 357–74.

Rajan, Raghuram G. 2005. "Has Financial Development Made the World Riskier?" Paper presented at The Greenspan Era: Lessons for the Future. Federal Reserve Bank of Kansas Symposium, Jackson Hole, Wyoming.

Ross, Stephen. 2004. "Compensation, Incentives, and the Duality of Risk Aversion." *Journal of Finance* 59 (1): 207–25.

Scharfstein, David, and Jeremy Stein. 1990. "Herd Behavior and Investment." *American Economic Review* 90 (3): 465–79.

Schmidt, Lawrence, Allan Timmermann, and Russ Wermers. 2013. "Runs on Money Market Mutual Funds." Working Paper, January. http://econweb.ucsd.edu/~lschmidt/Schmidt_Timmermann_Wermers.pdf.

Securities Industry and Financial Markets Association (SIFMA). 2014. "SIFMA Asset Management Group's Comments to the FSB and SEC in Response to OFR Study and in Regards to Separate Accounts." Securities Industry and Financial Markets Association, New York and Washington.

Sirri, Erik R., and Peter Tufano. 1998. "Costly Search and Mutual Fund Flows." *Journal of Finance* 53 (5): 1589–622.

Stein, Jeremy C. 2014. "Comments on 'Market Tantrums and Monetary Policy,' a paper by Michael Feroli, Anil K. Kashyap, Kermit Schoenholtz, and Hyun Song Shin." Paper presented at the U.S. Monetary Policy Forum, New York, New York, February 28.

Stracca, Livio. 2006. "Delegated Portfolio Management: A Survey of the Theoretical Literature." *Journal of Economic Surveys* 20 (5): 823–48.

TheCityUK. 2012. *Private Equity 2012.*

Vayanos, Dimitri. 2004. "Flight to Quality, Flight to Liquidity, and the Pricing of Risk." Working Paper 10327, National Bureau of Economic Research, Cambridge, Massachusetts.

Warther, Vincent A. 1995. "Aggregate Mutual Fund Flows and Security Returns." *Journal of Financial Economics* 39 (2-3): 209–35.

Wermers, Russ. 1999. "Mutual Fund Herding and the Impact on Stock Prices." *Journal of Finance* 54 (2): 581–622.

Wurgler, Jeffrey. 2010. "On the Economic Consequences of Index-Linked Investing." Working Paper 16376, National Bureau of Economic Research, Cambridge, Massachusetts.

GLOSSARY

Affiliate Member of a corporate group that controls, is controlled by, or is under the same control as another company. In Chapter 2, "affiliates" refers to bank subsidiaries and branches.

Agency problem Also called the principal-agent problem, this problem occurs when one person or entity (the "agent") is able to make decisions on behalf of another person or entity (the "principal"). In such situations, agents may be motivated to act in their own best interest rather than in that of the principal.

Asset management company/asset managers Delegated manager who manages portfolios, risk, and trading of securities and off-balance-sheet positions on behalf of clients under an investment management agreement for a fee. These companies handle day-to-day operations of various collective investment vehicles and of a portion of the assets held by institutional investors.

Asset price bubble Sharp rise in the price of an asset above its economically fundamental value for reasons other than random shocks.

Assets under management (AUM) Financial assets managed by a fund manager on behalf of end investors. These assets may be direct loans or securities and may be leveraged (for example, by hedge funds).

Authorized participant Typically major broker-dealers who play a key role in exchange-traded funds (ETFs). Only authorized participants trade with ETF sponsors in the primary ETF share market. Authorized participants hold ETF shares or trade shares with end investors or on stock exchanges and engage in arbitrage trading between the securities held by the ETF sponsor and ETF shares.

Bail-in Statutory power of the government to restructure the liabilities of a distressed financial institution by writing down its unsecured debt and/or converting it to equity.

Bailout Transfer of funds (or commitment to transfer funds) from public sources to a distressed firm. Examples include recapitalization, asset purchases, subsidized loans, and the provision of guarantees. A bailout benefits primarily creditors but may also benefit shareholders,

managers, and employees. The business of the supported entity may be reorganized or merged with that of other entities.

Banking union Policy response to the financial crisis by the European Commission, establishing a single supervisory and regulatory framework, harmonized national resolution regimes for credit institutions, and harmonized standards across national deposit insurance schemes for the euro area.

Basel Committee on Banking Supervision (BCBS) Committee of banking supervisory authorities that provides a forum for regular cooperation on banking supervisory matters. Its objective is to enhance understanding of key supervisory issues and improve the quality of banking supervision worldwide. The committee also develops guidelines and supervisory standards in various areas, including the international standards on capital adequacy, the Core Principles for Effective Banking Supervision, and the Concordat on cross-border banking supervision.

Basel III Comprehensive set of reform measures introduced in the aftermath of the global financial crisis to improve the banking sector's ability to absorb financial and economic shocks, enhance banks' risk management and governance, and increase banks' transparency and disclosure. These measures revise the existing definition of regulatory capital under the Basel Accord; enhance capital adequacy standards; and introduce, for the first time, minimum liquidity adequacy standards for banks.

Bid-offer (or bid-ask) spread Difference between the price at which an instrument is simultaneously quoted for immediate purchase (bid) and sale (offer or ask).

Branch Legally dependent part of a bank that, unlike a subsidiary, is separated from its head office only geographically.

Brand name effects Spillover of operational and reputational concerns about one fund to others in the same fund family. See *fund family*.

Capital buffer Capital that banks must hold in excess of their minimum capital requirements. In particular, Basel

III introduced a capital conservation buffer (designed to ensure that banks build capital buffers outside periods of stress, which can be drawn down as losses are incurred); a countercyclical capital buffer (aimed at building financial resources during periods of excess aggregate credit growth); and capital surcharges for global systemically important banks (G-SIBs). Domestic SIBs are also often expected to hold additional resources to meet capital surcharges, as established by national regulations. More broadly, capital buffers are the capital banks hold to absorb losses should they occur.

Closed-end fund   Collective investment vehicle that has a fixed number of shares. Unlike open-end funds, new shares in a closed-end fund are not issued nor are shares redeemed by managers to meet demand from ultimate investors. Instead, the shares are traded on secondary markets.

Coefficient   Element of a regression that shows the size of the relationship between a regressor and the dependent variable. If the regression takes the form $Y = A + BX$, B is the coefficient for regressor X.

Collateral   Assets pledged or posted to a counterparty to secure an outstanding exposure, derivative contract, or loan.

Collective investment vehicle   Institution that sells its shares to retail and institutional investors and invests the proceeds in securities. These vehicles are often referred to as investment funds, management funds, mutual funds, or funds.

Commercial paper   Unsecured promissory note with a fixed maturity of 1 to 270 days.

Consolidated Banking Statistics   Statistics produced by the Bank for International Settlements that record the consolidated positions of reporting banks' worldwide offices, excluding interoffice positions.

Contagion   Transmission of economic and financial disturbances across countries and/or institutions.

Convexity   A mathematical function is convex if the line segment between any two points on the graph of the function lies above the graph. In the context of Chapter 3, this property arises for a fund's performance-inflow relationship if investors inject money following good performance to a greater extent than they withdraw money following poor performance.

Correlation   Degree of comovement between two variables, taking values between +1 and −1: +1 means they

move together perfectly, and −1 means they always move by the same amount but in opposite directions.

Correlation network   Type of financial network in which the nodes, generally stock prices, are linked by significant correlation coefficients. Correlation networks can be used to analyze market dynamics.

Credit default spread   Annual amount ("premium") a protection buyer must pay a protection seller over the length of a credit default swap (CDS) contract, expressed as a percentage of the notional amount. See *CDS*.

Credit default swap (CDS)   Financial contract under which the seller agrees to compensate the buyer in the event of a loan default or other credit event. CDS settlements can be "physical" (the protection seller buys a defaulted reference asset at its face value from the protection buyer) or "cash" (the protection seller pays the protection buyer the difference between the reference asset face value and the price of the defaulted asset). A single-name CDS contract references a single firm or government agency, whereas CDS index contracts reference standardized indices based on baskets of liquid single-name CDS contracts.

Credit spread   Difference in yield between a benchmark debt security and another debt security that is comparable to the benchmark instrument in all respects except that it is of lower credit quality and, hence, typically returns a higher yield.

Credit-to-GDP ratio   Ratio that measures domestic credit to the private sector as a proportion of GDP. Domestic credit to the private sector refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, trade credits, and other accounts receivable that establish a claim for repayment. For some countries these claims include credit to public enterprises.

Cross-border claim   Claim of a bank on a resident in another country (for example, a direct loan of a bank in a given country to a firm in another country). On a consolidated basis, cross-border claims do not include claims vis-à-vis affiliated entities.

Cross-sectional regression   Regression model in which dependent and explanatory variables are related in only one period, unlike in a time series regression, which relates dependent and explanatory variables over multiple periods.

Custodian   Institution, usually a bank, in charge of safekeeping a firm's or individual's financial assets.

Deleveraging   Reduction of the leverage ratio, or the percentage of debt in the balance sheet.

Derivative   Financial contract whose value derives from underlying securities prices, interest rates, foreign exchange rates, commodity prices, or market or other indices. Examples of derivatives include stock options, currency and interest rate swaps, and credit default swaps.

Diversification   Risk-management technique that mixes a wide variety of investments within a portfolio. The rationale behind this technique is that a portfolio of different kinds of investments will pose a lower risk than any individual investment found within the portfolio, because the positive performance of some investments will offset to some extent the negative performance of others.

EMBI Global or EMBIG   JPMorgan Emerging Market Bond Index Global, which tracks the performance of dollar-denominated sovereign bonds issued by a broad set of emerging market economies. Other versions of the index are assembled according to different criteria—with respect, for example, to liquidity requirements.

Endogeneity   Issue that arises in a statistical model when an independent variable (regressor) is correlated with the error term. Endogeneity can be caused by, for example, omitted variables, simultaneity, and certain forms of measurement error.

Eurodollars   Time deposits denominated in U.S. dollars at banks outside the United States and thus not under the jurisdiction of the Federal Reserve.

Excess returns   Total returns of a risky asset above those of a risk-free asset. For exchange rates it is the percentage difference between the forward exchange rate and the spot rate at maturity.

Exchange-traded fund (ETF)   Type of collective investment vehicle traded on an exchange. ETF shares are created or withdrawn only between the fund and authorized participants (usually large broker-dealers). ETFs may be attractive to investors because of their low costs and tax efficiency. ETFs started as passively managed funds following some market indices, but in 2008 the United States began to authorize actively managed ETFs.

Expected default frequency (EDF)   Measure of the probability of a firm's default over a specified period (five years in Chapter 2). Chapter 2 uses the EDF model developed by Moody's Credit Edge, in which a firm is considered in default when the market value of its assets

(value of the ongoing business) falls below its liabilities payable (default point).

Externality   Cost or benefit arising from an economic activity that affects someone other than the people engaged in the economic activity, without compensation to the affected agent.

Financial deepening   Growing size of financial markets relative to economic activity, defined by the various functions those markets perform, including intermediation, price discovery, and hedging.

Fire sale   Panic condition in which many holders of an asset or class of assets attempt a market sale, thereby driving the price down to extremely low levels. The acceptance of a low price for assets by a seller facing bankruptcy or other impending distress may also characterize a fire sale.

First-mover advantage   Advantage to early redeemers, whose payoff from a fund is higher than that of those who wait longer to redeem.

Fit and proper   Process through which a person is evaluated as suitable for employment, especially as an executive in a financial institution. A fit and proper person is generally considered to be financially sound, competent, reputable, and reliable.

Fixed-effects panel data estimation   Econometric panel data technique that accounts for possible time-invariant unobserved characteristics in the underlying data.

Follow-your-customer strategy   International expansion strategy through which banks choose to set up branches or subsidiaries to serve their domestic customers in the countries in which they operate.

Foreign claims   Sum of cross-border claims and local claims denominated in both foreign and local currencies.

Fund family   Group of funds with the same asset management company.

Fund flows   Difference between total purchases and sales of fund shares by end investors over a given period.

Group of Twenty (G20)   Group of Twenty finance ministers and central bank governors established in 1999 as a forum for officials from systemically important advanced and emerging market and developing economies to discuss key issues related to the global economy. It consists of leaders from the European Union and the following 19 countries: Argentina, Australia, Brazil,

Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, the Republic of Korea, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, and the United States.

Hedge fund   Investment pool, typically organized as a private partnership, that faces few restrictions on its portfolio and transactions. Hence, compared with more regulated financial institutions, hedge funds use a wider variety of investment techniques—including short positions, derivatives transactions, and leverage—in their effort to boost returns and manage risk.

Herding   Behavior characterized by decisions investors would not make if they did not observe other investors making them.

High yield   Credit rating considered speculative grade. A− credit rating of BBB or better (Baa3 on Moody's scale) is considered investment (high) grade.

Immediate risk basis   Claims allocated to the country of residence of the immediate counterparty. See *ultimate risk basis*.

In kind   Type of settlement method involving the exchange of securities rather than the exchange of securities for cash.

Institutional investor   Professional financial institution that pools money and makes investments. In Chapter 2, institutional investors are defined narrowly as those with a long-term investment horizon, such as pension funds, insurance companies, and official sector institutions. Banks, hedge funds, and mutual funds are excluded from this narrow definition.

Instrumental variable approach   A method that allows consistent estimation when the explanatory variables are correlated with the error terms of a regression relationship. Such correlation may occur when the dependent variable affects at least one of the explanatory variables ("reverse causality"), when there are omitted explanatory variables, or when the explanatory variables are subject to measurement error. An ideal instrument is highly correlated with the original explanatory variable but should have little correlation with the dependent variable.

Interconnectedness   Linkage between entities or markets within the financial system that drive financial contagion and risk concentration.

Intermediation   Transfer of funds from a source to a user. A financial institution, such as a bank, intermediates when it obtains money from depositors or other lenders and onlends to borrowers.

International claims   Sum of cross-border claims and local claims denominated in foreign currencies.

Leverage   Proportion of debt to equity (also assets to equity or capital to assets in banking). Leverage can be built by borrowing (on-balance-sheet leverage, commonly measured by debt-to-equity ratios) or through off-balance-sheet transactions.

Liquidity mismatch   Difference between the liquidity of an institution's assets and liabilities. If liabilities are more liquid than assets (for example, a bank with illiquid loans and demand deposits), the institution must perform liquidity transformation and therefore is exposed to a liquidity mismatch.

Liquidity transformation   Function of financial intermediaries to fund illiquid assets (such as loans) with liquid liabilities.

Local claims   Claims of foreign banks' affiliates on residents of the host country, that is, the country in which the affiliates are located.

Macroprudential oversight   Regulatory and supervisory framework of financial institutions aimed at maintaining the safety and soundness of the financial system as a whole (fostering financial stability and minimizing systemic risk).

Market liquidity   Degree to which an asset or security can be bought or sold in the market without affecting its price. Liquidity is characterized by a high level of trading, a tight bid-ask spread, and ample market depth (quantities available for trading). Assets that are easily bought and sold are known as liquid assets.

Microprudential oversight   Regulatory and supervisory framework of individual financial institutions aimed at maintaining the safety and soundness of each institution.

Momentum strategy   Type of trading strategy in which investors buy securities that have recently performed well and sell securities that have recently performed poorly. It is also known as positive-feedback trading.

Money market fund   Collective investment vehicle made up of a pool of funds collected from many investors for the purpose of investing in short-term debt markets (money markets) such as commercial paper and certificates of deposit.

Moral hazard   Tendency of an individual or institution to act less carefully because the consequences of a bad

outcome will be largely shifted to another party. Such behavior is often the result of the other party's inability to observe the actions. For example, financial institutions can be motivated to take excessive risks if they believe the government will step in with support during a crisis and cannot observe the risky behavior and prevent it.

Multinational banking model   Model according to which banks operate through branches and subsidiaries in several host countries. The activities of the bank's foreign affiliates are at least partially locally funded. This model is different from a cross-border banking model in which international banks conduct mostly cross-border business from their home country.

Mutual fund   Collective investment vehicle made up of a pool of funds collected from many investors for the purpose of investing in financial assets such as stocks and bonds.

Net asset value (NAV)   Value of a company's total assets minus its total liabilities. For example, if an investment company has securities and other assets worth $100 million and has liabilities of $10 million, its NAV is $90 million.

Net stable funding ratio (NSFR)   Requirement introduced by Basel III to provide a sustainable maturity structure of assets and liabilities. It requires a minimum amount of stable sources of funding at a bank relative to the liquidity profiles of the assets, as well as to the potential for contingent liquidity needs arising from off-balance-sheet commitments, over a one-year horizon.

Nonbank institution or sector   Financial institution that does not have a full banking license or is not supervised by a national or international banking regulatory agency. These institutions facilitate banking-related financial services, such as investment, risk pooling, contractual savings, and market brokering, and may include money market mutual funds, investment banks, finance companies, insurance firms, pension funds, hedge funds, currency exchanges, and microfinance organizations.

Open-end fund   Type of collective investment vehicle that allows investors the flexibility to add to or redeem money from the fund.

Other depository corporation   Term used in the international methodology of monetary statistics to describe all financial corporations (other than the central bank) that incur liabilities included in broad money (such as traditional banks and money market fund investment funds).

Panel regression   Econometric technique to estimate relationships among variables in a panel data set. A panel data set is two dimensional: one for the time dimension (year, quarter, month) and the other for the cross-sectional dimension (people, firms, countries). Various estimation techniques can be used depending on the nature of these two dimensions.

Portfolio flows   Capital flows into or out of foreign portfolio investments (equity, debt, or other investments).

Price externalities   In the context of financial markets, price externalities are the result of economic agents' decisions to buy or sell assets or to allocate or reallocate their asset portfolios without fully taking into account the impact of their actions on the market price.

Private equity fund   Collective investment vehicle that invests primarily in private equity. Private equity is a broad term that refers to any type of equity participation in which the equity is not freely tradable on a public stock market, such as equities of delisted or nonlisted private and public companies.

Probit model   Statistical binary response model in which the response probability follows a normal distribution and is evaluated as a function of the explanatory variables.

Procyclicality   Tendency of changes in asset prices and capital flows to move in line with macroeconomic business and financial cycles.

R squared (R^2)   Statistical measure that captures how much of the variability in a dependent variable is explained by the variability in the explanatory variables, in the context of a regression model. It ranges between zero and 1, with values closer to 1 implying a better fit of the model.

Redemption   Return of money to an ultimate investor in a fund.

Redemption gate   Mechanism in asset management to slow money outflows and control run risk by imposing quantitative or qualitative restrictions on outflows.

Redemption side pocket   Mechanism in asset management to slow money outflows and control run risk by separating impaired or illiquid securities to keep them from affecting a fund's return until market conditions stabilize.

Redemption suspension   Mechanism in asset management to slow money outflows and control run risk by fully closing a fund to redemptions.

Regression   Statistical technique for modeling and analyzing the relationship between economic variables.

Regulatory arbitrage   Reduction of regulatory capital requirements by taking advantage of differences in regulatory treatment across countries or across types of financial institutions, as well as of differences between economic risk and risk as measured by regulatory guidelines.

Regulatory perimeter   Entities or activities subject to regulation and supervision.

Resolution   Procedures and measures to resolve the situation of an unviable institution in a way that protects its critical functions, government funds, and systemic stability.

Retail investors   Typically small individual investors who buy and sell financial assets for their personal account instead of for another investor, a company, or an organization.

Return chasing   Investor purchases (chasing) of assets or funds that have recently outperformed their peers.

Reverse causality   Two-way causal relationship or a direction of cause and effect contrary to a common presumption.

Ring fencing   Measures imposed by prudential supervisors with the objective of protecting the domestic assets of a bank so they can be seized and liquidated under local law in case of failure of the whole or part of an international banking group.

Risk aversion   Degree to which an investor who, when faced with two investments with the same expected return but different risk characteristics, prefers the one with the lower risk. In other words, it is a measure of an investor's aversion to uncertain outcomes or payoffs.

Risk committee   Committee of the board of directors of a company that is tasked with risk management.

Risk shifting   In this report, actions by a manager that shift risk from shareholders to bond holders. Risk shifting is possible because of limited liability of shareholders.

Risk-weighted assets   Total of all assets held by a bank weighted by credit, market, and operational risk weights according to formulas determined by the national regulator or supervisor. Most regulators and supervisors adopt the Basel Committee on Banking Supervision capital standards in setting formulas for asset risk weights.

Robustness   Regression results whose estimated coefficients change little among several differently specified regressions or among different estimation methods.

Run risk   Risk that many depositors or security holders will suddenly and simultaneously seek to redeem their investments placed with financial intermediaries.

Search for yield   Search by investors for investments with higher returns, usually within the context of a low-interest-rate environment.

Securities lending   Lending of a security by one party (the lender) to another (the borrower) against payment of a fee. Securities lending is typically collateralized with cash or other securities. Reasons for borrowing securities include the desire to establish a short position, dividend arbitrage, and hedging and settlement.

Separate account of an asset management company   Separate account services privately manage the money of institutional investors, including that of corporations, pension funds, insurance companies, sovereign wealth funds, and wealthy individuals. Clients provide an investment mandate, and asset managers manage the money within the mandate for a fee.

Single Resolution Mechanism (SRM)   Second pillar of the European Banking Union—provides for uniform application of a single set of resolution rules, together with access to a Single Resolution Fund by a central authority and an integrated decision-making structure aligning resolution under the SRM with supervision under the Single Supervisory Mechanism.

Single Supervisory Mechanism (SSM)   Common banking supervision framework under the aegis of the European Central Bank for the euro area banks, as proposed by the European Commission in September 2012.

Standard deviation   Measure of the degree of a variable's potential movement. The variance of a variable is constructed by (1) calculating each observation's deviation from the mean, (2) taking squares for each deviation, and (3) calculating the average of the squares. The standard deviation is the square root of the variance. In a regression analysis, standard deviation is computed for each coefficient estimate.

Statistically significant   Not merely the result of chance. For example, if the same policy spurs economic growth at least 95 times in 100 trials, the policy's effect can be said to be statistically significantly different from zero at the 5 percent confidence level.

Subsidiary Separate legal entity that, unlike a branch, is independent of the parent bank and must fulfill regulatory requirements on a stand-alone basis.

Synthetic exchange-traded fund (ETF) Type of ETF offered mainly in Europe. Instead of holding underlying assets directly ("physical ETFs"), synthetic ETF returns are generated through derivatives, especially total return swaps. Synthetic ETFs can be used for various investment strategies, ranging from simple index tracking to leveraged and short-selling strategies.

Systemic risk Risk that the failure of a particular financial institution will cause large losses to other financial institutions, thus threatening the stability of the financial system.

Tail risk Risk of an extremely rare event, in finance often defined as the risk that an asset price will move three standard deviations from its mean.

Transparency Availability of information that allows investors to properly assess risks and returns associated with investing in a country.

Ultimate risk basis Claims allocated to the country in which final risk lies, thereby reflecting risk transfers. See *immediate risk basis*.

Unconventional monetary policy Central bank policy, such as forward guidance on interest rates, long-term provision of liquidity to banks, and large-scale asset purchases, that is not part of the conventional central bank toolkit.

Vector autoregression (VAR) Multivariate models often used in macroeconomics and finance to explore the dynamic relationships among variables. Each endogenous variable has a corresponding (autoregressive) equation, and each VAR is made up of two or more equations, one for each endogenous variable. Because each equation contains its own lags, as well as the lags of the other variables in the system, the model is said to be autoregressive.

Vienna initiative European Bank Coordination ("Vienna") Initiative (EBCI) launched in January 2009 to provide a framework for coordinating the crisis management and crisis resolution of large cross-border banking groups systemically important in emerging Europe. The European Bank for Reconstruction and Development, the IMF, the European Commission, and other international financial institutions initiated a process aimed at addressing the collective action problem. In a series of meetings, the international financial institutions and policymakers from home and host countries met with commercial banks active in emerging Europe to discuss what measures might be needed to reaffirm their presence in the region in general, and more specifically in countries receiving balance of payments support from international financial institutions.

VIX Chicago Board Options Exchange Market Volatility Index, which measures market expectations of financial volatility over the next 30 days. The VIX is constructed from Standard & Poor's 500 option prices.

Wholesale funding Bank funding typically issued in money and capital markets, including interbank deposits, commercial paper, certificates of deposit, repurchase agreements, swaps, and various kinds of bonds. These are typically financed by institutional investors, including other banks.

IMF EXECUTIVE BOARD DISCUSSION SUMMARY

The following remarks were made by the Chair at the conclusion of the Executive Board's discussion of the World Economic Outlook, Global Financial Stability Report, *and* Fiscal Monitor *on April 3, 2015.*

Executive Directors noted that a moderate recovery continues in the global economy, with uneven prospects across countries and regions. Growth in emerging market economies is softening, reflecting an adjustment to weaker medium-term growth expectations, lower commodity prices and exports, and country-specific factors. The outlook for advanced economies shows some signs of improvement on the back of lower oil prices, continued support from accommodative monetary policy stances, and some moderation in the pace of fiscal adjustment. A number of Directors considered that global economic developments might turn out to be more positive than currently expected. A few other Directors emphasized the importance of decisive policy actions to counter the "new mediocre."

Directors noted that global growth should continue to increase gradually as crisis legacies fade and advanced economies benefit from accommodative macroeconomic policies. Emerging market economies are likely to slow further in 2015, but growth should pick up again in 2016 and beyond, as the current setbacks to activity begin to dissipate. Directors agreed that the near-term distribution of risks to global growth has become more balanced, although most noted that it remains tilted to the downside. The decline in oil prices could boost activity more than expected, but geopolitical tensions continue to pose threats, and risks of abrupt shifts in asset prices—including exchange rates—have increased. In some advanced economies, protracted below-target inflation or deflation could affect activity and public and private debt dynamics. A few Directors considered that this risk has diminished. A few others urged greater focus on global imbalances.

Despite the expected improvement in the outlook, Directors broadly agreed that short-term financial stability risks have increased. Oil- and commodity-exporting countries and firms generally face revenue losses and higher risks. Emerging market corporations that have borrowed heavily in U.S. dollars and are not sufficiently hedged are now faced with potential balance sheet pressures from the appreciating U.S. dollar. A retrenchment of over-invested industries and property price declines—especially in China—could spill over to emerging markets more broadly. In advanced economies, the low-interest-rate environment poses challenges for long-term investors, including weaker life insurance companies in Europe. High debt levels and nonperforming loans in the private sector continue to pose headwinds to growth and financial stability in some advanced economies. Recent declines in liquidity in some markets may amplify financial stability risks.

At the same time, Directors also noted important medium-term risks to the global recovery. In emerging market economies, tighter financial conditions or unaddressed supply-side constraints represent significant risks. Growth prospects in advanced economies are held down by aging populations, weak investment, and lackluster productivity growth while sustained weakness in demand could weigh on potential output.

To address these risks and challenges, Directors underscored that boosting actual and potential growth remains a policy priority. In emerging market economies, macroeconomic policy space to support growth remains limited, but lower oil prices will alleviate inflation pressures and could increase fiscal space in oil importers. In oil exporters, adjusting public spending in view of lower fiscal revenues is a priority, although countries with strong financial buffers may adjust more gradually. Better fiscal frameworks with clear medium-term objectives are needed in many countries to anchor fiscal policy and avoid a procyclical policy stance. Directors also emphasized that lower oil prices provide

an opportunity to reform inefficient energy subsidies and provide breathing room for more productive and equitable spending and growth-enhancing tax reforms.

Directors broadly concurred that continued accommodative monetary policy is essential in many advanced economies. To support credit markets, additional measures are needed to restore balance sheet health in the private sector, including in the euro area. At the same time, many Directors noted the limitations and risks of prolonged accommodative monetary policies and divergent monetary stances, and some underscored the need to better understand their implications for emerging market and developing countries. Fiscal policy could be used to support demand and contribute to global rebalancing, for example through infrastructure investment in some advanced economies, while countries constrained by high levels of public debt should pursue growth-friendly reforms affecting the composition of revenues and expenditures. Credible medium-term fiscal consolidation plans are still needed in a number of countries, especially in Japan and the United States.

Directors highlighted the importance of a sound international banking system, and noted that more progress on the implementation of regulatory standards and cross-border resolution is needed. Strengthening microprudential policies and building a macroprudential toolkit remains a priority in many emerging market and developing economies. In advanced economies, the oversight of certain parts of the nonbank financial sector needs to be strengthened, particularly the asset management industry, as well as the life insurance industry in Europe, with better microprudential supervision and stronger emphasis on systemic risk. A number of Directors noted progress in the international regulatory reform agenda and increased efforts to monitor financial risks and build resilience. They cautioned that additional regulation and oversight should be commensurate to the systemic risk posed and take into account both costs and benefits.

Directors emphasized the importance of exchange rate flexibility for emerging markets without currency pegs, while recognizing that measures may be necessary to limit excessive exchange rate volatility. Bolstering resilience to external shocks will also require stronger macroeconomic and macroprudential policy frameworks, and robust prudential regulation and supervision. In China, further progress to gradually shift the composition of demand toward domestic consumption and reduce reliance on credit and investment would help forestall medium-term risks of financial disruption or a sharp slowdown.

Directors called for further structural reforms to raise potential growth. In emerging market and developing economies, the main priorities are removing infrastructure bottlenecks, reforming labor and product markets, strengthening education, easing limits on trade and investment, improving business conditions, and enhancing government services delivery. In advanced economies, strengthening public infrastructure, increasing labor force participation, and enabling innovation and productivity-enhancing investment are key priorities. In the euro area, reforms need to tackle legacy debt overhang, barriers to product market entry, labor market regulations that hamper adjustment, and obstacles to investment activity. In Japan, there is scope to improve service sector productivity and support investment through corporate governance reform.

Directors also stressed that continued strong growth in low income developing countries calls for greater progress in diversification and structural transformation. Key requirements include boosting fiscal positions with stronger revenues and rationalized public spending, strengthening public financial management, achieving greater monetary policy independence, promoting financial deepening, and attracting capital flows. Infrastructure investment, anchored in well-designed debt management strategies, is essential to increase growth potential. Advanced and systemically important emerging economies should play a supportive role in maintaining an enabling external environment for low-income developing countries. Priorities include further trade liberalization, providing development aid and technical assistance, completing the global regulatory reform agenda, and cooperating on international taxation and climate change issues.